

CITY AND COUNTY OF DENVER
STATE OF COLORADO



DENVER
THE MILE HIGH CITY

DEPARTMENT OF PUBLIC WORKS

Contract Documents

Contract Number: 201844162



Rude Park Ballfield and Access Improvements

August 29, 2018



NOTICE OF APPARENT LOW BIDDER

AMERICAN CIVIL CONSTRUCTORS LLC
4901 S. Windermere St.
Littleton, Colorado 80120

The EXECUTIVE DIRECTOR OF PUBLIC WORKS has considered the Bids submitted on **October 4, 2018**, for work to be done and materials to be furnished in and for:

201844162 - Rude Park Ballfield and Access Improvements

as set forth in detail in the Contract Documents for the City and County of Denver, Colorado. It appears that your Bid is fair, equitable, and to the best interest of the City and County; therefore, said Bid is hereby accepted at the bid price contained herein, subject to the approval and execution of the Contract Documents by the City in accordance with the Charter of the City and County of Denver, and to your furnishing the items specified below. The award is based on the total bid items: **Eighty-Five (85) bid items (01 11 00-1 through 32 97 00-01) plus Five (5) allowance account items (A/A 01 through A/A 05)** the total estimated cost thereof being: **One Million, One Hundred Ninety-Four Thousand Six Hundred Ninety-Seven Dollars and Fifty-Five Cents (\$1,194,697.55)**.

It will be necessary for you to appear forthwith at the office of the Department of Public Works, Contract Administration, 201 W. Colfax Ave., Dept 614, Denver, Colorado 80202, to receive the said Contract Documents, execute the same and return them to the Department of Public Works, Contract Administration within the time limit set forth in the Bid Package Documents.

In accordance with the requirements set forth in the Contract Documents, you are required to furnish the following documents:

- a. Insurance Certificates: General Liability and Automotive Liability, Workman's Compensation and Employer Liability;
- b. Payment and Performance Bond along with One original Power of Attorney relative to Performance and/or Payment Bond; and,

All construction Contracts made and entered into by the City and County of Denver are subject to Affirmative Action and Equal Opportunity Rules and Regulations, as adopted by the Manager of Public Works, and each contract requiring payment by the City of one-half million dollars (\$500,000.00) or more shall first be approved by the City Council acting by ordinance and in accordance with Section 3.2.6 of the Charter of the City and County of Denver.

Prior to issuance of Notice to Proceed, all Equal Opportunity requirements must be completed. Additional information may be obtained by contacting the Director of Contract Compliance at (720-913-1700).

Denver Public Works/Office of the Executive Director
201 West Colfax Avenue, Dept 608 | Denver, CO 80202
www.denvergov.org/dpw
p. 720.865.8630 | f. 720.865.8795



NOTICE OF APPARENT LOW BIDDER

CONTRACT NO. 201844162

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The Bid Security submitted with your Bid, will be returned upon execution of the Contract and furnishing of the Performance Bond. In the event you should fail to execute the Contract and to furnish the performance Bond within the time limit specified, said Bid Security will be retained by the City and County of Denver as liquidated damages, and not as a penalty for the delay and extra work caused thereby.

Dated at Denver, Colorado this 24th day of October 2018.

CITY AND COUNTY OF DENVER

By *Eulois Cleckley*
Eulois Cleckley
Executive Director of Public Works

cc: Kristen Moore (CAO), Cynthia Bills (Treasury/Tax Compliance), Imogene Manuelito, (DSBO), Craig Long, (PM), (PW-Aud), File.

Denver Public Works/Office of the Executive Director
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CITY AND COUNTY OF DENVER
STATE OF COLORADO



DENVER
THE MILE HIGH CITY

DEPARTMENT OF PUBLIC WORKS

Bid Form Package

Contract Number: 201844162



Rude Park Ballfield and Access Improvements

August 29, 2018

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

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DENVER

THE MILE HIGH CITY

*This Checklist is provided solely for the assistance of the bidders, and need not be returned by Bidders with your **BID FORM PACKAGE**.*

BIDDER'S CHECKLIST

These forms comprise the Bid Form and Submittal Package. Designated forms must be completed and turned in at the time of Bid Opening. Bidders should refer to the Contract Documents, particularly the Instructions to Bidders, accompanying this package, in completing these forms.

FORM/ PAGE NO.	COMMENTS	COMPLETE
BF-4 – BF-5	a.) Legal name, address, Acknowledgment signature and attestation (if required.)	<input checked="" type="checkbox"/>
BF-6+	a.) Fill in individual bid item dollars and totals in Numerical figures only	<input checked="" type="checkbox"/>
	b.) Complete all blanks	<input checked="" type="checkbox"/>
	c.) Legal name required	
BF-7	a.) Write out bid total or bid totals in words and figures in the blank form space(s) provided	<input checked="" type="checkbox"/>
	b.) Calculate Textura® Construction Payment Management System Fee from chart on pg. BF-3 and write % and fee in the space provided	
BF-8	a.) List all subcontractors who are performing work on this project	<input checked="" type="checkbox"/>
BF-9 – BF-10	a.) Fully complete List of Proposed Minority /Woman Business Enterprise Bidders, Subcontractors, Suppliers, Manufacturers, or Brokers – check appropriate boxes.	<input checked="" type="checkbox"/>
BF-11	a.) Complete all blanks	<input checked="" type="checkbox"/>
	b.) If Addenda have been issued, complete bottom section.	<input checked="" type="checkbox"/>
BF-12	a.) Complete appropriate sections - signature(s) required.	<input checked="" type="checkbox"/>
	b.) If corporation, then corporate seal required.	<input checked="" type="checkbox"/>
BF-13	a.) Fully complete Commitment to Participation	<input checked="" type="checkbox"/>
BF-16	a.) If applicable, fully complete Joint Venture Affidavit (Submit 10 days prior to Bid Opening date)	<input type="checkbox"/>
BF-17 – BF-19	a.) If applicable, fully complete Joint Venture Eligibility Form (Submit 10 days prior to Bid Opening date)	<input type="checkbox"/>
BF-20	a.) Fill in all Bid Bond blanks	<input checked="" type="checkbox"/>
	b.) Signatures required	<input checked="" type="checkbox"/>
	c.) Corporate Seal if required	<input checked="" type="checkbox"/>
	d.) Dated	<input checked="" type="checkbox"/>
	e.) Attach Surety Agents Power of Attorney	<input checked="" type="checkbox"/>
	or Certified or cashier's check made out to the Manager of Revenue referencing Bidder's Company and Contract Number.	
BF-21- BF-24	a.) Each bidder, as a condition of responsiveness to this solicitation, shall <u>complete and return</u> the "Diversity and Inclusiveness in City Solicitations Information Request Form" with their Bid.	<input checked="" type="checkbox"/>

Textura® Construction Payment Management System (CPM System)

Contractor recognizes and agrees that it shall be required to use the Textura® Construction Payment Management System (CPM System) for this Project. All fees associated with the CPM System are to be paid by the Contractor for billings for work performed. Bidders are required, when preparing a bid, to enter the price of the CPM service on the line provided for the service. The fee is all inclusive of all subcontractor, project and subscription fees associated with the CPM system. The bidder will calculate the fee based on a percentage of their total bid, and then should include it on the line item provided in the bid form labeled “Textura® Construction Payment Management System Fee”. This expense becomes part of the contract and billable to the City. All costs including but not limited to costs associated with training, entering data or utilizing Textura other than the Textura Construction Payment Management System Fee are overhead and shall not be reimbursed by the City. Contractor is responsible for any tax on Textura fee. As with other taxes, the City will not reimburse Contractor for this cost and therefore this cost should be included in Contractor’s bid. Textura will invoice the awarded contractor directly.

Project Value	Project Fee (GC + Sub Usage)
\$250,000 - \$499,999.99	\$1,625
\$500,000 - \$999,999.99	\$3,250
\$1,000,000 - \$2,999,999.99	\$5,850
\$3,000,000 - \$4,999,999.99	\$9,100
\$5,000,000 - \$9,999,999.99	\$12,220
\$10,000,000 - \$19,999,999.99	\$20,345
\$20,000,000 - \$49,999,999.99	\$32,500
\$50,000,000 - \$99,999,999.99	\$48,750
\$100,000,000 - \$199,999,999.99	\$69,095
\$200,000,000 - \$299,999,999.99	\$85,345
\$300,000,000 - \$399,999,999.99	\$109,720
\$400,000,000 - \$499,999,999.99	\$142,220
\$500,000,000 - \$999,999,999.99	\$162,500
\$1,000,000,000 - \$1,999,999,999.99	\$345,345
\$2,000,000,000 - \$4,999,999,999.99	\$650,000
\$5,000,000,000 - \$9,999,999,999.99	\$1,015,625
\$10,000,000,000 or greater	\$1,503,125

For more information:

<http://www.denvergov.org/content/denvergov/en/contract-administration/bidding-process.html>

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

BID FORM AND SUBMITTAL PACKAGE ACKNOWLEDGMENT

CONTRACT NO. 201844162

RUDE PARK BALLFIELD and ACCESS IMPROVEMENTS

BIDDER: American Civil Constructors LLC dba ACC Mountain West
(Legal Name per Colorado Secretary of State)

ADDRESS: 4901 S. Windermere St.
Littleton, CO 80120

The undersigned bidder states that the undersigned bidder has received and had an opportunity to fully and thoroughly examine a complete set of the Contract Documents for **Contract No. 201844162, Rude Park Ballfield and Access Improvements**, made available to the undersigned bidder pursuant to Notice of Invitation for Bids dated August 29, 2018.

The undersigned bidder acknowledges that a complete and final set of the Contract Documents for the referenced Project, the components of which are identified below, are bound and maintained as the record set of Contract Documents by the Contract Administration Division of the Department of Public Works and that this Record Set is available for examination by the undersigned bidder.

The undersigned bidder, having thoroughly examined each of the components identified below and contained in Contract Documents, HEREBY SUBMITS THIS BID FORM AND SUBMITTAL PACKAGE, fully understanding that the Contract Documents, as defined in Paragraph 1 of the contract, including this executed Bid Form and Submittal Package, constitute all of the terms, conditions and requirements upon which this submission is based and further understanding that, by submission of this Bid Form and Submittal Package, the City shall rely on the representations and commitments of the undersigned bidder contained herein.

The following completed documents comprising this Bid Form and Submittal Package will be included with and, by this reference, are expressly incorporated into the Contract Documents specified at Paragraph 1 of the Contract:

- Bid Form and Submittal Package Acknowledgment Form
- Bid Form
- List of Proposed Minority/Woman Owned Business Enterprise(s)
- Commitment to Minority/Woman Owned Business Enterprise Participation
- Minority/Woman Owned Business Enterprise(s) of Intent
- Joint Venture Affidavit (if applicable)
- Joint Venture Eligibility Form (if applicable)
- Bid Bond
- Certificate of Insurance

The following designated documents constitute that portion of the Contract Documents made available by the Notice of Invitation for Bids, but not included in the Bid Form and Submittal Package:

Notice of Invitation for Bids
Instructions to Bidders
Addenda (as applicable)
Equal Employment Opportunity Provisions (Appendix A and Appendix F)
Contract Form
General Contract Conditions
Special Contract Conditions
Performance and Payment Bond
Notice to Apparent Low Bidder
Notice to Proceed
Contractor's Certification of Payment Form
Final/Partial Lien Release Form
Final Receipt
Change Orders (as applicable)
Federal Requirements (as applicable)
Prevailing Wage Rate Schedule(s)
Technical Specifications
Contract Drawings
Accepted Shop Drawings

The undersigned bidder expressly assumes responsibility for the complete contents of these designated documents as bound together with the Bid Form and Submittal Package submitted herewith and designated the Contract Documents.

IN WITNESS WHEREOF, the undersigned bidder has signed personally or by duly authorized officer or agent and duly attested.

BIDDER:

Name: Randy L. Maher
By: Randy L. Maher
Title: President

ATTEST:

By: [Signature]

[SEAL]

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

BID FORM

CONTRACT NO. 201844162
RUDE PARK BALLFIELD and ACCESS IMPROVEMENTS

BIDDER American Civil Constructors LLC dba ACC Mountain West
(Legal Name per Colorado Secretary of State)

TO: The Manager of Public Works
City and County of Denver
c/o Contract Administration
201 West Colfax, Dept. 614
Denver, Colorado 80202

The Undersigned Bidder, having examined the plans, technical specifications, and remainder of the proposed Contract Documents as designated and enumerated in the General and Special Contract Conditions and any and all addenda thereto; having investigated the location of and conditions affecting the proposed Work; and being acquainted with and fully understanding the extent and character of the Work covered by this bid, and all factors and conditions affecting or which may be affected by Work, HEREBY SUBMITS THIS BID, pursuant to an advertisement of a Notice of Invitation for Bids as published on **August 29, 2018**, to furnish all required materials, tools, appliances, equipment and plant; to perform all necessary labor and to undertake and complete: **Contract No. 201844162, Rude Park Ballfield and Access Improvements**, in Denver, Colorado, in full accordance with and conformity to the Plans, Technical Specifications, and Contract Documents hereto attached or by reference made a part hereof, at and for the following price(s) set forth on this Bid Form.

The following documents, which taken as a whole constitute the Contract Documents for this Project, and which are incorporated herein, by reference, were made available to the Bidder as provided in the Advertisement of Notice of Invitation for Bids, were received by the bidder, and form the basis for this bid:

Advertisement of Notice of Invitation for Bids
Instructions to Bidders
Commitment to M/WBE Participation
Article III, Divisions 1 and 3 of Chapter 28, D.R.M.C.
Bid Bond
Addenda (as applicable)
Equal Employment Opportunity Provisions (Appendix A and Appendix F)
Bid Form
Contract Form
General Contract Conditions
Special Contract Conditions
Performance and Payment Bond
Notice to Apparent Low Bidder
Notice to Proceed
Contractor's Certification of Payment Form
Final/Partial Lien Release Form
Final Receipt
Change Orders (as applicable)
Federal Requirements (as applicable)
Prevailing Wage Rate Schedule(s)
Technical Specifications
Contract Drawing
Accepted Shop Drawings
Certificate of Insurance

Item No.	Description and Price	Estimated Quantity	Estimated Cost
01 11 00-1	Mobilization at the unit price of \$ <u>165,000-</u> per Lump Sum.	1 LS	\$ <u>165,000.00</u>
01 56 39-1	Tree Protection at the unit price of \$ <u>120-</u> per Each.	5 EA	\$ <u>600.00</u>
01 57 13-1	Erosion Control Plan, Implementation and Permitting at the unit price of \$ <u>6,000-</u> per Lump Sum.	1 LS	\$ <u>6,000.00</u>
01 57 13-2	Construction Fence at the unit price of \$ <u>4.50</u> per Linear Feet.	1,795 LF	\$ <u>8,077.50</u>
01 57 13-3	Silt Fence at the unit price of \$ <u>4.50</u> per Linear Feet.	463 LF	\$ <u>2,083.50</u>
01 57 13-4	Stabilized Construction Staging Area at the unit price of \$ <u>15.75</u> per Square Yard.	225 SY	\$ <u>3,543.75</u>
01 57 13-5	Vehicle Tracking Control at the unit price of \$ <u>2,000-</u> per Each.	1 EA	\$ <u>2,000.00</u>
01 57 13-6	Concrete Washout Area at the unit price of \$ <u>1,725-</u> per Each.	1 EA	\$ <u>1,725.00</u>
01 57 13-7	Storm Drain Inlet Protection at the unit price of \$ <u>450-</u> per Each.	3 EA	\$ <u>1,350.00</u>
01 74 19-1	Final MMP, Implementation, and qualified environmental person at the unit price of \$ <u>6,100-</u> per Lump Sum.	1 LS	\$ <u>6,100.00</u>
02 41 00-1	Salvage Bleachers at the unit price of \$ <u>500-</u> per Each.	1 EA	\$ <u>500.00</u>
02 41 00-2	Demolition of bleacher pad, paving, stairs, footings, curbs at the unit price of \$ <u>120-</u> per Cubic Yard.	295 CY	\$ <u>35,400.00</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
02 41 00-3	Demolition of Building at the unit price of \$ <u>5,900-</u> per Each.	1 EA	\$ <u>5,900.00</u>
02 41 00-4	Demolition of Asphalt at the unit price of \$ <u>18-</u> per Square Yard.	177 SY	\$ <u>3,186.00</u>
02 41 00-5	Demolition of Backstop System at the unit price of \$ <u>36-</u> per Linear Feet.	121 LF	\$ <u>4,356.00</u>
02 41 00-6	Demolition of Fencing System at the unit price of \$ <u>8-</u> per Linear Feet.	795 LF	\$ <u>6,360.00</u>
02 41 00-7	Demolition of Dugouts at the unit price of \$ <u>3,290-</u> per Each.	2 EA	\$ <u>6,580.00</u>
02 41 00-8	Demolition of Construction Access Route at the unit price of \$ <u>1.50</u> per Square Feet.	4,940 SF	\$ <u>7,410.00</u>
03 30 00-1	2' Ht Concrete Wall at the unit price of \$ <u>730-</u> per Cubic Yard.	194 CY	\$ <u>141,620.00</u>
03 30 00-2	Concrete Stairs, Cheekwall, and Landings at the unit price of \$ <u>748-</u> per Cubic Yard.	24 CY	\$ <u>17,952.00</u>
05 50 00-1	Railing at Stairs at the unit price of \$ <u>210-</u> per Linear Feet.	76 LF	\$ <u>15,960.00</u>
26 05 00-1	Reset Utilities/ Electrical Work at the unit price of \$ <u>34,000-</u> per Lump Sum.	1 LS	\$ <u>34,000.00</u>
26 05 00-2	Electrical Cabinet and Pad at the unit price of \$ <u>33,350-</u> per Each.	1 EA	\$ <u>33,350.00</u>
26 05 00-3	New Scoreboard and Supports at the unit price of \$ <u>27,900-</u> per Each.	1 EA	\$ <u>27,900.00</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
26 05 00-4	Coordinate with Xcel at the unit price of \$ <u>350-</u> per Lump Sum.	1 LS	\$ <u>350.00</u>
26 05 33-1	Conduit and wire to scoreboard at the unit price of \$ <u>19.60</u> per Linear Feet.	400 LF	\$ <u>7,840.00</u>
26 22 13-1	Exterior Grade lighting transformer at the unit price of \$ <u>3,750-</u> per Lump Sum.	1 LS	\$ <u>3,750.00</u>
31 11 00-1	Clearing and Grubbing at the unit price of \$ <u>7,750-</u> per Lump Sum.	1 LS	\$ <u>7,750.00</u>
31 20 00-1	Earthwork - Moving of on-site material at the unit price of \$ <u>10.55</u> per Cubic Yard.	4,619 CY	\$ <u>48,730.45</u>
31 20 00-2	Soil Import -Haul and place at the unit price of \$ <u>15.80</u> per Cubic Yard.	3,937 CY	\$ <u>62,204.60</u>
31 20 00-3	CABI for work within Area of Environmental Concern and Management of RACS using Hand Methods at the unit price of \$ <u>1,000-</u> per Daily.	10 Daily	\$ <u>10,000.00</u>
31 20 00-4	Soil Export in Area of Environmental Concern - Handle and dispose of all spoils from earth disturbing activities at the unit price of \$ <u>125-</u> per Cubic Yard.	32 CY	\$ <u>4,000.00</u>
31 20 00-5	Earthwork In Area of Environmental Concern - Placing clean backfill at the unit price of \$ <u>25-</u> per Cubic Yard.	32 CY	\$ <u>800.00</u>
31 20 00-6	Fine Grade at Field at the unit price of \$ <u>.15</u> per Square Feet.	62,305 SF	\$ <u>9,345.75</u>
31 20 00-7	Adjust MWW manhole at the unit price of \$ <u>1,800-</u> per Each.	2 EA	\$ <u>3,600.00</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
32 12 16-1	Asphalt Parking Lot Paving at the unit price of \$ <u>42.50</u> per Square Yard.	188 SY	\$ <u>7,990.00</u>
32 13 13-1	Concrete Pavement - 4" depth at the unit price of \$ <u>5.75</u> per Square Feet.	6,695 SF	\$ <u>38,496.25</u>
32 13 13-2	Concrete Pavement - 6" depth at the unit price of \$ <u>6.90</u> per Square Feet.	1,280 SF	\$ <u>8,832.00</u>
32 13 13-3	Concrete Pavement - 6" depth at Construction Access Route at the unit price of \$ <u>6.90</u> per Square Feet.	4,940 SF	\$ <u>34,086.00</u>
32 13 13-4	Mow Edge, Mow Band, or Valley Pan at the unit price of \$ <u>14.95</u> per Linear Feet.	1,325 LF	\$ <u>19,808.75</u>
32 13 13-5	Curb and Gutter-1' Catch Pan, All types at the unit price of \$ <u>24-</u> per Linear Feet.	707 LF	\$ <u>16,968.00</u>
32 13 13-6	ADA Curb Ramp at the unit price of \$ <u>1,150-</u> per Each.	1 EA	\$ <u>1,150.00</u>
32 15 40-1	Stabilized Crusher Fines Warning Track at the unit price of \$ <u>2.50</u> per Square Feet.	7,100 SF	\$ <u>17,750.00</u>
32 17 23-1	Striping at the unit price of \$ <u>1,000-</u> per Lump Sum.	1 LS	\$ <u>1,000.00</u>
32 18 00-1	Skinned Infield at the unit price of \$ <u>2.30</u> per Square Feet.	16,925 SF	\$ <u>38,927.50</u>
32 31 13-1	20' High Backstop System - Black Vinyl Chainlink at the unit price of \$ <u>350-</u> per Linear Feet.	61 LF	\$ <u>21,350.00</u>
32 31 13-2	10' High Backstop System - Black Vinyl Chainlink at the unit price of \$ <u>240-</u> per Linear Feet.	60 LF	\$ <u>14,400.00</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
32 31 13-3	8' High Fencing - Black Vinyl Chainlink at the unit price of \$ <u>44-</u> per Linear Feet.	795 LF	\$ <u>34,980.00</u>
32 31 13-4	24' High Foul Pole w/ Mesh Panels - Painted Yellow at the unit price of \$ <u>2,100-</u> per Each.	2 EA	\$ <u>4,200.00</u>
32 31 13-5	4' Man Gates - Black Vinyl Chainlink at the unit price of \$ <u>525-</u> per Each.	2 EA	\$ <u>1,050.00</u>
32 31 13-6	16' Maintenance Gates - Black Vinyl Chainlink at the unit price of \$ <u>2,850-</u> per Each.	1 EA	\$ <u>2,850.00</u>
32 31 13-7	Prefabricated Dugout at the unit price of \$ <u>20,700-</u> per Each.	2 EA	\$ <u>41,400.00</u>
32 31 13-8	Yellow Protective Fence Cap at the unit price of \$ <u>8.50</u> per Linear Feet.	420 LF	\$ <u>3,570.00</u>
32 31 13-9	Green Protective Fence Cap at the unit price of \$ <u>8.50</u> per Linear Feet.	410 LF	\$ <u>3,485.00</u>
32 33 00-1	Bench at Dugout at the unit price of \$ <u>1,600-</u> per Each.	2 EA	\$ <u>3,200.00</u>
32 33 00-2	Field Lock Box at the unit price of \$ <u>1,500-</u> per Each.	1 EA	\$ <u>1,500.00</u>
32 33 00-3	Field Equipment (bases, pitching rubber, etc) at the unit price of \$ <u>1,650-</u> per Lump Sum.	1 LS	\$ <u>1,650.00</u>
32 80 00-1	RB 1806PRS SAM w/ plstc nozz spray head at the unit price of \$ <u>28-</u> per Each.	230 EA	\$ <u>6,440.00</u>
32 80 00-2	RB 1812PRS SAM w/ plstc nozz spray head at the unit price of \$ <u>38-</u> per Each.	26 EA	\$ <u>988.00</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
32 80 00-3	Rain Bird 5006 Rotor at the unit price of \$ <u>60-</u> per Each.	21 EA	\$ <u>1,260.00</u>
32 80 00-4	Rain Bird Falcon Rotor at the unit price of \$ <u>57-</u> per Each.	8 EA	\$ <u>456.00</u>
32 80 00-5	Rain Bird 8005-SS Rotor at the unit price of \$ <u>85-</u> per Each.	46 EA	\$ <u>3,910.00</u>
32 80 00-6	Rain Bird PEB - 1" valve at the unit price of \$ <u>655-</u> per Each.	3 EA	\$ <u>1,965.00</u>
32 80 00-7	Rain Bird PEB - 1.5" valve at the unit price of \$ <u>675-</u> per Each.	10 EA	\$ <u>6,750.00</u>
32 80 00-8	Rain Bird PEB - 2" valve at the unit price of \$ <u>705-</u> per Each.	11 EA	\$ <u>7,755.00</u>
32 80 00-9	Poly Lateral - 1" 100#NSF at the unit price of \$ <u>3.70</u> per Linear Feet.	2,830 LF	\$ <u>10,471.00</u>
32 80 00-10	Poly Lateral - 1.5" 100#NSF at the unit price of \$ <u>4.20</u> per Linear Feet.	1,970 LF	\$ <u>8,274.00</u>
32 80 00-11	Poly Lateral - 2" 100#NSF at the unit price of \$ <u>4.50</u> per Linear Feet.	915 LF	\$ <u>4,117.50</u>
32 80 00-12	CL200 PVC Lateral - 2.5" at the unit price of \$ <u>4.60</u> per Linear Feet.	130 LF	\$ <u>598.00</u>
32 80 00-13	CL200 PVC Lateral - 3" at the unit price of \$ <u>5.80</u> per Linear Feet.	430 LF	\$ <u>2,494.00</u>
32 80 00-14	CL200RT PVC Mainline 3" at the unit price of \$ <u>11.10</u> per Linear Feet.	1,000 LF	\$ <u>11,100.00</u>
32 80 00-15	CL160 PVC Sleeve 2" at the unit price of \$ <u>16.15</u> per Linear Feet.	50 LF	\$ <u>807.50</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
32 80 00-16	CL160 PVC Sleeve 4" at the unit price of \$ <u>17.70</u> per Linear Feet.	25 LF	\$ <u>442.50</u>
32 80 00-17	CL160 PVC Sleeve 6" at the unit price of \$ <u>20.65</u> per Linear Feet.	40 LF	\$ <u>826.00</u>
32 80 00-18	AWG Wire #12 at the unit price of \$ <u>.19</u> per Linear Feet.	15,000 LF	\$ <u>2,850.00</u>
32 80 00-19	18" Wire trench with locator tape at the unit price of \$ <u>4-</u> per Linear Feet.	500 LF	\$ <u>2,000.00</u>
32 80 00-20	Poly Lateral Piping Repair at the unit price of \$ <u>210-</u> per Each.	4 EA	\$ <u>840.00</u>
32 80 00-21	Mainline Piping Repair (Tie In) at the unit price of \$ <u>1,500-</u> per Each.	1 EA	\$ <u>1,500.00</u>
32 80 00-22	Mini-Click on Post at the unit price of \$ <u>150-</u> per Each.	1 EA	\$ <u>150.00</u>
32 80 00-23	Gate Valve - 3" at the unit price of \$ <u>460-</u> per Each.	4 EA	\$ <u>1,840.00</u>
32 80 00-24	Buckner 14LT Quick Coupler at the unit price of \$ <u>225-</u> per Each.	7 EA	\$ <u>1,575.00</u>
32 91 20-1	Strip, stockpile and respread topsoil at the unit price of \$ <u>14-</u> per Cubic Yard.	750 CY	\$ <u>10,500.00</u>
32 92 23-1	Bluegrass Sod and Soil Prep at the unit price of \$ <u>.66</u> per Square Feet.	66,500 SF	\$ <u>43,890.00</u>
32 93 00-1	English Oak-2" Cal at the unit price of \$ <u>505-</u> per Each.	3 EA	\$ <u>1,515.00</u>
32 93 00-2	Kentucky Coffeetree- 2" Cal at the unit price of \$ <u>505-</u> per Each.	3 EA	\$ <u>1,515.00</u>

Item No.	Description and Price	Estimated Quantity	Estimated Cost
32 93-00-3	Pacific Maple- 2" Cal at the unit price of \$ <u>490-</u> per Each.	1 EA	\$ <u>490.00</u>
32 93 00-4	Coral Beauty Cotoneaster-#5 at the unit price of \$ <u>56-</u> per Each.	45 EA	\$ <u>2,520.00</u>
32 93 00-5	Emerald and Gold Euonymus-#5 at the unit price of \$ <u>48-</u> per Each.	50 EA	\$ <u>2,400.00</u>
32 93-00-6	English Ivy-#1 at the unit price of \$ <u>18-</u> per Each.	20 EA	\$ <u>360.00</u>
32 97 00-1	Landscape Maintenance at the unit price of \$ <u>8,000-</u> per Lump Sum.	1 LS	\$ <u>8,000.00</u>
Allowance Account			
A/A 01	Mobilization for Mechanical Excavation by Abatement Contractor at the unit price of <u>\$10,000.00</u> per Lump Sum.	1 LS	\$ <u>10,000.00</u>
A/A 02	RACS management by CABI for mechanical excavation work within Area of Environmental Concern at the unit price of <u>\$500.00</u> per Daily.	10 Daily	\$ <u>5,000.00</u>
A/A 03	Mechanical Excavation within Area of Environmental Concern at the unit price of <u>\$60.00</u> per Cubic Yard.	64 CY	\$ <u>3,840.0</u>
A/A 04	Soil Export-Haul chemically impacted soil from Area of Environmental Concern to DADS at the unit price of <u>\$50.00</u> per Cubic Yard.	64 CY	\$ <u>3,200.00</u>
A/A 05	Soil Import - Backfill in Area of Environmental Concern at the unit price of <u>\$35.00</u> per Cubic Yard.	64 CY	\$ <u>2,240.00</u>

Bid Items Total Amount (01 11 00-1 through 32 97 00-1 (Eighty-Five [85]) total bid items), plus (Five [5]) allowance account items (A/A 01 through A/A 05)

\$ 1,188,847.55

Textura ® Fee from table on Page BF-3 (based on Bid Items Total Amount)

\$ 5,850.00

Bid Items Total Amount plus Textura® Fee equals Total Bid Amount

\$ 1,194,697.55

Total Bid Amount:

One million one hundred ninety four thousand six hundred ninety seven dollars and fifty five cents

Dollars (\$ 1,194,697.55)

If the Manager mails a written Notice of Apparent Low Bidder, addressed to the Bidder's business address stated on this Bid Form, the Undersigned Bidder shall, in accordance with the Contract Documents, be ready to, and shall, within five (5) days after the date of the Notice: (i) execute the attached form of Contract in conformity with this bid; (ii) furnish the required proofs of insurance; and (iii) furnish the required bond or bonds in the sum of the full amount of this bid, executed by a surety company acceptable to the Manager.

The Fidelity and Deposit Company of Maryland, a corporation of the State of NY, is hereby offered as Surety on said bond. If such surety is not approved by the Manager, another and satisfactory surety company shall be furnished.

Enclosed with this bid is a bid guarantee, as defined in the attached Instructions to Bidders, in the amount of 5% of amount bid. The Undersigned Bidder agrees that the entire amount of this bid guarantee is to be paid to and become the property of the City as liquidated damages, and not as a penalty, if: (i) the bid is considered to be the best by the City; (ii) the City notifies the Undersigned Bidder that it is the Apparent Low Bidder; and (iii) the Undersigned Bidder fails to execute the Contract in the form prescribed or to furnish the required bond and proofs of insurance, within five (5) days after the date of such notification.

The following persons, firms or corporations are interested with the Undersigned Bidder in this bid:

Name: N/A Name: _____

Address: _____ Address: _____

If there are no such persons, firms, or corporations, please so state in the following space:

N/A

The Undersigned Bidder proposes to subcontract the following Work in accordance with General Contract Conditions, Title 5, SUBCONTRACTS, and represents that, to the greatest degree practical, all subcontractors known at the time of bid submittal have been identified.

Item of Work	Percent (%) of Total; Work	Proposed Subcontractor and Address
Asphalt	.5%	Metro Pavers PO Box 601 Henderson, CO 80640
Concrete	20.6%	Alpine Custom Concrete, Inc. PO Box 33531 Denver, CO 80233
Fencing	10.1%	Ideal Fencing Corp. 5795 Ideal Dr. Erie, CO 80516
Sod	2%	Korby Sod LLC 2406 E. County Rd 60 Wellington, CO 80549
Railing	1%	K+K Custom Fabrication 3497 S. Zuni St. Sheridan, CO 80110
Electrical	5.8%	ARRCON Electric Inc. 7060 E. 54th Pl, Commerce City, CO 80022

(Copy this page if additional room is required.)



DENVER
OFFICE OF ECONOMIC
DEVELOPMENT

**List of Proposed
MWBE
Bidders, Subcontractors,
Suppliers (Manufacturers) or
Brokers**

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit
201 W. Colfax Ave. Dept. 907
Denver, CO 80202
Phone: 720-913-1999
D3BO@denvergov.org

City & County of Denver Contract No.: 201844162

The undersigned Bidder proposes to utilize all listed firms. The following MWBE(s) firms listed are CURRENTLY certified by the City and County of Denver. Only the level of MWBE participation listed at the bid opening will count toward satisfaction of the project goal. Only bona fide commissions may be counted for Brokers. MWBE prime bidders must detail their bid information below. Please copy and attach this page to list additional MWBE.

Prime Bidder

Business Name: American Civil Constructors LLC dba ACC Mountain West

Address: 4901 S. Windermere St. Littleton, CO 80120 Contact Person: Amy Levine

Type of Service: General Contractor Dollar Amount: \$: _____ Percent of Project: _____

Certified MWBE Prime Bidder

Business Name: _____

Address: _____ Contact Person: _____
Type of Service: _____ Dollar Amount: \$: _____ Percent of Project: _____

Subcontractors, Suppliers Manufacturers or Brokers (check one box)

Subcontractor (✓) Supplier (✓) Manufacturer (✓) Broker (✓)

Business Name: Metro Pavers

Address: Po Box 601 Henderson, CO 80640 Type of Service: Asphalt

Contact Person: Chad Anema Dollar Amount: \$: 6,929.65 Percent of Project: 5%

Subcontractor (✓) Supplier (✓) Manufacturer (✓) Broker (✓)

Business Name: Alpine Custom Concrete, Inc.

Address: Po Box 33531 Denver, CO 80233 Type of Service: Concrete

Contact Person: Mary Freske Dollar Amount: \$: 246,657.00 Percent of Project: 20.6%

Subcontractor (✓) Supplier (✓) Manufacturer (✓) Broker (✓)

Business Name: _____

Address: _____ Type of Service: _____
Contact Person: _____ Dollar Amount: \$: _____ Percent of Project: _____

Rev 031816JE

Subcontractors, Suppliers Manufacturers or Brokers (check one box)				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Name:				
Address:		Type of Service:		
Contact Person:		Dollar Amount: \$:	Percent of Project	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Rev 031816JE

The undersigned Bidder hereby certifies that the aforementioned subcontractors and suppliers have full knowledge that their names have been offered as subcontractors and suppliers for the work, and the Bidder further certifies that the dollar amount of work to be performed by the aforementioned M/WBE(s) was furnished to the Bidder prior to the bid opening. The undersigned Bidder agrees that after the bid opening, it shall submit to the City an executed and completed W/MBE "Letter of Intent" in three working days (3) on each of its M/WBE subcontractors. The "Letter of Intent" form is contained in the Contract Documents.

The undersigned Bidder acknowledges the right of the City to reject any or all bids submitted, to waive informalities in bids and to re-advertise this Project for bids.

The undersigned certifies that it has carefully checked all works and figures and all statements made in these Bid Forms.

This bid is submitted upon the declaration that neither, I (we), nor, to the best of my (our) knowledge, none of the members of my (our) firm or company have either directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this bid.

Business Address of Bidder: 4901 S. Windermere St.

City, State, Zip Code: Littleton, CO 80120

Telephone Number of Bidder: 303 795-2582 Fax No. 303 795-3249

Social Security or Federal Employer ID Number of Bidder: 84-0684692

Name and location of the last work of this kind herein contemplated upon which the Bidder was engaged:
Lowry Parks - Ongoing

For information relative thereto, please refer to:

Name: Roger Wingate

Title: Project Manager

Address: Lowry Redevelopment Authority 130 Rampart Way, Suite 225 Denver, CO 80230

The undersigned acknowledges receipt, understanding, and full consideration of the following addenda to the Contract Documents:

Addenda Number 1 Date 9-6-18

Addenda Number 2 Date 9-20-18

Addenda Number _____ Date _____

Dated this 4th day of October, 2018.

Signature of Bidder:

If an Individual: _____ doing business
as _____.

If a Partnership: _____
by: _____ General Partner.

If a Corporation: American Civil Constructors LLC dba ACC Mountain West
a Colorado Corporation,
by: Randy Under, its President.

Attest: 
Secretary _____ (Corporate Seal)

If a Joint Venture, signature of all Joint Venture participants.

Firm: _____
Corporation (), Partnership () or () Limited Liability Company

By: _____ (If a Corporation)
Attest: _____
Title: _____ Secretary (Corporate Seal)

Firm: _____
Corporation (), Partnership () or () Limited Liability Company

By: _____ (If a Corporation)
Attest: _____
Title: _____ Secretary (Corporate Seal)

Firm: _____
Corporation (), Partnership () or () Limited Liability Company

By: _____ (If a Corporation)
Attest: _____
Title: _____ Secretary (Corporate Seal)



DENVER
OFFICE OF ECONOMIC
DEVELOPMENT

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit
201 W. Colfax Ave. Dept. 907
Denver, CO 80202
Phone: 720-913-1999
DSBO@denvergov.org

COMMITMENT TO MWBE PARTICIPATION

**The undersigned has satisfied the MWBE participant requirements in the following manner
(Please check the appropriate box):**

The Bidder/Proposer is committed to the minimum 16 % **MWBE** utilization on the project, and will submit Letters of Intent (LOI) for each subcontractor/subconsultant listed in the Bid Forms as follows:
Hard Bids: Three (3) business days after the bid opening.
Request for Proposals/Qualifications: With the proposal when due.
Compliance Plans: With each task/work order

The Bidder/Proposer is unable to meet the project goal of _____% **MWBE**, but is committed to a minimum of _____% **MWBE** utilization on the project. The Bidder/Proposer understands that they must submit a detailed statement of their good faith effort under sealed bid procedures, as a matter of responsiveness, or with initial proposals, under contract negotiation procedures; or no later than **three (3)** days after bid opening as a matter of responsibility as in accordance with DRMC Section 28-62 and 28-67 of Ordinance 85 to the Division of Small Business Opportunity.

The Bidder/Proposer is a certified **MWBE** in good standing with the City and is committed to self-perform a minimum of _____% of the work on the contract.

Bidder/Proposer (Name of Firm): American Civil Constructors LLC dba ACC Mountain West

Firm's Representative (Please print): Randy Maher

Signature (Firm's Representative): Randy Maher

Title: President

Address: 4901 S. Windermere St.

City: Littleton State: CO Zip: 80120

Phone: 303 795-2582 Fax: 303 795-3249 Email: alevine@accbuil.com

A copy of the MWBE Certification letter must be attached to each Letter of Intent (LOI).



DENVER
OFFICE OF ECONOMIC
DEVELOPMENT

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit
201 West Colfax Ave., Dept. 807
Denver, CO 80202
Phone: 720-613-1989

LETTER OF INTENT (LOI)
INSTRUCTIONS FOR COMPLETION & SUBMISSION:

- All lines must be completed or marked N/A for Not Applicable
- Certification Letter must be submitted with LOI
- Submit the attached completed checklist with this letter
- Email to dboc@denvergov.org.
- FOR RFPs and RFQs: LOIs should be included with Submittal

Contract No.: 201844162		Project Name: Rude Park Ballfield + Access Improvements	
A. The Following Section is To Be Completed by the Bidder/Consultant This Letter of Intent Must be Signed by the Bidder/Consultant and MWBE, SBE, EBE or DBE			
Name of Bidder/Consultant: American Civil Constructors LLC dba ACC Mountain West		Self-Performing: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Phone: 303 795-2582
Contact Person: Amy Levine	Email: alevine@accbuild.com	Fax: 303 795-3249	
Address: 4901 S. Windermere St	City: Littleton	State: CO	Zip: 80120
B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any Tier This Letter of Intent Must be Signed by the MWBE, SBE, EBE or DBE and Bidder/Consultant			
Name of Certified Firm: Alpine Custom Concrete, Inc.		Phone: 720 917 7600	
Contact Person: Mary Reske	Email: Mary@alpinecc.com	Fax: 303 457 3906	
Address: RB33531	City: Denver	State: CO	Zip: 80233
Please check the designation which applies to the certified firm:		MWBE <input checked="" type="checkbox"/>	SBE <input checked="" type="checkbox"/>
		EBE <input type="checkbox"/>	DBE (N) <input checked="" type="checkbox"/>
Indirect Utilization: If this MWBE, SBE, EBE or DBE is not a direct first tier subcontractor/subconsultant, supplier or broker to the Bidder/Consultant, please indicate the name of the subcontractor/subconsultant, supplier or broker which is utilizing the participation of this firm:			
A Copy of the MWBE, SBE, EBE or DBE Letter of Certification must be Attached			
Identify the scope of the work to be performed or supply item that will be provided by the MWBE/SBE/DBE. On unit price bids only, identify which bid line items the MWBE/SBE/EBE/DBE's scope of work or supply corresponds to. Concrete - 015713-6, 033000-1, 033000-2, 321313-1, 321313-2, 321313-3, 321313-4, 321313-5, 321313-6			
<input checked="" type="checkbox"/>	Subcontractor/Subconsultant (N)	<input type="checkbox"/>	Supplier (N)
<input type="checkbox"/>		<input type="checkbox"/>	Broker (N)
Bidder intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:			
\$ 246,657.00		20.6 %	
Consultant intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The percentage of the work of the total sub consultant MWBE, SBE, EBE or DBE will perform is: %			
If the fee amount of the work to be performed is requested, the fee amount, is: \$			
Bidder/Consultant's Signature:		Date: 10-4-18	
Title: Estimator			
MWBE, SBE, EBE or DBE or Self-Performing Firm's Signature:		Date: 10-4-18	
Title: President			
If the above named Bidder/Consultant is not determined to be the successful Bidder/Consultant, this Letter of Intent shall be null and void.			



DENVER
OFFICE OF ECONOMIC
DEVELOPMENT

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit
201 West Colfax Ave., Dept. 607
Denver, CO 80202
Phone: 720-913-1800

LETTER OF INTENT (LOI)
INSTRUCTIONS FOR COMPLETION & SUBMISSION:

- All lines must be completed or marked N/A for Not Applicable
- Certification Letter must be submitted with LOI
- Submit the attached completed checklist with this letter
- Email to gabeoff@denvergov.org
- FOR RFPs and RFQs: LOIs should be included with Submittal

Contract No.: 201844162		Project Name: Rude Park Ballfield + Access Improvements	
A. The Following Section is to be Completed by the Bidder/Consultant This Letter of Intent Must be Signed by the Bidder/Consultant and M/WBE, SBE, EBE or DBE			
Name of Bidder/Consultant: American Civil Constructors LLC dba ACC Mountain West		Self-Performing: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Phone: 303 795-2582
Contact Person: Amy Levine		Email: amy.levine@accbuild.com	Fax: 303 795-3249
Address: 4901 S. Windermere St.		City: Littleton	State: CO Zip: 80120
B. The Following Section is to be Completed by the M/WBE, SBE, EBE or DBE, at any Tier This Letter of Intent Must be Signed by the M/WBE, SBE, EBE or DBE and Bidder/Consultant			
Name of Certified Firm: Metro Pavers Inc.		Phone: 303-927-5575	
Contact Person: Chad Arena		Email: chad@metro-pavers.com	
Address: 7230 6th Pl in Hwy St 180		City: Denver	State: CO Zip: 80229
Please check the designation which applies to this certified firm:		M/WBE (Y) <input checked="" type="checkbox"/>	SBE (Y) <input checked="" type="checkbox"/>
		EBE (Y) <input type="checkbox"/>	DBE (Y) <input type="checkbox"/>
Indirect Utilization: If this M/WBE, SBE, EBE or DBE is not a direct first tier subcontractor/subconsultant, supplier or broker to the Bidder/Consultant, please indicate the name of the subcontractor/subconsultant, supplier or broker which is utilizing the participation of this firm:			
A Copy of the M/WBE, SBE, EBE or DBE Letter of Certification must be Attached			
Identify the scope of the work to be performed or supply item that will be provided by the M/WBE/SBE/DBE. On unit price bids only, identify which bid line items the M/WBE/SBE/EBE/DBE's scope of work or supply corresponds to.			
Asphalt - 321216-1			
<input checked="" type="checkbox"/> Subcontractor/Subconsultant (Y)	<input type="checkbox"/> Supplier (Y)	<input type="checkbox"/> Broker (Y)	
Bidder intends to utilize the aforementioned M/WBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor M/WBE, SBE, EBE or DBE bid amount is:			
\$ 6,929.65		.5 %	
Consultant intends to utilize the aforementioned M/WBE, SBE, EBE or DBE for the Work/Supply described above. The percentage of the work of the total subconsultant M/WBE, SBE, EBE or DBE will perform is: %			
If the fee amount of the work to be performed is requested, the fee amount, is: \$			
Bidder/Consultant's Signature:		Date: 10-4-18	
Title: Estimator			
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature:		Date: 10/4/18	
Title: SECRETARY			
If the above named Bidder/Consultant is not determined to be the successful Bidder/Consultant, this Letter of Intent shall be null and void.			

Letter of Intent (LOI) Checklist

All lines must be completed or marked N/A for Not Applicable

Submit the attached completed checklist with this letter.

Completed ✓	
<input type="checkbox"/>	Project Number & Project Name
<input type="checkbox"/>	Section A: Name of Bidder/Consultant, Contact Person, Address, City, State, Zip, Phone, Email
<input type="checkbox"/>	Section B: Name of Certified Firm, Contact Person, Address, City, State, Zip, Phone, Email
<input type="checkbox"/>	Designation checked for MBE/WBE, SBE, EBE or DBE
<input type="checkbox"/>	Indirect Utilization: Name of subcontractor/subconsultant, supplier or broker is indicated if using the participation of a 2 nd tier subcontractor/subconsultant, supplier or broker.
<input type="checkbox"/>	Scope of work performed or item supplied by M/WBE, SBE, EBE or DBE
<input type="checkbox"/>	Line items performed, if line-item bid.
<input type="checkbox"/>	Copy of M/WBE, SBE, EBE or DBE Letter of Certification Attached
<input type="checkbox"/>	Designation checked for Subcontractor/Subconsultant, Supplier or Broker
	If project is a hard bid...
<input type="checkbox"/>	Bidder has indicated dollar amount for value of work going to Subcontractor/ Subconsultant, Supplier or Broker
<input type="checkbox"/>	Bidder has indicated percentage for value of work going to Subcontractor/ Subconsultant, Supplier or Broker
	If project is an RFP/RFQ...
<input type="checkbox"/>	Consultant has indicated percentage for value of work going to Subcontractor/ Subconsultant, Supplier or Broker Name & contact name for MWBE.
<input type="checkbox"/>	Fee amount if fee amount of work to be performed is requested.
<input type="checkbox"/>	Bidder/Consultant's Signature, Title & Date
<input type="checkbox"/>	M/WBE, SBE, EBE or DBE Firm's Signature, Title and Date

Select One ✓	SUBMITTED VIA... For Construction Hard Bids ONLY, Bidders are strongly urged to deliver the LOI via one of the methods below. (The preferred method is to scan/email completed forms to email address below. Delivery to any other point cannot be guaranteed timely delivery.)
<input type="checkbox"/>	Email to DSBO@denvergov.org

The complete and accurate information that is required for the Letter of Intent is based on the following sections of the Ordinance 85: Section 28-63 and Section 28-68. Failure to complete this information on the Letter of Intent (LOI) may automatically deem a bid or proposal non-responsive.



Joint Venture Affidavit

Office of Economic Development
 Division of Small Business Opportunity
 Compliance Unit
 201 W. Colfax Ave. Dept. 907
 Denver, CO 80202
 Phone: 720-913-1999
DSBO@denvergov.org

The Undersigned swears that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the Undersigned covenant and agree to provide the City current, complete, and accurate information regarding actual joint venture work and the payment thereof and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records, and files of the joint venture, by authorized representatives of the City or Federal funding agency, if applicable. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements.

Name of Firm: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

Notary Public

County of _____ State of _____ My Commission Expires: _____

Subscribed and sworn before me this _____ day of _____, 20____

Notary Seal

Notary Signature: _____

Notary Commission #: _____

Address: _____

Name of Firm: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

Notary Public

County of _____ State of _____ My Commission Expires: _____

Subscribed and sworn before me this _____ day of _____, 20____

Notary Seal

Notary Signature: _____

Notary Commission #: _____

Address: _____



**JOINT VENTURE
ELIGIBILITY FORM**

Joint Venture means an association of two (2) or more business enterprises to constitute a single business enterprise to perform a City construction or professional design and construction services contract for which purpose they combine their property, capital, efforts, skills and knowledge, and in which each joint venturer is responsible for a distinct, clearly defined portion of the work of the contract, performs a commercially useful function, and whose share in the capital contribution, control, management responsibilities, risks and profits of the joint venture are equal to its ownership interest. Joint ventures must have an agreement in writing specifying the terms and conditions of the relationships between the joint venturers and their relationship and responsibility to the contract.

The Division of Small Business Opportunity (DSBO) requires the following information be provided from participants of a prospective joint venture, to assist DSBO in evaluating the proposed joint venture. This Joint Venture Eligibility form and the Joint Venture Affidavit apply if SBEs, EBEs, MBEs, WBEs or DBEs participate in this joint venture.

Please return this form, the Joint Venture Affidavit, and a copy of your Joint Venture Agreement to: Division of Small Business Opportunity, 201 West Colfax Avenue, Denver, CO 80202, at least ten (10) working days prior to bid opening or proposal.

If you have questions regarding this process, please contact DSBO at 720-913-1999.

Joint Venture Information

Name:		Contact Person:	
Address:			
City:	State:	Zip:	Phone:

Joint Venture Participants

Name:		Contact Person:	
Address:			
City:	State:	Zip:	Phone:
% Ownership:	Certifying Entity:	Type Certification & Date: (S/E/M/W or DBE)	

Type of Work for which Certification was granted:

Name:		Contact Person:	
Address:			
City:	State:	Zip:	Phone:
% Ownership:	Certifying Entity:	Type Certification & Date: (S/E/M/W or DBE)	

Type of Work for which Certification was granted:

General Information

SBE/EBE/MBE/WBE/DBE Initial Capital Contributions: \$	%
Future capital contributions (explain requirements) (attach additional sheets if necessary):	

Source of Funds for the SBE/EBE/MBE/WBE/DBE Capital Contributions:

Describe the portion of the work or elements of the business controlled by the SBE/EBE/MBE/WBE or DBE: (attach additional sheets if necessary)

Describe the portion of the work or elements of the business controlled by non-SBE/EBE/MBE/WBE or DBE: (attach additional sheets if necessary)

JOINT VENTURE ELIGIBILITY FORM

General information

Describe the SBE/EBE/MBE/WBE or DBE's involvement in the overall management of the joint venture (e.g., participation on a management committee or managing board voting rights, etc.) (attach additional sheets if necessary)

Describe the SBE/EBE/MBE/WBE or DBE's share in the profits of the joint venture:

Describe the SBE/EBE/MBE/WBE or DBE's share in the risks of the joint venture:

Describe the roles and responsibilities of each joint venture participant with respect to managing the joint venture (use additional sheets if necessary):

a. SBE/EBE/MBE/WBE or DBE joint venture participant:

b. Non- SBE/EBE/MBE/WBE or DBE joint venture participant:

Describe the roles and responsibilities of each joint venture participant with respect to operation of the joint venture (use additional sheets if necessary):

a. SBE/EBE/MBE/WBE or DBE joint venture participant:

b. Non- SBE/EBE/MBE/WBE or DBE joint venture participant:

Which firm will be responsible for accounting functions relative to the joint venture's business?

Explain what authority each party will have to commit or obligate the other to insurance and bonding companies, financing institutions, suppliers, subcontractors, and/or other parties?

Please provide information relating to the approximate **number** of management, administrative, support and non-management employees that will be required to operate the business and indicate whether they will be employees of the S/E/MWBE/DBE, non- S/E/MWBE/DBE or joint venture:

	Non- SBE/EBE/MWBE/DBE	SBE/EBE/MWBE/DBE	Joint Venture
Management			
Administrative			
Support			
Hourly Employees			

JOINT VENTURE ELIGIBILITY FORM

General Information

Please provide the name of the person who will be responsible for hiring employees for the joint venture.

Who will they be employed by?

Are any of the proposed joint venture employees currently employees of any of the joint venture partners?

Yes (✓)		No (✓)	

If yes, please list the number and positions and indicate which firm currently employs the individual(s). (use additional sheets if necessary)

Number of employees	Position	Employed By

Attach a copy of the proposed joint venture agreement, promissory note or loan agreement (if applicable), and any and all written agreements between the joint venture partners.

List all other business relationships between the joint venture participants, including other joint venture agreements in which the parties are jointly involved.

If there are any significant changes in or pertaining to this submittal, the joint venture members must immediately notify the Division of Small Business Opportunity.

COMP-FRM-015

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT AMERICAN CIVIL CONSTRUCTORS LLC DBA ACC MOUNTAIN WEST, as Principal, and Fidelity and Deposit Company of Maryland, a corporation organized and existing under and by virtue of the laws of the State of NY, and authorized to do business within the State of Colorado, as Surety, are held and firmly bound unto the City and County of Denver, Colorado, as Obligees, in full and just sum of Five Percent (5%) of Amount Bid _____ Dollars, (\$-----5%-----), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, the said Principal is herewith submitting its bid, dated October 4th, 2018, for the construction of: Contract No. 201844162, RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS, as set forth in detail in the Contract Documents for the City and County of Denver, Colorado, and said Obligees has required as a condition for receiving said bid that the Principal deposit specified bid security in the amount of not less than five percent (5%) of the amount of said bid, as it relates to work to be performed for the City, conditioned that in event of failure of the Principal to execute the Contract, for such construction and furnish required Performance and Payment Bond if the contract is offered him that said sum be paid immediately to the Obligees as liquidated damages, and not as a penalty, for the Principal's failure to perform.

The condition of this obligation is such that if the aforesaid Principal shall, within the period specified therefore, on the prescribed form presented to him for signature, enter into a written contract with the Obligees in accordance with his bid as accepted and give Performance and Payment Bond with good and sufficient surety or sureties, upon the form prescribed by the Obligees, for the faithful performance and the proper fulfillment of said Contract, or in the event of withdrawal of said bid within the time specified, or upon the payment to the Obligees of the sum determined upon herein, as liquidated damages and not as penalty, in the event the Principal fails to enter into said contract and give such Performance and Payment Bond within the time specified, then this Obligation shall be null and void, otherwise to remain in full force and effect.

Signed, sealed and delivered this 27th day of September, 2018.

ATTEST

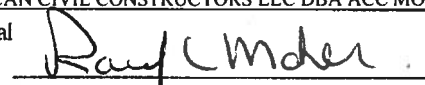
Secretary



AMERICAN CIVIL CONSTRUCTORS LLC DBA ACC MOUNTAIN WEST

Principal

By



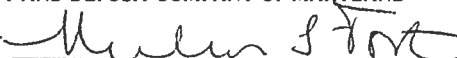
Title

President

FIDELITY AND DEPOSIT COMPANY OF MARYLAND

Surety

By



Melissa L. Fortier, Attorney-in-Fact

Seal if Bidder is Corporation
(Attach Power-of-Authority)

[SEAL]

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Maryland, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Maryland (herein collectively called the "Companies"), by **DAVID MCVICKER, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Melissa L. FORTIER, Vanessa DOMINGUEZ, Michael J. HERROD, Wendy W. STUCKEY, Lupe TYLER, Lisa A. WARD and Donna L. WILLIAMS**, all of Houston, Texas, **EACH** its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings, EXCEPT bonds on behalf of Independent Executors, Community Survivors and Community Guardians.** and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 22nd day of May, A.D. 2017.

ATTEST:

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**



Dawn E. Brown

By: _____

*Assistant Secretary
Dawn E. Brown*

David McVicker

*Vice President
David McVicker*

State of Maryland
County of Baltimore

On this 22nd day of May, A.D. 2017, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **DAVID MCVICKER, Vice President, and DAWN E. BROWN, Assistant Secretary**, of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, depose and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.

Constance A. Dunn

Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2019





Office of Economic Development
 Division of Small Business Opportunity
 201 W. Colfax Ave, Dept. 907
 Denver, CO 80202
 p: 720.813.1999
 f: 720.813.1809
www.denvergov.org/dsbo

Diversity and Inclusiveness * in City Solicitations Information Request Form

Type in your response, print out, sign and date; or print out and complete manually. Please print legibly.

Denver Executive Order No. 101 establishes strategies between the City and private industry to use diversity and inclusiveness to promote economic development in the City and County of Denver and to encourage more businesses to compete for City contracts and procurements. The Executive Order requires, among other things, the collection of certain information regarding the practices of the City's contractors and consultants toward diversity and inclusiveness and encourages/requires City agencies to include diversity and inclusiveness policies in selection criteria where legally permitted in solicitations for City services or goods.

Answer each question below. Missing or incomplete responses will be recorded as "no", "not applicable", or "none". A proposal or response to a solicitation by a contractor/consultant that does not include this completed form shall be deemed non-responsive and rejected.

Business Email Address: alevine@accbuild.com

Please include the Email address of the contact person facilitating this solicitation for the City and County of Denver: alevine@accbuild.com

Agency Name:

- | | | |
|---|---|--|
| <input type="checkbox"/> Arts and Venue | <input checked="" type="checkbox"/> Purchasing Division | <input type="checkbox"/> Sheriff Department |
| <input type="checkbox"/> Auditor Office | <input type="checkbox"/> Human Services | <input type="checkbox"/> Technology Services |
| <input type="checkbox"/> Community Planning | <input type="checkbox"/> Economic Development | <input type="checkbox"/> Other |
| <input type="checkbox"/> Denver International Airport | <input type="checkbox"/> Parks and Recreation | |
| <input type="checkbox"/> Environmental Health | <input type="checkbox"/> Police Department | |
| <input type="checkbox"/> Fire Department | <input type="checkbox"/> Public Works | |

Project Name: Rude Park Ballfields

BID / RFP No.: 201844162

Name of Contractor/Consultant: American Civil Constructors LLC dba ACC MountainWest

What industry is your business? General Contractor

Address:
4901 S. Windermere St.
Littleton, CO 80120

Business Phone No.: 303 795-2582

Business Facsimile No.: 303 795-3249

OED - Executive Order No. 101
 Diversity and Inclusiveness in City Solicitations Information Request Form
 Rev. 12/29/2015

1. How many employees does your company employ?

- 1-10 51-100
 11-50 over 100

1.1. How many of your company's employees are:

Full-time 150 Part-Time 20

2. Do you have a Diversity and Inclusiveness Program? Yes No

If No, and your company size is less than 10 employees continue to question 11.
Complete and sign the form.

If Yes, does it address:

- 2.1 Employment and retention? Yes No
2.2 Procurement and supply chain activities? Yes No
2.3 Customer service? Yes No

3. Provide a detailed narrative of your company's diversity and inclusiveness principles and programs. This may include, for example, (i) diversity and inclusiveness employee training programs, equal opportunity policies, and the budget amount spent on an annual basis for workplace diversity; or (ii) diversity and inclusiveness training and information to improve customer service.

Diversity + inclusiveness employee training programs, Equal opportunity policies posted

4. Does your company regularly communicate its diversity and inclusiveness policies to employees?

If Yes, how does your company regularly communicate its diversity and Inclusiveness policies to employees? (select all that apply)

- Employee Training
 Pamphlets
 Public EEO postings
 Other
 Not Applicable

5. If you responded that you do not have a diversity and inclusiveness program, describe any plans your company may have to adopt such a program.

6. How often do you provide training in diversity and inclusiveness principles?

- Monthly Annually
 Quarterly Not Applicable Other _____

6.1 What percentage of the total number of employees generally participate?

- 0 - 25% 51 - 75%
 26 - 50% 76 - 100% Not Applicable

7. State how you achieve diversity and inclusiveness in supply and procurement activities. This may include, for example, narratives of training programs, equal opportunity policies, diversity or inclusiveness partnership programs, mentoring and outreach programs, and the amount and description of budget spent on an annual basis for procurement and supplier diversity and inclusiveness.

Training, Equal Opportunity policies

8. Do you have a diversity and inclusiveness committee? Yes No

8.1 If Yes, how often does it meet?

- Monthly Annually No Committee
 Quarterly Other _____

8.2 If you responded that you do not have a diversity and inclusiveness committee, describe any plans your company may have to establish such a committee.

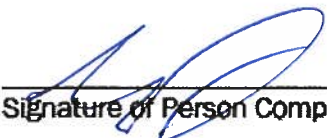
9. Do you have a budget for diversity and inclusiveness efforts? Yes No

10. Does your company integrate diversity and inclusion competencies into executive/manager performance evaluation plans? Yes No

11. Would you like information detailing how to implement a Diversity and Inclusiveness program? Yes No

If yes, please email XO101@denvergov.org.

I attest that the information represented herein is true, correct and complete, to the best of my knowledge.



Signature of Person Completing Form

10-4-18

Date

Amy Levine

Printed Name of Person Completing Form

NOTE: Attach additional sheets or documentation as necessary for a complete response.

*"Diversity and inclusiveness program" means a program that invites values, perspectives and contributions of people from diverse backgrounds, and integrates diversity into its hiring and retention policies, training opportunities, and business development methods to provide an equal opportunity for each person to participate, contribute, and succeed within the organization's workplace. "Diversity" encompasses a wide variety of human differences, including differences such as race, age, gender, gender identity, sexual orientation, ethnicity, physical disabilities, appearance, historically underutilized and disadvantaged persons, as well as social identities such as religion, marital status, socio-economic status, lifestyle, education, parental status, geographic background, language ability, and veteran status."

CITY AND COUNTY OF DENVER
STATE OF COLORADO



DENVER
THE MILE HIGH CITY

DEPARTMENT OF PUBLIC WORKS

Bid Documents Package

Contract Number: 201844162



Rude Park Ballfield and Access Improvements

August 29, 2018

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
201844162

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Bid Form	BF-6 through BF-8
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Commitment to Minority and Woman Business Enterprise Participation	BF-13
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DENVER
THE MILE HIGH CITY
CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

<u>Item No.</u>	<u>Description</u>	<u>Estimated</u>	<u>Quantity</u>
01 11 00-1	Mobilization	1	LS
01 56 39-1	Tree Protection	5	EA
01 57 13-1	Erosion Control Plan, Implementation and Permitting	1	LS
01 57 13-2	Construction Fence	1,795	LF
01 57 13-3	Silt Fence	463	LF
01 57 13-4	Stabilized Construction Staging Area	225	SY
01 57 13-5	Vehicle Tracking Control	1	EA
01 57 13-6	Concrete Washout Area	1	EA
01 57 13-7	Storm Drain Inlet Protection	3	EA
01 74 19-1	Final MMP, Implementation, and qualified environmental person	1	LS
02 41 00-1	Salvage Bleachers	1	EA
02 41 00-2	Demolition of bleacher pad, paving, stairs, footings, curbs	295	CY
02 41 00-3	Demolition of Building	1	EA
02 41 00-4	Demolition of Asphalt	177	SY
02 41 00-5	Demolition of Backstop System	121	LF
02 41 00-6	Demolition of Fencing System	795	LF
02 41 00-7	Demolition of Dugouts	2	EA
02 41 00-8	Demolition of Construction Access Route	4,940	SF
03 30 00-1	2' Ht Concrete Wall	194	CY



DENVER
THE MILE HIGH CITY
CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
03 30 00-2	Concrete Stairs, Cheekwall, and Landings	24	CY
05 50 00-1	Railing at Stairs	76	LF
26 05 00-1	Reset Utilities/ Electrical Work	1	LS
26 05 00-2	Electrical Cabinet and Pad	1	EA
26 05 00-3	New Scoreboard and Supports	1	EA
26 05 00-4	Coordinate with Xcel	1	LS
26 05 33-1	Conduit and wire to scoreboard	400	LF
26 22 13-1	Exterior Grade lighting transformer	1	LS
31 11 00-1	Clearing and Grubbing	1	LS
31 20 00-1	Earthwork - Moving of on-site material	4,619	CY
31 20 00-2	Soil Import -Haul and place	3,937	CY
31 20 00-3	CABI for work within Area of Environmental Concern and Management of RACS using Hand Methods	10	Days
31 20 00-4	Soil Export in Area of Environmental Concern - Handle and dispose of all spoils from earth disturbing activities	32	CY
31 20 00-5	Earthwork In Area of Environmental Concern - Placing clean backfill	32	CY
31 20 00-6	Fine Grade at Field	62,305	SF
31 20 00-7	Adjust MWW manhole	2	EA
32 12 16-1	Asphalt Parking Lot Paving	188	SY
32 13 13-1	Concrete Pavement - 4" depth	6,695	SF



DENVER
THE MILE HIGH CITY
CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

<u>Item No.</u>	<u>Description</u>	<u>Estimated</u>	<u>Quantity</u>
32 13 13-2	Concrete Pavement - 6" depth	1,280	SF
32 13 13-3	Concrete Pavement - 6" depth at Construction Access Route	4,940	SF
32 13 13-4	Mow Edge, Mow Band, or Valley Pan	1,325	LF
32 13 13-5	Curb and Gutter-1' Catch Pan, All types	707	LF
32 13 13-6	ADA Curb Ramp	1	EA
32 15 40-1	Stabilized Crusher Fines Warning Track	7,100	SF
32 17 23-1	Striping	1	LS
32 18 00-1	Skinned Infield	16,925	SF
32 31 13-1	20' High Backstop System - Black Vinyl Chainlink	61	LF
32 31 13-2	10' High Backstop System - Black Vinyl Chainlink	60	LF
32 31 13-3	8' High Fencing - Black Vinyl Chainlink	795	LF
32 31 13-4	24' High Foul Pole w/ Mesh Panels - Painted Yellow	2	EA
32 31 13-5	4' Man Gates - Black Vinyl Chainlink	2	EA
32 31 13-6	16' Maintenance Gates - Black Vinyl Chainlink	1	EA
32 31 13-7	Prefabricated Dugout	2	EA
32 31 13-8	Yellow Protective Fence Cap	420	LF
32 31 13-9	Green Protective Fence Cap	410	LF
32 33 00-1	Bench at Dugout	2	EA



DENVER
THE MILE HIGH CITY
CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
32 33 00-2	Field Lock Box	1	EA
32 33 00-3	Field Equipment (bases, pitching rubber, etc)	1	LS
32 80 00-1	RB 1806PRS SAM w/ plstc nozz spray head	230	EA
32 80 00-2	RB 1812PRS SAM w/ plstc nozz spray head	26	EA
32 80 00-3	Rain Bird 5006 Rotor	21	EA
32 80 00-4	Rain Bird Falcon Rotor	8	EA
32 80 00-5	Rain Bird 8005-SS Rotor	46	EA
32 80 00-6	Rain Bird PEB - 1" valve	3	EA
32 80 00-7	Rain Bird PEB - 1.5" valve	10	EA
32 80 00-8	Rain Bird PEB - 2" valve	11	EA
32 80 00-9	Poly Lateral - 1" 100#NSF	2,830	LF
32 80 00-10	Poly Lateral - 1.5" 100#NSF	1,970	LF
32 80 00-11	Poly Lateral - 2" 100#NSF	915	LF
32 80 00-12	CL200 PVC Lateral - 2.5"	130	LF
32 80 00-13	CL200 PVC Lateral - 3"	430	LF
32 80 00-14	CL200RT PVC Mainline 3"	1,000	LF
32 80 00-15	CL160 PVC Sleeve 2"	50	LF
32 80 00-16	CL160 PVC Sleeve 4"	25	LF
32 80 00-17	CL160 PVC Sleeve 6"	40	LF



DENVER
THE MILE HIGH CITY
CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
32 80 00-18	AWG Wire #12	15,000	LF
32 80 00-19	18" Wire trench with locator tape	500	LF
32 80 00-20	Poly Lateral Piping Repair	4	EA
32 80 00-21	Mainline Piping Repair (Tie In)	1	EA
32 80 00-22	Mini-Click on Post	1	EA
32 80 00-23	Gate Valve - 3"	4	EA
32 80 00-24	Buckner 14LT Quick Coupler	7	EA
32 91 20-1	Strip, stockpile and respread topsoil	750	CY
32 92 23-1	Bluegrass Sod and Soil Prep	66,500	SF
32 93 00-1	English Oak-2" Cal	3	EA
32 93 00-2	Kentucky Coffeetree- 2" Cal	3	EA
32 93-00-3	Pacific Maple- 2" Cal	1	EA
32 93 00-4	Coral Beauty Cotoneaster-#5	45	EA
32 93 00-5	Emerald and Gold Euonymus-#5	50	EA
32 93-00-6	English Ivy-#1	20	EA
32 97 00-1	Landscape Maintenance	1	LS



DENVER
 THE MILE HIGH CITY
 CITY AND COUNTY OF DENVER
 DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
	Allowance Account		
A/A 01	Mobilization for Mechanical Excavation by Abatement Contractor	1	LS
A/A 02	RACS management by CABI for mechanical excavation work within Area of Environmental Concern	10	Days
A/A 03	Mechanical Excavation within Area of Environmental Concern	64	CY
A/A 04	Soil Export-Haul chemically impacted soil from Area of Environmental Concern to DADS	64	CY
A/A 05	Soil Import - Backfill in Area of Environmental Concern	64	CY

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

**NOTICE FOR INVITATION FOR BIDS
FOR CONTRACT NO. 201844162**

RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

BID SCHEDULE:

**11:00 a.m., Local Time
September 27, 2018**

Sealed bids will be received in Room 6.G.7, 201 W. Colfax Ave., Denver, CO 80202, beginning at 10:30 a.m., no later than 11:00 a.m., on bid day. All properly delivered bids will then be publicly opened and read aloud.

Bids submitted prior to 10:30 a.m. on the specified bid opening date/time shall be presented at the Office of Contract Administration, Attention: Public Works Contract Administration, 201 W. Colfax Ave., Department 614, Denver, CO 80202.

Prior to submitting a bid, the bidder shall consult the Contractor's Bulletin Board located at 201 W. Colfax Ave., 2nd Floor, Denver, CO 80202 and/or www.work4denver.com.

GENERAL STATEMENT OF WORK:

The Rude Park ADA improvement project will bring an existing tier 1 ballfield up to current standards. The project will transform the dated and in-accessible bleacher style seating into a sloped walk with retaining walls doubling as seat walls and tiered amphitheater style grass slopes for sitting. The ballfield will also be upgraded with improved drainage, new dugouts, backstop, fencing, foul posts, infield mix and equipment, outfield sports turf, and scoreboard. Existing lights and lighting system will remain.

ESTIMATED CONSTRUCTION COST:

The estimated cost of construction for this project is between \$908,400.00 and \$1,110,300.00.

TEXTURA CONSTRUCTION PAYMENT MANAGEMENT:

Bidders are required, when preparing a bid, to agree that it shall use the Textura® Construction Payment Management System (CPM System) for this Project and recognizes that all fees associated with the CPM System are to be paid by the awarded Contractor for billings for work performed. Use the pricing scale provided in Instructions to Bidders to price the Textura service appropriately. For details on the company and service contact the Textura® Corporation 866-TEXTURA or www.texturacorp.com.

DOCUMENTS AND BID INFORMATION AVAILABLE:

Contract Documents complete with Technical Specifications and, if applicable, construction drawings will be available on the first day of publication at: www.work4denver.com. To download digital Contract Documents at a cost of \$10.00 per download, reference eBid Document Number #5924502. Contact QuestCDN at 952-233-1632 or info@questcdn.com for assistance.

PRE-BID CONFERENCE:

A pre-bid conference will be held for this Project at 3:00 p.m., local time, on September 13, 2018. This meeting will take place at: the WEBB Building, 201 W Colfax Ave 4th Floor Conference Room 4.I.5., Denver, Colorado 80202.

DEADLINE TO SUBMIT QUESTIONS: September 20, 2018 at 2:00 p.m. local time.

PREQUALIFICATION REQUIREMENTS:

Each bidder must be prequalified as a 1A - GENERAL CIVIL in the \$1,500,000.00 monetary level in accordance with the City's Rules and Regulations Governing Prequalification of Contractors. Each bidder must have submitted a prequalification application a minimum of ten (10) calendar days prior to the bid opening date.

Applications must be submitted to the Department of Public Works, Prequalification Section, 201 W. Colfax Ave.,

Department 614, Denver,
Contract No. 201844162
Rude Ballfield

CO 80202. To view the Rules and Regulations and to obtain a prequalification application, please visit our website at www.denvergov.org/prequalification or call 720-865-2539 for prequalification information ONLY.

MINORITY AND WOMAN BUSINESS ENTERPRISE PARTICIPATION:

Construction, reconstruction and remodeling contracts made and entered into by the City and County of Denver are subject to Article III, Divisions 1 and 3 of Chapter 28 of the Denver Revised Municipal Code, (Sections 28-31 to 28-36 and 28-52 to 28-90 D.R.M.C) and all Minority and Woman Business Enterprise and Equal Employment Opportunity Rules and Regulations adopted by the Director of the Division of Small Business Opportunity.

Article III, Division 3 of Chapter 28 of the D.R.M.C. directs the Director of the Division of Small Business Opportunity to establish a project goal for expenditures on construction, reconstruction, and remodeling work contracted by the City and County of Denver. The specific goal for this project is:

16% Minority and Woman Business Enterprise (M/WBE) Participation

Project goals must be met with certified participants as set forth in Section 28-60, D.R.M.C. or through the demonstration of a sufficient good faith effort under Section 28-62 D.R.M.C. For compliance with good faith requirements under Section 28-62(b), **the M/WBE percentage solicitation level required for this project is 100%.**

The Director of the Division of Small Business Opportunity urges all participants in City construction, reconstruction and remodeling projects to assist in achieving these goals.

MISCELLANEOUS:

Contracts for construction, reconstruction, and remodeling are subject to the City prevailing wage rate requirements established pursuant to Section 20-76, D.R.M.C.

As its best interest may appear, the City and County of Denver reserves the right to reject any or all bids and to waive informalities in bids.

A modified version of this Notice of Invitation for Bids and the project's Statement of Quantities is available on the City and County of Denver's website at: www.work4denver.com.

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CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
201844162

INSTRUCTIONS TO BIDDERS

IB-1 INSTRUCTION TO BIDDERS

These Instructions to Bidders are a part of the Contract Documents and are intended to serve as a guide to bidders. They are general in nature and may be amended or supplemented as needed to support any one specific invitation to bid. Each bidder shall prepare its bid in strict compliance with all requirements of the Contract Documents and by careful application of these instructions.

IB-2 BIDDING

The copy of the Contract Documents contains the Bid Form and Submittal Package for this Project, which must be used to submit a bid hereunder. The bidder must fully complete, execute and submit this Bid Form and Submittal Package, along with any other specified components of the Contract Documents, as its bid for the referenced Project.

A bidder is not required to submit as part of its bid the entire set of Contract Documents distributed by the City pursuant to the Notice of Invitation for Bids, if the bidder executes and submits the Bidder Acknowledgment Form included with the Bid Form and Submittal Package as part of its bid. However, each bidder, by submitting its bid, shall be conclusively presumed to have received and reviewed all of the information contained in the Contract Documents as this term is further defined herein.

Each bid must be enclosed in a sealed envelope, must be addressed to the Manager and must show on the face of the envelope the full name of the bidder, the City Project number, and descriptive title of the Project for which the bid is made.

The advertisement for Notice of Invitation for Bids will identify where and when the bid must be delivered.

IB-3 CONTRACT DOCUMENTS AS PUBLISHED BY CITY

Each bidder shall be responsible for, and shall be deemed to have received, all the information contained in the Contract Documents as distributed by the City pursuant to the Notice of Invitation for Bids, including addenda, whether or not such bidder has reviewed all or part of the Contract Documents in either its hard copy form or in any other format. If organizations or companies other than the City or its design professional distribute the City's Contract Documents for review by prospective bidders, whether in hard copy or via electronic or other media, neither the City nor its design professional shall be responsible for the content, completeness or accuracy of any information distributed or transmitted by any such organization or company.

IB-4 COMPLETING AND SIGNING THE BID FORMS

The bidder must complete the Bid Form by legibly writing or printing in ink, in words and figures as required, all the bidder's prices offered for the Work to be performed. All blank spaces, which require a response of the bidder, must be properly completed in full. If in the process of evaluating a bid, words and figures, as written on the Bid Form by the bidder, do not agree, the written words will govern.

For Bid Forms requiring unit price bids, the bidder shall write in the Bid Form spaces provided a unit price for each item for which a quantity is given and shall also write the product of each unit price and the quantity specified in the "Amount" or "Total" space provided.

Each bidder must sign the Bid Form and give the bidder's current business address. If an individual, the signature must be of the individual offering the bid; if a partnership, the signature must be that of a general partner; and if a corporation, both the president and the secretary must sign and the seal of the corporation must be affixed. Signatures of other persons may be acceptable if the bid contains sufficient evidence, satisfactory to the City in its sole discretion, to indicate that the other persons are authorized to bind the bidder.

IB-5 UNACCEPTABLE BIDS

The City will not accept bids from Bidders not prequalified with the Department of Public Works (if prequalification is required for this project), in arrears to the City upon debt or contract, or which are defaulters (as surety or otherwise) upon any obligation to the City.

IB-6 INFORMAL AND UNBALANCED BIDS

Any alteration, interlineations, erasure, omission, deletion or addition by the bidder to the Bid Form and Submittal Package or other parts of the Contract Documents submitted with the Bid Form and Submittal Package, as originally issued to the bidder, shall render the accompanying bid informal and may constitute cause for rejection.

Any unauthorized addition, conditional or alternate bids, failure to provide a unit price, lump sum amount or authorized alternate item specified or other irregularities of any kind which tend to render the bid incomplete, indefinite or ambiguous shall render the bid informal and may constitute cause for rejection.

Bids that are unbalanced so that each item does not reasonably carry its own proportion of cost or that contain inadequate or unreasonable prices for any item may be rejected. Bids, which have not acknowledged all addenda to the Contract Documents issued for this bid, may also be rejected.

The right is reserved by the City to reject any or all bids and to waive any informalities where it is deemed by the City to be in the best interests of the City to do so.

IB-7 ONLY ONE BID ACCEPTED

The City will accept only one bid for the same work from any one bidder. This includes bids that may be submitted under different names by one business enterprise.

IB-8 BID GUARANTEE

As a guarantee of good faith on the part of the bidder, each bid must be accompanied by a bid guarantee, consisting of either a certified or cashier's check made payable without condition to the order of the City and County of Denver or a bid bond written by an approved corporate surety in favor of the City and County of Denver. If the bid of a bidder is acceptable and the bidder is notified by the Manager that it is considered to be the Apparent Low Bidder and said bidder fails to execute a contract in the form prescribed or to furnish a performance and payment bond with a legally responsible and approved surety or to furnish the required evidence of insurance or satisfy all conditions precedent to contract execution within five (5) days after such notice is made by the City, said bid guarantee shall be forfeited to the City as liquidated damages and not as a penalty.

The bid guarantee shall be in the amount of five percent (5%) of the total bid unless otherwise specified in the Notice of Invitation for Bids and on the form appearing in the Contract Documents in the Bid Form and Submittal Package. Failure to submit a properly executed bid guarantee, on the form provided herein may, in the City's sole discretion, constitute cause for rejection.

Following award and execution of the Contract by the Apparent Low Bidder, or earlier in the sole discretion of the City, bid guarantees of all but the Apparent Low Bidder will be returned. When the Apparent Low Bidder executes the Contract and delivers to the City satisfactory performance and payment bonds, required insurance documentation, and has satisfied all conditions precedent to contract execution by the City, and after approval, if any, by the Council of the City of the proposed Contract with the Apparent Low Bidder, the bid guarantee of the Apparent Low Bidder shall be returned. Such return shall be made within one hundred twenty (120) days from date bids are opened unless otherwise specified in the Special Contract Conditions.

IB-9 SITE INSPECTION AND INVESTIGATIONS

Prior to submitting a bid, the bidder is invited to inspect the work site and its surroundings. Although the bidder is not required to make such an inspection before bidding, for purposes of the Contract it shall be conclusively presumed that by failing to make such an inspection, the bidder has waived the right to later claim additional compensation or time extensions for conditions which would have been evident had the site been inspected.

Drawings and Technical Specifications, defining the Work to be done, were prepared on the basis of interpretation by the design professionals of information derived from investigations of the work site. Such information and data are subject to sampling errors, and the interpretation of the information and data depends to a degree on the judgment of the design professional. In view of this, the bidder is invited to make such additional investigations as the bidder's judgment dictates the need for such investigations. Information about the degree of difficulty of the Work to be done cannot totally be derived from either the Drawings or Technical Specifications or from the Manager or his representatives.

Since the bid information cannot be guaranteed, the Contractor shall have assumed the risks attendant to successful performance of the Work and shall never make claim for additional compensation or time extensions on the grounds that the nature or amount of work to be done was not understood by the bidder at the time of the bidding.

IB-10 INCONSISTENCIES

Any seeming inconsistencies or ambiguities between different provisions of the Contract Documents or any point which the bidder believes requires a decision or interpretation by the City must be inquired into by the bidder by addressing a formal written communication to the Manager of Public Works and sending or delivering it to the offices of the Division of Public Works advertising this Project for bid at least forty-eight (48) hours, excluding Saturdays, Sundays, and holidays, before the time set for the opening of bids

Information about the decision or interpretation made in response to any inquiry will be posted on the Contractor's Bulletin Board (refer to IB-12 CONTRACTOR'S BULLETIN BOARD, for the location of the Contractor's Bulletin Board). If the matter raised requires, in the sole discretion of the Manager, that an addendum to the bid documents be issued, such addendum will be published and each bidder shall be required to acknowledge the addendum by signing and identifying it in the Bid Form when submitting the bid.

After bids are opened, all bidders must abide by the formal response of the Manager, as to any interpretation. The City shall not be bound and the bidder shall not rely on any oral communication, interpretation clarification or determination of the Contract Documents prior to bid opening.

IB-11 WITHDRAWAL OF BID

A bidder may withdraw its bid at any time prior to the time for receipt of bids set forth in the Notice of Invitation for Bids by making written request upon the Manager of Public Works. After such time, no bid may be withdrawn or modified.

Such request must be signed by the persons authorized to bind the bidder as defined in IB-3, COMPLETING AND SIGNING BID FORMS.

IB-12 CONTRACTOR'S BULLETIN BOARD

It shall be conclusively presumed that the bidder has, before submitting any bid, read and shall take full responsibility for all addenda, posted decisions, and other information relevant to the bid posted by the City on the Contractor's Bulletin Board. The Contractor's Bulletin Board is located at 201 W. Colfax, 2nd Floor, Denver, CO 80202, in the Wellington E. Webb Municipal Office Building.

IB-13 PRE-BID MEETING

Bidders are urged to attend the pre-bid meeting(s) scheduled for this Project. Attendance is not mandatory; however, bidders will be held responsible for all information presented at such meeting(s).

IB-14 ADDENDA

As its best interests may require, the City may issue addenda to the Contract Documents. Such addenda shall be posted on the Contractor's Bulletin Board and made available to all persons having purchased a set of Contract Documents as set forth in the Notice of Invitation for Bids contained herein. All bidders must acknowledge receipt of all addenda on the Bid Form at the time of submission of the bid.

IB-15 BID OPENING

Bidders are invited to be present at the bid opening. Unless otherwise suspended, delayed or canceled by posted notice from the Manager, bid opening will occur at the time and place designated in the Notice of Invitation for Bid.

IB-16 EVALUATION OF BIDS AND BASIS OF BID SELECTION

Bids will be evaluated after being read in open meeting at the place designated for such bid opening. All low bidders' bids will be reviewed for responsiveness to the requirements of the Contract Documents and whether or not the bids contain irregularities which could give any bidder an unfair advantage.

Selection will be made on the basis of the lowest, total, responsive, qualified bid, which bid shall include the total base bid set forth on the Bid Form, plus the total of any alternates set forth on the Bid Form and selected by the City during evaluation. Alternates, if any are included in the bid, will be selected in the priority shown on the Bid Form, subject to the limits of available funds. Bid selection will be subject to all requirements and special bidder qualifications contained herein and subject to approval of such resulting Contract in accordance with the Charter and Revised Municipal Code of the City and County of Denver. In addition to all other specified requirements, the City will correct arithmetical errors in all bids and corrected totals only will be considered as the basis of selection.

Upon concluding that the bid is, in fact, the lowest, total, responsive bid to the bidding conditions and that of a responsible, qualified bidder, the City will notify the Apparent Low Bidder.

As its best interests may appear, the City and County of Denver reserves the right to waive informalities in bids, to reject any and all bids and to rebid the Project.

IB-17 NOTICE TO APPARENT LOW BIDDER

The Notice to Apparent Low Bidder, a form of which is included in the Contract Special Conditions Section of the Contract Documents, is issued by the City directly to the selected bidder and informs the bidder that the Manager intends to seek approval of the execution of the Contract by the City in accordance with the Charter and Revised Municipal Code of the City and County of Denver. Specifically, it informs the bidder of its obligations with respect to execution of the Contract and instructs the bidder on how to proceed toward execution of the Contract. The City reserves the right to notify the Apparent Low Bidder, at any time within one hundred twenty (120) days from the date of the opening of the bids, that approval to contract with the Apparent Low Bidder shall be sought in accordance with the Charter and Revised Municipal Code of the City and County of Denver.

In accordance with the terms and conditions contained in the Bid Form and Submittal Package and any additional requirements set forth in the Notice to Apparent Low Bidder or elsewhere in the Contract Documents, the Apparent Low Bidder shall execute the Contract Form contained in the Contract Documents made available by the City for execution in the appropriate number of counterparts. The Apparent Low Bidder shall return the fully executed Contract Document sets, along with any supplemental documents required herein, to the City and shall comply with all other conditions precedent to Contract execution within five (5) days of the date of issuance of the Notice to Apparent Low Bidder by the City. Failure to comply with each of these requirements within five (5) days of the date of issuance of the Notice to Apparent Low Bidder by the City shall render the bid nonresponsive and may constitute cause for rejection.

Issuance of such Notice shall not, however, constitute a commitment on the part of the City or create any rights in the Apparent Low Bidder to any contract with the City.

IB-18 EXECUTION OF CONTRACT

The process of executing a contract requires action by both the apparent low bidder and the City. After it notifies the Apparent Low Bidder, the City will prepare the Contract Documents by incorporating all of the documents submitted by the Apparent Low Bidder into one or more executable copies. Upon notification that contracts documents are ready for execution the Apparent Low Bidder shall execute the contract documents. At this time, the successful bidder shall also provide certain supplemental documents for incorporation into the Contract Documents. These supplemental documents shall include: the properly executed Certificate of Insurance Forms evidencing the apparent low bidder's satisfactory compliance with the insurance requirements set forth in the Contract Documents; a properly executed Payment and Performance Bond Form and appropriate Power of Attorney evidencing the Apparent Low Bidder's satisfactory compliance with the bonding requirements set forth in the Contract Documents; and documentation of compliance with any other conditions precedent to execution of the Contract by the City set forth in the Contract Documents. The insurance and bond forms contained in the Contract Special

Conditions Section of the Contract Documents must be used in satisfying these supplemental document requirements.

These documents are then delivered to the City within the prescribed time period for examination of the documents to determine whether or not the Contractor has correctly executed the Contract and has correctly provided the required supplemental documents and that these documents are satisfactorily and properly completed. From here, all of the documents are forwarded to the City Attorney who will, if the insurance and bonding offered is acceptable and if all other elements of the Contract Documents are in order, recommend that the Manager and the Mayor approve the documents and, when required by the City Charter, prepare an ordinance for submittal to City Council authorizing the execution of the Contract. The City Attorney shall in all applicable instances submit the proposed contract and ordinance to City Council. After City Council approval, the Contract shall be reviewed by the City Attorney and routed for execution by the Mayor, the Clerk for attestation and the Auditor for countersignature and registration. When the total process of contract execution is complete, a Notice to Proceed will be issued and a single executed copy of the Contract will be delivered to the Contractor. Any work performed or a material purchased prior to the issuance of Notice to Proceed is at the Contractor's risk.

IB-19 BONDING REQUIREMENTS

In accordance with the provisions of General Contract Conditions, Title 15, PERFORMANCE AND PAYMENT BONDS, the minimum bonding requirements for this Contract are set forth in the form **CITY AND COUNTY OF DENVER PERFORMANCE AND PAYMENT BOND** contained in the Special Conditions Section of the Contract Documents. Upon receipt of Notice to Apparent Low Bidder, the apparent low bidder must cause this form bond to be purchased, executed and furnished, along with appropriate Powers of Attorney and a surety authorization letter (in form similar to the one attached), to the City in accordance with the instructions contained herein.

IB-20 INSURANCE REQUIREMENTS

The minimum insurance requirements for this Contract are set forth in the Special Conditions Section of the Contract Documents. Bidders are urged to consider, in preparing a bid hereunder, that each condition, requirement or specification set forth in the form certificate must be complied with by the Contractor and all subcontractors performing Work on the Project, unless such requirements are specifically accepted in writing by the City's Risk Management Office. The Contractor must either include all subcontractors performing work hereunder as insureds under each required policy or furnish a separate certificate for each subcontractor. In either case, the Contractor shall insure that each subcontractor complies with all of the coverage requirements.

IB-21 PERMITS AND LICENSES

All permits, licenses and approvals required in the prosecution of the work shall be obtained and paid for by the Contractor.

IB-22 PREVAILING WAGE REQUIREMENTS

Contractor shall comply with, and agrees to be bound by, all requirements, conditions and City determinations regarding the Payment of Prevailing Wages Ordinance, Sections 20-76 through 20-79, D.R.M.C. including, but not limited to, the requirement that every covered worker working on a City owned or leased building or on City-owned land shall be paid no less than the prevailing wages and fringe benefits in effect on the date the bid or request for proposal was advertised. In the event a request for bids, or a request for proposal, was not advertised, Contractor shall pay every covered worker no less than the prevailing wages and fringe benefits in effect on the date funds for the contract were encumbered.

Date bid or request for qualifications/proposals was advertised: August 29, 2018.

Prevailing wage and fringe rates will adjust on, and only on, the anniversary of the date the Contract was fully executed. Unless expressly provided for in this Agreement, Contractor will receive no additional compensation for increases in prevailing wages or fringe benefits.

Contractor shall provide the Auditor with a list of all subcontractors providing any services under the contract.

Contractor shall provide the Auditor with electronically-certified payroll records for all covered workers employed under the contract.

Contractor shall prominently post at the work site the current prevailing wage and fringe benefit rates. The posting must inform workers that any complaints regarding the payment of prevailing wages or fringe benefits may be submitted to the Denver Auditor by calling 720-913-5000 or emailing auditor@denvergov.org.

If Contractor fails to pay workers as required by the Prevailing Wage Ordinance, Contractor will not be paid until documentation of payment satisfactory to the Auditor has been provided. The City may, by written notice, suspend or terminate work if Contractor fails to pay required wages and fringe benefits.

IB-23 TAX REQUIREMENTS

General. Bidders are referred to the General Contract Condition 323, TAXES, as to taxes to which they may be subject in performing the Work under this Contract, including but not limited to sales and use taxes and the Denver Occupational Privilege Tax. The following instructions are to be considered along with the General Contract Conditions and not in lieu of them.

Sales and Use Tax. Construction and building materials sold to contractors and subcontractors for use on structures, roads, streets, highways, and other public works owned by the City and County of Denver are exempt from state, RTD, and Cultural Facilities District sales and use taxes. However, such materials will be subject to sales and use taxes imposed by the City and County of Denver.

It is the responsibility of the Contractor and its subcontractors to apply to the Colorado Department of Revenue ("CDOR") for a certificate, or certificates, of exemption indicating that their purchase of construction or building materials is for a public project, and to deliver to the City copies of such applications as soon as possible after approval by the CDOR. Bidders shall not include in their bid amounts the exempt state, RTD, and Cultural Facilities District Sales and Use Taxes.

Denver Occupational Privilege Tax. Any employee working for a contractor, or a subcontractor, who earns over \$500 working in Denver during a calendar month, is subject to the payment of the Employee Occupational Privilege Tax. The Contractor and any subcontractor must pay the Business Occupational Privilege Tax for each of its employees who are subject to such tax.

IB-24 DIVERSITY AND INCLUSIVENESS IN CITY SOLICITATIONS

Each bidder shall, as a condition of responsiveness to this solicitation, complete and return the "Diversity and Inclusiveness in City Solicitations Information Request Form" with their Bid.

Using the "Diversity and Inclusiveness in City Solicitations Information Request Form" provided, please state whether you have a diversity and inclusiveness program for employment and retention, procurement and supply chain activities, or customer service and provide the additional information requested on the form. The information provided on the "Diversity and Inclusiveness in City Solicitations Information Request Form" will provide an opportunity for City contractors to describe their own diversity and inclusiveness practices. Contractors are not expected to conduct intrusive examinations of its employees, managers, or business partners in order to describe diversity and inclusiveness measures. Rather, the City simply seeks a description of the contractor's current practices, if any.

Diversity and Inclusiveness information provided by City contractors in response to City solicitations for services or goods will be collated, analyzed, and made available in reports consistent with City Executive Order No. 101. However, no personally identifiable provided by or obtained from contractor's will be in such reports.

IB-25 MINORITY AND WOMAN BUSINESS ENTERPRISE (M/WBE) REQUIREMENTS

Article III, Divisions 1 and 3 of Chapter 28, Denver Revised Municipal Code (D.R.M.C.), designated as Sections 28-31 – 28-36 and 28-52 – 28-90 D.R.M.C. and referred to in these Bid Documents as the "M/WBE Ordinance" and any Rules or Regulations promulgated pursuant thereto apply to this Project and are incorporated into these Bid Documents by reference. Generally, the M/WBE Ordinance provides for the adoption of a good faith goals program, to be administered by the Division of Small Business Opportunity (DSBO), devised to provide increased bidding opportunities for Minority and Woman Business Enterprises

(M/WBEs). As such, each bidder must comply with the terms and conditions of the M/WBE Ordinance in making its bid and, if awarded the Contract, in performing all Work thereunder. A bidder's failure to comply with the M/WBE Ordinance, any Rules or Regulations promulgated pursuant thereto, or any additional requirement contained herein shall render the bid non-responsive and shall constitute cause for rejection. Failure by the contractor awarded the contract to comply with M/WBE Ordinance requirements during the performance of the contract is a material breach of the contract, which may result in the imposition of sanctions on the Contractor, as deemed appropriate by DSBO. Copies of the M/WBE Ordinance and its accompanying Rules and Regulations are available for the use and review of bidders from DSBO. In order to comply with the bid requirements of the M/WBE Ordinance, a bidder shall either meet the established project goal or, in the alternative, demonstrate that the bidder has made sufficient good faith efforts to meet the goal in accordance with the M/WBE Ordinance.

Meeting Established Goal

In preparing a bid to meet the established Project goal, bidders should consider the following instructions relating to compliance with the M/WBE Ordinance:

1. Under the M/WBE Ordinance, the Director of DSBO ("Director") is directed to establish project goals for expenditures on construction, reconstruction, and remodeling work performed for the City and County of Denver. The specific goal for this project is stated in the Notice of Invitation for Bids bound herein.
2. In preparing its bid, each bidder shall list on the Bid Form pages entitled "List of Proposed MWBE Bidders, Subcontractors, Suppliers, Manufacturers, Manufacturers' Representatives or Brokers" the name, address, work description/supply, committed level of participation and other required information for each M/WBE of any tier which the bidder intends to use in performing the work on this Project. **Only the M/WBEs identified and the precise levels of participation listed for each on the Bid Form page, at the time of bid opening, will be considered in determining whether the bidder has met the designated participation goal. Additional, revised or corrected participation submitted after bid opening will not be considered.** M/WBE bidders may count self-performance or joint venture activity in meeting the M/WBE project goal, but only for the scope of work performed as a commercially useful function and at a percentage level the M/WBE will be performing itself.
3. Any agreement between a bidder or proposer and an MBE or WBE in which the bidder or proposer requires that the MBE or WBE not provide subcontracting quotations to other bidders or proposers is prohibited and shall render a bidder's bid or proposer's proposal nonresponsive. D.R.M.C. 28- 63(f)
4. If a bidder/proposer is participating in a joint venture with a certified M/WBE firm, complete the Joint Venture Eligibility Form and Joint Venture Affidavit contained in this bid document/RFP. Submit the aforementioned forms with the firm's Joint Venture Agreement, to the DSBO Director, **at least 10 working days prior to the proposal submittal.** The Joint Venture must be approved prior to the bid opening or proposal submittal by the DSBO Director. Approval by the DSBO Director includes determining the amount the Joint Venture will count towards meeting the project goal.
5. All M/WBEs listed on the Bid Form must be properly certified by the City on or before the date bids are opened in order to count towards meeting the designated goal. DSBO maintains an M/WBE Directory ("Directory"), which is a current listing of M/WBEs that have been certified by the City. A copy of the DSBO Directory is located at DSBO web site at <https://www.denvergov.org/dsbo>. Bidders are encouraged to use the Directory to assist in locating M/WBEs for the work and supplies required on the Project. Bidders are reminded that changes may be made to the Directory at anytime in accordance with the City's M/WBE Ordinance and procedures established to administer this program and a current copy of the Directory must always be used in preparing a bid. M/WBE certification or listing in the Directory is not a representation or warranty by the City as to the qualifications of any listed M/WBE.

6. In accordance with the provisions of the M/WBE Ordinance, DSBO will evaluate each bid to determine the responsiveness of the bid to the requirements of the M/WBE Ordinance. In determining whether a bidder's committed level of participation meets or exceeds the stated M/WBE goal, DSBO shall base its calculation of applicable amounts and percentages on the total base bid amount, not including any listed alternates, of each bid as follows:
- a. The bid information provided by the agency will be used to determine the total base bid amount of each bid. Each bidder's total base bid amount will be multiplied by the M/WBE percentage established for the project to determine the exact dollar amount of required M/WBE participation for the Project. This amount will then be compared against the exact dollar amounts for the M/WBE committed for participation by the bidder. If the total dollar amount of participation listed meets or exceeds the established M/WBE dollar amount goal listed, then DSBO will determine that the goal has been met.
 - b. In addition, DSBO will determine the exact commitment percentage for each listed M/WBE by dividing the dollar amount listed for each M/WBE by the total base bid dollar amount submitted by the bidder. These individual percentages, when totaled for all listed M/WBE, will establish the total committed percentage level of M/WBE participation that the bidder must comply with during the life of the contract. In all cases, the committed percentage level of M/WBE participation must equal or exceed the assigned M/WBE goal for the Project.
 - c. In providing the exact dollar amount of participation for each listed M/WBE, a bidder should take care never to round up in determining whether or not the total of these amounts meets or exceeds the established percentage goal. The goal must be met or exceeded by dollar amounts and percentages in order for DSBO to determine that the bidder has met or exceeded the applicable M/WBE goal.
 - d. As previously mentioned, compliance with the M/WBE goal will be determined on the base bid alone. If a bid contains alternates, participation contained in any alternate will not count towards satisfaction of the Project goal. However, should any designated alternate be selected by the City for inclusion in the contract ultimately awarded, the M/WBE goal percentage level submitted at bid time, on the base bid, will also apply to the selected alternates and must be maintained for the life of the contract on the total contract amount, including any alternate work. Thus, even though such participation will not be considered in evaluating bids, bidders are urged to consider participation in preparing bids for designated alternates.
 - e. On projects where force account or allowance bid items have been included, bidders must meet the M/WBE goal percentage based upon the total base bid, including all such items that are submitted to the City. However, when a force account or allowance is designated by the City to be either performed or purchased from a specific company, the bidder may back out the dollar amount of the force account or allowance from the total base bid and meet the M/WBE goal on the remaining reduced amount.
 - f. On bids which, at the time of bid opening, are equal to or exceed Five Million Dollars (\$5,000,000.00), including any alternates which may be selected, only sixty percent (60%) of the value of the commercially useful function performed by M/WBE suppliers shall count toward satisfaction of the Project goal. On Projects under Five Million (\$5,000,000.00) the value of the commercially useful function of M/WBE supplier(s) will count at a one hundred percent (100%) level. Manufacturer's representatives and packagers shall be counted in the same manner as brokers.
 - g. In utilizing the M/WBE participation of a Broker only the bona fide commissions earned by such Broker for its performance of a commercially useful function will count toward meeting the Project goals. The bidder must separate the bona fide brokerage commissions from the actual cost of the supplies or materials provided to determine the actual dollar amount of participation that can be counted towards meeting the goal.

7. On or before the third (3rd) working day after bid opening, all of the Bidders are required to submit an executed "Letter of Intent" for each M/WBE listed on the Bid Form as a joint venture member, subcontractor, supplier, manufacturer, manufacturers' representative or broker of any tier. **An MBE or WBE Prime Bidder needs to submit a Letter of Intent for itself for self-performed work** and must identify their level of participation on the designated M/WBE participation page bound herein. A Letter of Intent shall be submitted only for the M/WBEs listed at the time of bid opening, since this is the only participation that will be counted toward satisfaction of the project goal. A form for the M/WBE Letter of Intent is included with the Bid Form. The M/WBE Letter of Intent is a written communication from the Bidder to the City evidencing an understanding that the Bidder has or will enter into a contractual relationship with the M/WBE or that its subcontractor(s) and supplier(s), manufacturer(s), manufacturers' representative(s) and broker(s) will do so. Each M/WBE Letter of Intent shall be accompanied by a copy of the City and County of Denver's M/WBE certification letter for each proposed M/WBE identified at bid time. Bidders are urged to carefully review these Letters before submission to the City to ensure that they are properly completed and executed by the appropriate parties.

Good Faith Effort.

In preparing a bid to demonstrate a good faith effort, bidders should consider the following instructions relating to compliance with the M/WBE Ordinance:

1. If the bidder or proposer has not fully met the project goal as provided in section 28-60, then it shall demonstrate that it has made good faith efforts to meet such goal. The bidder or proposer shall furnish to the director, within three (3) working days after bid opening by the City or on or before the time of the final project-specific proposal submitted to and authorized by the City pursuant to a competitive selection process, or bid selection by a private owner, a detailed statement of its good faith efforts to meet the project goal set by the director. This statement shall address each of the items in subsection (b) and any additional criteria that the director may establish by rule or regulation consistent with the purposes of this division 3. Good faith efforts must be demonstrated to be meaningful and not merely for formalistic compliance with this Division 3. The scope and intensity of the efforts will be considered in determining whether the bidder or proposer has achieved a good faith effort.
2. The statement of good faith efforts shall include a specific response and verification with respect to each of the following good faith effort categories, which may be further defined by rule or regulation. A bidder or proposer may include any additional information it believes may be relevant. Failure of a bidder or proposer to show good faith efforts as to any one (1) of the following categories shall render its overall good faith effort showing insufficient and its bid or proposal non-responsive:
 - a. If prebid or preselection meetings are scheduled by the City at which MBEs and WBEs may be informed of subcontracting or joint venture opportunities under a proposed contract to be bid, or procured pursuant to the competitive selection process, attendance at such prebid or preselection meetings is not mandatory; however, bidders and proposers are responsible for the information provided at these meetings.
 - b. The bidder or proposer must solicit through all reasonable and available means, the interest of all MBEs and WBEs certified in the scopes of work of the contract. The bidder or proposer must solicit the interest of such MBEs and WBEs within sufficient time, prior to the bid opening or date of final project-specific proposal in the case of a competitive selection process, to allow such MBEs and WBEs to respond to the solicitation. The bidder or proposer must determine with certainty if the MBEs and WBEs are interested by demonstrating appropriate steps to follow up initial solicitations.
 - c. The bidder or proposer must select portions of the work of the contract to be performed by MBEs and WBEs in order to increase the likelihood that the project goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MBE and WBE participation as subcontractors or joint venturers, and for bidder or proposer self-performed work, as suppliers, manufacturers, manufacturer's representatives and

must be expressly indicated on the "Commitment to MWBE SBE Participation" form included with the Bid Form. This commitment includes the following understandings:

1. The bidder understands it must maintain M/WBE goals throughout the performance of the Contract pursuant to the requirements set out in D.R.M.C. 28-72.
2. The bidder understands that it must establish and maintain records and submit regular reports, as required, which will allow the City to assess progress in achieving the M/WBE participation goal.
3. The bidder understands that if change orders or any other contract modifications are issued under the contract, the bidder shall have a continuing obligation to immediately inform DSBO in writing of any agreed upon increase or decrease in the scope of work of such contract, upon any of the bases discussed in Section 28-73 of the M/WBE Ordinance, regardless of whether such increase or decrease in scope of work has been reduced to writing at the time of notification.
4. The bidder understands that if change orders or other contract modifications are issued under the contract, that include an increase in scope of work of a contract for construction, reconstruction, or remodeling, whether by amendment, change order, force account or otherwise which increases the dollar value of the contract, whether or not such change is within the scope of work designated for performance by an M/WBE at the time of contract award, such change orders or contract modification shall be immediately submitted to DSBO for notification purposes. Those amendments, change orders, force accounts or other contract modifications that involve a changed scope of work that cannot be performed by existing project subcontractors or by the contractor shall be subject to a goal for M/WBEs equal to the original goal on the contract which was included in the bid. The contractor shall satisfy such goal with respect to such changed scope of work by soliciting new M/WBEs in accordance with Section 28-73 of the M/WBE Ordinance as applicable, or the contractor must show each element of modified good faith set out in Section 28-75(c) of the M/WBE Ordinance. The contractor shall supply to the director the documentation described in Section 28-75(c) of the M/WBE Ordinance with respect to the increased dollar value of the contract.

All bidders are charged with knowledge of and are solely responsible for complying with each and every provision of the M/WBE Ordinance in making a bid and, if awarded, in performing the work described in the Contract Documents. Failure to comply with these provisions could constitute cause for rejection of a bid or subject the selected contractor to sanctions set forth in the M/WBE Ordinance. These instructions are intended only to generally assist the bidder in preparing and submitting a compliant bid. Should any questions arise regarding specific circumstances, bidders must consult the M/WBE Ordinance or contact the Project's designated DSBO representative at (720) 913-1999.

IB- 26 DISCLOSURE OF INFORMATION

All submissions and other materials provided or produced pursuant to this Invitation for Bids may be subject to the Colorado Open Records Law, C.R.S. 24-72-201, et seq. As such, bidders are urged to review these disclosure requirements and any exceptions to disclosure of information furnished by another party and, prior to submission of a bid to the City, appropriately identify materials that are not subject to disclosure. In the event of a request to the City for disclosure of such information, the City shall advise the bidder of such request to give the bidder an opportunity to object to the disclosure of designated confidential materials furnished to the City. In the event of the filing of a lawsuit to compel such disclosure, the City will tender all such material to the court for judicial determination of the issue of disclosure and each bidder agrees to intervene in such lawsuit to protect and assert its claims of privilege against disclosure of such material. Each bidder further agrees to defend, indemnify and save and hold harmless the City, its officers, agents and employees, from any claim, damages, expense, loss or costs arising out of the bidder's intervention to protect and assert its claims of privilege against disclosure under the Open Records Law including, but not limited to, prompt reimbursement to the City of all reasonable attorney fees, costs and damages that the City may incur directly or may be ordered to pay by such court.

IB-27 GENERAL BIDDING INFORMATION

Bidders are instructed to contact the Contract Administrator designated below for this Project for pre-bid, post-bid and general City bidding information. Bidders can also visit www.work4denver.com for information, both general and project specific. The Contract Administrator assigned to this project is David Relaford who can be reached via email at pw.procurement@denvergov.org.

IB-28 PAYMENT PROCEDURE REQUIREMENTS

Contractor recognizes and agrees that it shall be required to use the Textura® Construction Payment Management System (CPM System) for this Project. All fees associated with the CPM System are to be paid by the Contractor for billings for work performed. Bidders are required, when preparing a bid, to enter the price of the CPM service on the line provided for the service. The fee is all inclusive of all subcontractor, project and subscription fees associated with the CPM system. The bidder will calculate the fee based on a percentage of their total bid, and then should include it on the line item provided in the bid form labeled “Textura® Construction Payment Management System Fee”. This expense becomes part of the contract and billable to the City. Textura will invoice the awarded contractor directly. All costs including but not limited to costs associated with training, entering data or utilizing Textura other than the Textura Construction Payment Management System Fee are overhead and shall not be reimbursed by the City. Contractor is responsible for tax on Textura fee. As with other taxes, the City will not reimburse Contractor for this cost and therefore this cost should be included in Contractor’s bid. Textura will invoice the awarded contractor directly.

Project Value	Project Fee (GC + Sub Usage)
\$250,000 - \$499,999.99	\$1,625
\$500,000 - \$999,999.99	\$3,250
\$1,000,000 - \$2,999,999.99	\$5,850
\$3,000,000 - \$4,999,999.99	\$9,100
\$5,000,000 - \$9,999,999.99	\$12,220
\$10,000,000 - \$19,999,999.99	\$20,345
\$20,000,000 - \$49,999,999.99	\$32,500
\$50,000,000 - \$99,999,999.99	\$48,750
\$100,000,000 - \$199,999,999.99	\$69,095
\$200,000,000 - \$299,999,999.99	\$85,345
\$300,000,000 - \$399,999,999.99	\$109,720
\$400,000,000 - \$499,999,999.99	\$142,220
\$500,000,000 - \$999,999,999.99	\$162,500
\$1,000,000,000 - \$1,999,999,999.99	\$345,345
\$2,000,000,000 - \$4,999,999,999.99	\$650,000
\$5,000,000,000 - \$9,999,999,999.99	\$1,015,625
\$10,000,000,000 or greater	\$1,503,125

**RULES AND REGULATIONS
REGARDING
EQUAL EMPLOYMENT OPPORTUNITY**

Promulgated and adopted by the Manager of Public Works pursuant to and by authority of Article III, Division 2, Chapter 28 of the Revised Municipal Code of the City and County of Denver, and for the purpose of insuring that contractors, subcontractors and suppliers soliciting and receiving compensation for contract work from or through the City and County of Denver provide equal opportunity in employment without regard to race, color, creed, sex, national origin, age, religion, marital status, political opinion or affiliation or mental or physical handicap and meet certain requirements for the hiring, training, promotion, and treatment during employment of members of ethnic groups subject to differential treatment, including persons of African descent (Black), Spanish-surnamed (Hispanic), Asian-American and American Indian Groups.

RULE I - DEFINITIONS

- A. "City" means the City and County of Denver.
- B. "Manager" shall mean the Manager of Public Works for the City and County of Denver.
- C. "Contract" means a contract entered into with the City and County of Denver, financed in whole or in part by local resources or funds of the City and County of Denver, for the construction of any public building or prosecution or completion of any public work.
- D. "Contractor" means the original party to a contract with the City and County of Denver, also referred to as the "general" or "prime" contractor.
- E. "Director" means the Director of the Division of Small Business Opportunity.
- F. "Subcontractor" means any person, company, association, partnership, corporation, or other entity, which assumes by subordinate agreement some or all of the obligations of the general or prime contractor.
- G. The phrase "Bidding Specifications" as used in Article III, Division 2 of Chapter 28 of the Revised Municipal Code shall include BID CONDITION, INVITATION TO BID, and NOTICE OF PROPOSAL.
- H. "Affirmative Action Program" means a set of specific and result-oriented procedures or steps to which a contractor commits himself to apply every good faith effort to employ members of ethnic minority groups, to include persons of African descent (Black), Spanish surnamed (Hispanic), Asian-American, American Indians, and persons with mental or physical handicap.
- I. "Division of Small Business Opportunity" means the City agency established pursuant to Article III, Division 1 of Chapter 28 of the Denver Revised Municipal Code.

RULE II - NOTICE OF HEARING

When results of conciliation efforts are unsatisfactory to the Manager and he is informed in accordance with Article III, Division 2 of Chapter 28 of the Revised Municipal code that a contractor or subcontractor has apparently failed to meet affirmative action and equal employment opportunity requirements after a reasonable period of notice to correct deficiencies, the Manager will, prior to imposition of any sanctions, afford the general contractor a hearing in order to determine whether the contractor or his subcontractors have failed to comply with the affirmative action and equal employment opportunity requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or of the contract. Written notice of such hearing shall be delivered personally or sent by certified mail, return receipt requested, to the contractor and to any subcontractor involved, at least ten (10) days prior to the date scheduled for the hearing.

RULE III - HEARING

- A. Contractors will appear at hearings and may be represented by counsel, and may present testimony orally and other evidence.
- B. Hearings shall be conducted by one or more hearing examiners designated as such by the Manager.
- C. The Director of the Division of Small Business Opportunity may participate in hearings as a witness.
- D. Hearings shall be held at the place specified in the notice of hearing.
- E. All oral testimony shall be given under oath or affirmation and a record of such proceedings shall be made.
- F. All hearings shall be open to the public.
- G. The hearing officer shall make recommendations to the Manager who shall make a final decision.

REGULATIONS

REGULATION NO. 1 - ORDINANCE:

The Rules and Regulations of the Manager shall be inserted in the bidding specifications for every contract for which bidding is required.

REGULATION NO. 2 - EXEMPTIONS:

Each contract and subcontract, regardless of the dollar amount, shall be subject to affirmative action requirements unless specifically exempted in writing individually by the Manager. Exemptions apply only to "affirmative action" in equal employment opportunity and are not to be construed as condonation in any manner of "discrimination" or "discriminatory practices" in employment because of race, color, creed, sex, age, national origin, religion, marital status, political opinion or mental or physical handicap.

REGULATION NO. 3 - DIRECTOR OF CONTRACT COMPLIANCE:

The Director of the Division of Small Business Opportunity shall perform the duties assigned to such official by Article III, Division 2 Chapter 28 of the Revised Municipal Code and by the Manager. (1) The Director of the Division of Small Business Opportunity or designated representatives shall inform bidders and contractors of affirmative action procedures, programs, and goals in accordance with the Ordinance at pre-bid and pre-construction conference; (2) make regular on-site inspections; (3) supply contractors and subcontractors with report forms to be completed by them when requested, and furnished to the Director of the Division of Small Business Opportunity; and (4) review payroll records, employment records and practices of general contractors and their subcontractors and suppliers during the performance of any contract. The Director of the Division of Small Business Opportunity shall promptly report apparent affirmative action deficiencies to the Manager.

REGULATION NO. 4 - GOALS AND TIMETABLES:

In general, goals and timetables should take into account anticipated vacancies and the availability of skills in the market place from which employees should be drawn. In addition, where discrimination in employment by a general contractor or any of his subcontractors is indicated, a corrective action program will take into account the need by the general contractor and his subcontractors to correct past discriminatory practices and reach goals of minority manpower utilization on a timely basis through such recruiting and advertising efforts as are necessary and appropriate.

REGULATION NO. 5 - AWARD OF CONTRACTS:

It shall be the responsibility of the Director of the Division of Small Business Opportunity to determine the affirmative action capability of bidders, contractors and subcontractors and to recommend to the Manager the award of contracts to those bidders, contractors and subcontractors and suppliers who demonstrate the ability and willingness to comply with the terms of their contract.

REGULATION NO. 6 - PUBLICATION AND DUPLICATION:

Copies of these Rules and Regulations as amended by the Manager from time to time, shall as soon as practicable and after Notice being published will be made a part of all City Contracts.

REGULATION NO. 7 - NOTICE TO PROCEED:

Prior to issuance of the Notice to Proceed, a sign-off will be required of the Director of the Division of Small Business Opportunity or his designee.

REGULATION NO. 8 - CONTRACTS WITH SUBCONTRACTORS:

To the greatest extent possible, the contractor shall make a good faith effort to contract with minority contractors, subcontractors and suppliers for services and supplies by taking affirmative actions, which include but are not limited to the following:

1. Advertise invitations for subcontractor bids in minority community news media.
2. Contact minority contractor organizations for referral of prospective subcontractors.
3. Purchase materials and supplies from minority material suppliers.

REGULATION NO. 9 - AGENCY REFERRALS:

It shall be no excuse that the union with which the contractor or subcontractor has an agreement providing for referral, exclusive or otherwise, failed to refer minority employees.

REGULATION NO. 10 - CLAUSES:

The Manager shall include the appropriate clauses in every contract and the contractor shall cause to be inserted in every subcontract the appropriate clauses:

1. APPENDIX A: City and County of Denver Equal Opportunity Clause - ALL CONTRACTS funded only with City and County of Denver monies.
2. APPENDIX B: Equal Opportunity Clause (11246) - ALL FEDERAL ASSISTED.
3. APPENDIX C: Section 3 - Assurance of Compliance - HUD ASSISTED PROJECTS.
4. APPENDIX D: Section 3 - Clause - HUD ASSISTED PROJECTS.

All amendments to the appendices shall be included by reference.

REGULATION NO. 11 - SHOW CAUSE NOTICES:

When the Manager has reasonable cause to believe that a contractor has violated Article III, Division 2 of Chapter 28 of the Denver Revised Municipal Code, he may issue a notice requiring the contractor to show cause, within fifteen (15) days why enforcement procedures, or other appropriate action to insure compliance, should not be instituted.

REGULATION NO. 12 - BID CONDITIONS - AFFIRMATIVE ACTION REQUIREMENTS - EQUAL EMPLOYMENT OPPORTUNITY:

1. APPENDIX E: The Bid Conditions - Affirmative Action Requirements - Equal Employment Opportunity as amended and published by the U.S. Department of Labor Employment Standards Administration, Office of Federal Contract Compliance, shall be inserted verbatim for bidding specification for every non-exempt contract involving the use of Federal funds.
2. APPENDIX F: The Bid Conditions - Affirmative Action Requirements - Equal Employment Opportunity as published by the Department of Public Works, City and County of Denver, shall be inserted verbatim as bidding specifications for every non-exempt contract using City funds.

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APPENDIX A

**CITY AND COUNTY OF DENVER EQUAL OPPORTUNITY CLAUSE -
ALL CONTRACTS**

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap.
3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided, advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. Each Contractor will comply with all provisions of Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and the rules, regulations, and relevant orders of the Manager and the Director.
5. The Contractor will furnish all information and reports required by Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and by rules, regulations and orders of the Manager and Director or pursuant thereto, and will permit access to his books, records, and accounts by the Manager, Director, or their designee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further City contracts in accordance with procedures authorized in Article III, Division 2, Chapter 28 of the Revised Municipal Code, or by rules, regulations, or order of the Manager.
7. The Contractor will include Regulation 12, Paragraph 2 and the provisions of paragraphs (1) through (6) in every subcontract of purchase order unless exempted by rules, regulations, or orders of the Manager issued pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, so that such provisions will be binding on each subcontractor or supplier. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

The applicant further agrees to be bound by the above equal opportunity clauses with respect to its own employment practices when it participates in City contracts. The Contractor agrees to assist and cooperate actively with the Manager and the Director in obtaining compliance of subcontractors and suppliers with the equal opportunity clause and the rules, regulations and relevant orders of the Manager, and will furnish the Manager and the Director such information as they may require for the supervision of compliance, and will otherwise assist the Manager and Director in the discharge of the City's primary responsibility for securing

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APPENDIX F

AFFIRMATIVE ACTION REQUIREMENTS

EQUAL EMPLOYMENT OPPORTUNITY

For All Non-Exempt Construction Contracts to Be Awarded by the
City and County of Denver, Department of Public Works.

NOTICE

EACH BIDDER, CONTRACTOR OR SUBCONTRACTOR (HEREINAFTER THE CONTRACTOR) MUST FULLY COMPLY WITH THE REQUIREMENTS OF THESE BID CONDITIONS AS TO EACH CONSTRUCTION TRADE IT INTENDS TO USE ON THIS CONSTRUCTION CONTRACT, AND ALL OTHER CONSTRUCTION WORK (BOTH CITY AND NON-CITY) IN THE DENVER AREA DURING THE PERFORMANCE OF THIS CONTRACT OR SUBCONTRACT. THE CONTRACTOR COMMITS ITSELF TO THE GOALS FOR MINORITY MANPOWER UTILIZATION, AS APPLICABLE, AND ALL OTHER REQUIREMENTS, TERMS AND CONDITION OF THESE BID CONDITIONS BY SUBMITTING A PROPERLY SIGNED BID.

THE CONTRACTOR SHALL APPOINT A COMPANY EXECUTIVE TO ASSUME THE RESPONSIBILITY FOR THE IMPLEMENTATION OF THE REQUIREMENTS, TERMS AND CONDITIONS OF THESE BID CONDITIONS.

/s/ _____

Manager of Public Works
City and County of Denver

A. REQUIREMENTS - AN AFFIRMATIVE ACTION PLAN:

Contractors shall be subject to the provisions and requirements of these bid conditions including the goals and timetables for minority* and female utilization, and specific affirmative action steps set forth by the Division of Small Business Opportunity (DSBO). The contractor's commitment to the goals for minority, and female utilization as required constitutes a commitment that it will make every good faith effort to meet such goals.

1. GOALS AND TIMETABLES:

The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade are as follows:

GOALS FOR MINORITY PARTICIPATION FOR EACH TRADE	GOALS FOR FEMALE PARTICIPATION FOR EACH TRADE
From January 1, 1982 to Until Further Notice	From January 1, 1982 to Until Further Notice
21.7% - 23.5%	6.9%

The goals for minority and female utilization above are expressed in terms of hours of training and employment as a proportion of the total number of hours to be worked by the contractor's aggregate workforce, which includes all supervisory personnel, in each trade, on all projects for the City and County of Denver during the performance of its contract (i.e., The period beginning with the first day of work on the City and County of Denver funded construction contract and ending with the last day of work).

The hours of minority and female employment and training must be substantially uniform throughout the length of the contract in each trade and minorities and females must be employed evenly on each of a contractor's projects. Therefore, the transfer of minority or female employees from contractor to contractor or from project to project for the purpose of meeting the contractor's goals shall be a violation of these Bid Conditions.

If the Contractor counts the nonworking hours of apprentices they must be employed by the Contractor during the training period; the Contractor must have made a commitment to employ apprentices at the completion of their training subject to the availability of employment opportunities; and the apprentices must be trained pursuant to training programs approved by the Bureau of Apprenticeship and Training.

* "Minority" is defined as including, Blacks, Spanish Surname Americans, Asian Americans, and American Indians, and includes both men and minority women.

2. SPECIFIC AFFIRMATIVE ACTION STEPS:

No contractor shall be found to be in noncompliance solely on account of its failure to meet its goals, but will be given an opportunity to demonstrate that the contractor has instituted all the specific affirmative action steps specified and has made every good faith effort to make these steps work toward the attainment of its goals within the timetables, all to the purpose of expanding minority and female utilization in its aggregate workforce. A contractor, who fails to comply with its obligation under the Equal Opportunity Clause of its contract and fails to achieve its commitments to the goals for minority and female utilization has the burden of proving that it has engaged in an Affirmative Action Program directed at increasing minority and female utilization and that such efforts were at least as extensive and as specific as the following:

- a. The Contractor should have notified minority and female organizations when employment opportunities were available and should have maintained records of the organization's response.

- b. The Contractor should have maintained a file of the names and addresses of each minority and female referred to it by any individual or organization and what action was taken with respect to each such referred individual, and if the individual was not employed by the Contractor, the reasons. If such individual was sent to the union hiring hall for referral and not referred back by the union or if referred, not employed by the Contractor, the file should have documented this and their reasons.
- c. The Contractor should have promptly notified the Department of Public Works, and the Division of Small Business Opportunity when the union or unions with which the Contractor has collective bargaining agreements did not refer to the contractor a minority or female sent by the contractor, or when the Contractor has other information that the union referral process has impeded efforts to meet its goals.
- d. The Contractor should have disseminated its EEO policy within its organization by including it in any employee handbook or policy manual; by publicizing it in company newspapers and annual reports and by advertising such policy at reasonable intervals in union publications. The EEO policy should be further disseminated by conducting staff meetings to explain and discuss the policy; by posting of the policy; and by review of the policy with minority and female employees.
- e. The Contractor should have disseminated its EEO policy externally by informing and discussing it with all recruitment sources; by advertising in news media, specifically including minority and female news media; and by notifying and discussing it with all subcontractors.
- f. The Contractor should have made both specific and reasonably recurrent written and oral recruitment efforts. Such efforts should have been directed at minority and female organizations, schools with substantial minority and female enrollment, and minority and female recruitment and training organizations within the Contractor's recruitment area.
- g. The Contractor should have evidence available for inspection that all tests and other selection techniques used to select from among candidates for hire, transfer, promotion, training, or retention are being used in a manner that does not violate the OFCCP Testing Guidelines in 41 CFR Part 60-3.
- h. The Contractor should have made sure that seniority practices and job classifications do not have a discriminatory effect.
- i. The Contractor should have made certain that all facilities are not segregated by race.
- j. The Contractor should have continually monitored all personnel activities to ensure that its EEO policy was being carried out including the evaluation of minority and female employees for promotional opportunities on a quarterly basis and the encouragement of such employees to seek those opportunities.
- k. The Contractor should have solicited bids for subcontracts from available minority and female subcontractors engaged in the trades covered by these Bid Conditions, including circulation of minority and female contractor associations.

NOTE: The Director and the Division of Small Business Opportunity will provide technical assistance on questions pertaining to minority and female recruitment sources, minority and female community organizations, and minority and female news media upon receipt of a request for assistance from a contractor.

3. **NON - DISCRIMINATION:**

In no event may a contractor utilize the goals and affirmative action steps required in such a manner as to cause or result in discrimination against any person on account of race, color, religion, sex, marital status, national origin, age, mental or physical handicap, political opinion or affiliation.

4. **COMPLIANCE AND ENFORCEMENT:**

In all cases, the compliance of a contractor will be determined in accordance with its obligations under the terms of these Bid Conditions. All contractors performing or to perform work on projects subject to these Bid Conditions hereby agree to inform their subcontractors in writing of their respective obligations under the terms and requirements of these Bid Conditions, including the provisions relating to goals of minority and female employment and training.

B. CONTRACTORS SUBJECT TO THESE BID CONDITIONS:

In regard to these Bid Conditions, if the Contractor meets the goals set forth therein or can demonstrate that it has made every good faith effort to meet these goals, the Contractor shall be presumed to be in compliance with Article III, Division 2 of Chapter 28 of the Revised Municipal Code, the implementing regulations and its obligations under these Bid Conditions. In the event, no formal sanctions or proceedings leading toward sanctions shall be instituted unless the contracting or administering agency otherwise determines that the contractor is violating the Equal Opportunity Clause.

1. Where the Office of Contract Compliance finds that a contractor failed to comply with the requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or the implementing regulations and the obligations under these Bid Conditions, and so informs the Manager, the Manager shall take such action and impose such sanctions, which include suspension, termination, cancellation, and debarment, as may be appropriate under the Ordinance and its regulations. When the Manager proceeds with such formal action it has the burden of proving that the Contractor has not met the goals contained in these Bid Conditions. The Contractor's failure to meet its goals shall shift to it the requirement to come forward with evidence to show that it has met the good faith requirements of these Bid Conditions.
2. The pendency of such proceedings shall be taken into consideration by the Department of Public Works in determining whether such contractor can comply with the requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and is therefore a "responsible prospective contractor".
3. The Division of Small Business Opportunity shall review the Contractor's employment practices during the performance of the contract. If the Division of Small Business Opportunity determines that the Contractor's Affirmative Action Plan is no longer an acceptable program, the Director shall notify the Manager.

C. OBLIGATIONS APPLICABLE TO CONTRACTORS:

It shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority or female employees. Discrimination in referral for employment, even if pursuant to provisions of a collective bargaining agreement, is prohibited by the National Labor Relations Act, as amended, Title VI of the Civil Rights Act of 1964, as amended, and Article III, Division 2 of Chapter 28 of the Revised Municipal Code. It is the policy of the Department of Public Works that contractors have a responsibility to provide equal employment opportunity, if they wish to participate in City and County of Denver contracts. To the extent they have delegated the responsibility for some of their employment practices to a labor organization and, as a result, are prevented from meeting their obligations pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, such Contractors cannot be considered to be in compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, or its implementing rules and regulations.

D. GENERAL REQUIREMENTS:

Contractors are responsible for informing their subcontractors in writing regardless of tier, as to their respective obligations. Whenever a Contractor subcontracts a portion of work in any trade covered by these Bid Conditions, **it shall include these Bid Conditions in such subcontracts and each subcontractor shall be bound by these Bid Conditions to the full extent as if it were the prime contractor.** The Contractor

shall not, however, be held accountable for the failure of its subcontractors to fulfill their obligations under these Bid Conditions. However, the prime contractor shall give notice to the Director of any refusal or failure of any subcontractor to fulfill the obligations under these Bid Conditions. A subcontractor's failure to comply will be treated in the same manner as such failure by a prime contractor.

1. Contractors hereby agree to refrain from entering into any contract or contract modification subject to Article III, Division 2, Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who is determined not to be a "responsive" bidder for the City and County of Denver contracts pursuant to the Ordinance.
2. The Contractor shall carry out such sanctions and penalties for violation of these Bid Conditions and the Equal Opportunity Clause including suspension, termination and cancellation of existing subcontracts and debarment from future contracts as may be ordered by the Manager pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code and its implementing regulations.
3. Nothing herein is intended to relieve any contractor during the term of its contract from compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, and the Equal Opportunity Clause of its contract with respect to matters not covered in these Bid Conditions.
4. Contractors must keep such records and file such reports relating to the provisions of these Bid Conditions as shall be required by the Office of Contract Compliance.
5. Requests for exemptions from these Bid Conditions must be made in writing, with justification, to the Manager of Public Works, 201 W. Colfax, Dept. 608, Denver, Colorado 80202, and shall be forwarded through and with the endorsement of the Director.

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

CONTRACT NO. 201844162

RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

CONTRACT

THIS CONTRACT AND AGREEMENT, made and entered into by and between the City and County of Denver, a municipal corporation of the State of Colorado, hereinafter referred to as the "City," party of the first part, and 201844162, hereinafter referred to as the "Contractor," party of the second part,

**American Civil Constructors LLC dba ACC Mountain West
4901 S. Windermere St.
Littleton, CO 80120**

WITNESSETH, Commencing on **August 29, 2018**, and for at least three (3) days the City advertised that sealed bids would be received for furnishing all labor, tools, supplies, equipment, materials, and everything necessary and required for the following:

**CONTRACT NO. 201844162
RUDE PARK BALLFIELD AND ACCESS
IMPROVEMENTS**

WHEREAS, bids pursuant to said advertisement have been received by the Manager of Public Works, who has recommended that a Contract for said work be made and entered into with the above named Contractor who was the lowest, responsive, qualified bidder therefore, and

WHEREAS, said Contractor is now willing and able to perform all of said work in accordance with said advertisement and its bid.

NOW THEREFORE, in consideration of the compensation to be paid the Contractor, the mutual agreements hereinafter contained, and subject to the terms hereinafter stated, it is mutually agreed as follows:

1. CONTRACT DOCUMENTS

It is agreed by the parties hereto that the following list of documents, instruments, technical specifications, plans, drawings and other materials which are attached hereto and bound herewith, incorporated herein by reference or otherwise referenced in these documents constitute and shall be referred to either as the "Contract Documents" or the "Contract," and all of said documents, instruments, technical specifications, Plans, Drawings and other materials taken together as a whole constitute the Contract between the parties hereto, and they are as fully a part of this agreement as if they were set out verbatim and in full herein:

*Advertisement of Notice of Invitation for Bids
Instructions to Bidders
Commitment to M/WBE Participation
Article III, Divisions 1, 2, and 3 of Chapter 28, D.R.M.C.
Bid Bond
Addenda (as applicable)*

qual Employment Opportunity Provisions (Appendix A and Appendix F)
Bid Form
Contract Form
General Contract Conditions
Special Contract Conditions
Performance and Payment Bond
Notice to Apparent Low Bidder
Notice to Proceed
Contractor's Certification of Payment Form
Final/Partial Lien Release Form
Certificate of Contract Release
Change Orders (as applicable)
Federal Requirements (as applicable)
Prevailing Wage Rate Schedule(s)
Technical Specifications
Contract Drawings
Accepted Shop Drawings

2. **SCOPE OF WORK**

The Contractor agrees to and shall furnish all labor, tools, supplies, equipment, materials and everything necessary for and required to do, perform and complete all of the Work described, drawn, set forth, shown and included in said Contract Documents.

3. **TERMS OF PERFORMANCE**

The Contractor agrees to undertake the performance of the Work under this Contract within ten (10) days after being notified to commence work by issuance of a Notice to Proceed in substantially the form contained herein from the Manager and agrees to fully complete said Work within **180 (One Hundred and Eighty Days)** consecutive calendar days from the effective date of said Notice, plus such extension or extensions of time as may be granted in accordance with the provisions of the General Contract Conditions and any applicable Special Contract Conditions.

4. **TERMS OF PAYMENT**

The City agrees to pay the Contractor for the performance of all of the Work required under this Contract, and the Contractor agrees to accept as the Contractor's full and only compensation therefore, such sum or sums of money as may be proper in accordance with the price or prices set forth in the Contractor's Bid Form hereto attached and made a part hereof for **bid item numbers 01 11 00-1 through 32 97 00-1 (Eighty-Five [85] total bid items plus (Five [5]) allowance account items A/A 01 through A/A 05, the total estimated cost thereof being One Million, One Hundred Ninety-Four Thousand, Six Hundred Ninety-Seven Dollars and Fifty-Five Cents (\$1,194,697.55)**. Adjustments to said Contract Amount and payment of amounts due hereunder shall be made in accordance with the provisions of the General Contract Conditions and any applicable Special Contract Conditions.

5. **NO DISCRIMINATION IN EMPLOYMENT**

In connection with the performance of work under this contract, the Contractor may not refuse to hire, discharge, promote or demote, or discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, gender identity or gender expression, marital status, or physical or mental disability. The Contractor shall insert the foregoing provision in all subcontracts.

6. **COMPLIANCE WITH M/WBE REQUIREMENT**

This Contract is subject to all applicable provisions of Divisions 1 and 3 of Article III, of Chapter 28, Denver Revised Municipal Code (D.R.M.C.), designated as Sections 28-31 – 28-36 and 28-52 – 28-90 D.R.M.C. and referred to in this Contract as the "M/WBE Ordinance". Without limiting the general applicability of the foregoing, the Contractor acknowledges its continuing duty, pursuant to Sections 28-72, 28-73 and 28-75 of the D.R.M.C., to maintain throughout the duration of this Contract, compliance with the level of minority and Woman business enterprise participation, upon which the City approved the award of this Contract to the Contractor and the Contractor further acknowledges that failure to maintain such participation commitments or otherwise comply with the requirements of the M/WBE Ordinance shall subject the

Contractor to sanctions in accordance with Section 28-77 of the D.R.M.C. Nothing contained in this provision or in the M/WBE Ordinance shall negate the City's right to prior approval of subcontractors, or substitutes therefore, under this Contract

7. WAGE RATE REQUIREMENTS

In performance of all Work hereunder, the Contractor agrees to comply with and be bound by all requirements and conditions of the City's Payment of Prevailing Wages Ordinance, Sections 20-76 through 20-79, D.R.M.C. and any determinations made by the City pursuant thereto.

8. APPLICABILITY OF LAWS

The Agreement between the Contractor and the City shall be deemed to have been made in the City and County of Denver, State of Colorado and shall be subject to, governed by, and interpreted and construed by or in accordance with the laws of the State of Colorado and the Charter, Revised Municipal Code, Rules, Regulations, Executive Orders and fiscal rules of the City. As such, the Contractor shall at all times comply with the provisions of the Charter, Revised Municipal Code, Rules, Regulations, Executive Orders and fiscal rules of the City, and those State of Colorado and Federal Laws, Rules and Regulations, which in any manner limit, control or apply to the actions or operations of the Contractor, any subcontractors, employees, agents or servants of the Contractor engaged in the Work or affecting the materials and equipment used in the performance of the Work, as the same may be, from time to time, promulgated, revised or amended. The Charter and Revised Municipal Code of the City and County of Denver, as the same may be amended from time to time, are hereby expressly incorporated into this Agreement as if fully set out herein by this reference.

9. APPROPRIATION

The amount of money, which has been appropriated and encumbered for the purpose of this contract, to date, is equal to or in excess of the Contract Amount. The Manager, upon reasonable written request, will advise the Contractor in writing of the total amount of appropriated and encumbered funds, which remain available for payment for all Work under the Contract.

The issuance of any change order or other form or order or directive by the City which would cause the aggregate payable under the contract to exceed the amount appropriated for the contract is expressly prohibited. In no event shall the issuance of any change order or other form of order or directive by the City be considered valid or binding if it requires additional compensable work to be performed, which work will cause the aggregate amount available under the Contract to exceed the amount appropriated and encumbered for this Contract, unless and until such time as the Contractor has been advised in writing by the Manager that a lawful appropriation, sufficient to cover the entire cost of such additional work, has been made.

It shall be the responsibility of the Contractor to verify that the amounts already appropriated for this Contract are sufficient to cover the entire cost of such work, and any work undertaken or performed in excess of the amount appropriated is undertaken or performed in violation of the terms of this contract, without the proper authorization for such work, and at the Contractor's own risk.

10. APPROVALS

In the event this Contract calls for the payment by the City of five hundred thousand dollars (\$500,000.00) or more, approval by the Board of Councilmen of the City and County of Denver, acting by ordinance, in accordance with Section 3.2.6 of the Charter of the City and County of Denver, is and shall be an express condition precedent to the lawful and binding execution and effect and performance of this contract.

11. ASSIGNMENT

The Contractor shall not assign any of its rights, benefits, obligations or duties under this Contract except upon the prior written consent and approval of the Manager to such assignment.

12. DISPUTES RESOLUTION PROCESS

It is the express intention of the parties to this Contract that all disputes of any nature whatsoever regarding the Contract including, but not limited to, any claims for compensation or damages arising out of breach or default under this Contract, shall be resolved by administrative hearing pursuant to the provisions of Section 56-106, D.R.M.C., or, as applicable, Section 28-33 D.R.M.C. for Minority and Woman Business Enterprise disputes. The Contractor expressly agrees that this dispute resolution process is the only dispute resolution mechanism that will be recognized by the parties for any claims put forward by the Contractor,

notwithstanding any other claimed theory of entitlement on the part of the Contractor or its subcontractors or suppliers.

13. CONTRACT BINDING

It is agreed that this Contract shall be binding on and inure to the benefit of the parties hereto, their heirs, executors, administrators, assigns and successors.

14. PARAGRAPH HEADINGS

The captions and headings set forth herein are for convenience of reference only and shall not be construed so as to define or limit the terms and provisions hereof.

15. SEVERABILITY

It is understood and agreed by the parties hereto that, if any part, term, or provision of this Contract, except for the provisions of this Contract requiring prior appropriation and limiting the total amount to be paid by the City, is by the courts held to be illegal or in conflict with any law of the State of Colorado, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular part, term or provision held to be invalid.

16. ELECTRONIC SIGNATURES AND ELECTRONIC RECORDS

Contractor consents to the use of electronic signatures by the City. The Agreement, and any other documents requiring a signature hereunder, may be signed electronically by the City in the manner specified by the City. The Parties agree not to deny the legal effect or enforceability of the Agreement solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

Contract Control Number:

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at Denver, Colorado as of

SEAL

CITY AND COUNTY OF DENVER

ATTEST:

By _____

APPROVED AS TO FORM:

REGISTERED AND COUNTERSIGNED:

By _____

By _____

By _____



IN WITNESS WHEREOF, the parties have executed this agreement and affixed their seals at Denver, Colorado as of the day first above written.

Contract Control Number: 201844162

Vendor Name: American Civil Constructors LLC dbaACC Mountain West

By: Randy L Maher

Name: Randy L Maher
(please print)

Title: President
(please print)



ATTEST: [if required]

By: [Signature]

Name: LARRY RICE
(please print)

Title: VICE PRESIDENT
(please print)



**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

General Contract Conditions

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CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
201844162

SPECIAL CONTRACT CONDITIONS

SC-1 CONSTRUCTION SPECIFICATIONS

Except as amended herein or in the attached Technical Specifications, all Work performed under the terms of this Contract shall be governed by the applicable provisions of the following latest editions:

City and County of Denver:

Standard Specifications for Construction, GENERAL CONTRACT CONDITIONS,
2011 Edition.

Transportation Standards and Details for the Engineering Division

City and County of Denver Traffic Standard Drawings

Wastewater Management Division

– *Standard Detail Drawings*

– *Public Works Wastewater Capital Projects Management Standard Construction Specifications*

Colorado Department of Transportation:

Standard Specifications for Road and Bridge Construction
(Sections 200 through 700 of the 2011 Edition)

Federal Highway Administration:

Manual on Uniform Traffic Control Devices for Streets & Highways (MUTCD)

Building & Fire Codes:

Building Code of the City and County of Denver

(International Building Code 2015 Series, City and County of Denver Amendments 2016)

National Fire Protection Association Standards

(As referenced in the Building Code of the City and County of Denver)

The aforementioned City and County of Denver documents are available for review at the Capital Projects Management Office, 201 W. Colfax Ave., Dept. 506, (5th floor), Denver, CO 80202. The *Standard Specifications for Construction, GENERAL CONTRACT CONDITIONS* is available at: <https://www.denvergov.org/content/denvergov/en/contract-administration/contractor-resources.html>. *Transportation Standards and Details for the Engineering Division* and the Wastewater Management Division – *Standard Detail Drawings*, are available at <http://www.denvergov.org>.

The “*Colorado Department of Transportation Standard Specifications for Road and Bridge Construction*” is available for review on CDOT’s website at <http://www.coloradodot.info/> and can be purchased from the Colorado Department of Transportation.

The *Manual on Uniform Traffic Control Devices for Streets & Highways* is available for review at the Federal Highway Administration Website at: www.fhwa.dot.gov, The FHWA website also contains purchasing information.

SC-2 DEPUTY MANAGER / CITY ENGINEER

General condition 109 DEPUTY MANAGER is hereby deleted in its entirety and replaced with the following:

The "Deputy Manager" means the official who reports directly to the Manager and exercises supervisory responsibility in the City agency defined in Title 2 herein that is responsible for the Project. The Manager hereby designates the City Engineer as the Deputy Manager for purposes of this Contract. The City Engineer shall have responsibility for this Project and shall undertake all duties, responsibilities, rights and authority, including specific actions and decisions, delegated to the Deputy Manager under the various terms and conditions of this Contract.

SC-3 ENGINEERING DIVISION / CITY ENGINEER

The Engineering Division is a unit of the Department of Public Works and is supervised by the City Engineer, who is subordinate to the Manager of Public Works. This Division is responsible for the planning, design, construction, operation and maintenance of all of the City's transportation facilities and the planning, design and construction of all of the City's wastewater facilities, except for the City's Municipal Airport System. All other references to the Transportation Division or the Deputy Manager of Public Works for Transportation are deleted and replaced with references to the Engineering Division and City Engineer, respectively.

SC-4 WASTEWATER MANAGEMENT DIVISION

The Wastewater Management Division is a unit of the Department of Public Works and is supervised by the Deputy Manager of Public Works for Wastewater Management, who is subordinate to the Manager of Public Works. This Division is responsible for the operation and maintenance of the City's wastewater facilities.

SC-5 CITY DELEGATION OF AUTHORITY

With reference to General Contract Condition 109, DEPUTY MANAGER and General Contract Condition 212, CITY'S CONTRACT ADMINISTRATION LINE OF AUTHORITY, the Manager hereby designates the City Engineer as the City official responsible for those certain actions and decisions designated as the responsibility of the Deputy Manager under the General Conditions and delegates to the City Engineer the authority necessary to undertake those responsibilities under this Contract. The Director shall have supervisory responsibility over the Project Manager. Additionally, Contractor questions concerning the Plans and Technical Specifications shall be directed to:

Denver Department of Public Works,

Project Manager
City Project Manager
Craig Long

Telephone

(720) 913-4519

Consultant
Design Consultant
Studio CPG

Consultant Contact
Ilene Flax

Telephone

(303) 455-3779

SC-6 LIQUIDATED DAMAGES

Should the Contractor fail to complete all Work within the Contract Time allocated under the Contract Form at Paragraph 3, TERMS OF PERFORMANCE, the Contractor shall become liable to the City and County of Denver for liquidated damages, and not as a penalty, at the rate of \$500.00 for each Day that the Contractor exceeds the time limits herein specified, all in accordance with provisions of General Contract Condition 602, LIQUIDATED DAMAGES; ADMINISTRATIVE COSTS; ACTUAL DAMAGES.

Representative hourly rates for the City administrative costs described in General Contract Condition 602.2 shall be as follows for this Project:

Project Manager	\$69 per hour
Project Engineer	\$63 per hour
Inspector	\$49 per hour
Surveying, if necessary	\$100 per hour

SC-7 SUBCONTRACTS

In accordance with General Contract Condition 501, SUBCONTRACTS, no limit shall apply to that percentage of the Work, which may be sublet providing that the subcontractors receive prior approval in accordance with General Contract Condition 502, SUBCONTRACTOR ACCEPTANCE.

SC-8 RESERVED

SC-9 PAYMENTS TO CONTRACTORS

The application for payment shall be submitted through Textura® Corporations Construction Management Website. Contractor recognizes and agrees that it shall be required to use the Textura Construction Payment Management System for this Project. Contractor further agrees that, to the fullest extent possible within the CPM System, the City shall be entitled to all non-Confidential records, reports, data and other information related to the project that are available to Contractor through the CPM System, including, but not limited to, information related to Contractor and subcontractor billings. To that end, Contractor agrees that it will activate any available settings within the CPM System that are necessary to grant the City access to such non-Confidential information related to the contract and the project. Applications for payment shall be based on the Contract Unit Prices or the approved Schedule of Values described in GC 903.1

In accordance with General Contract Condition 902, PAYMENT PROCEDURE, the party(ies) responsible for review of all Pay Applications shall be:

<u>Agency/Firm</u>	<u>Name</u>	<u>Telephone</u>
Public Works	Craig Long	(720) 913-4519

In accordance with General Contract Condition 906, APPLICATIONS FOR PAYMENT, each Application submitted shall include the following:

1. The estimate of Work completed shall be based on the approved schedule of values or unit prices, as applicable, and the percent of the Work complete.
2. Each Application for Payment shall include each and every independent subcontractor's payroll information including pay dates and pay amounts.
3. The Contractor shall also submit to the Auditor and other appropriate officials of the City in a timely fashion, information required by General Contract Condition 1004, REPORTING WAGES PAID.
4. Applications for Payment must be accompanied by completed Partial or Final Claim Release Form, as appropriate, from EACH subcontractor and supplier, **AND** the Contractors' Certification of Payment Form (CCP), unless an exception is approved pursuant to General contract condition 907.

The forms, Final/Partial Release and Certificate of Payment (Subcontractor/Supplier) and the Contractor's Certification of Payment (CCP), both of which must be used are attached below. If subcontractor or supplier payments are disbursed via Textura® CPM, those systems generated Release and CCP forms are acceptable.

DEPARTMENT OF PUBLIC WORKS

FINAL/PARTIAL RELEASE AND CERTIFICATE OF PAYMENT
(SUBCONTRACTOR/SUPPLIER)

(PROJECT NO. and NAME)

Date: _____, 20__.

(NAME OF CONTRACTOR)

Subcontract #: _____.

(NAME OF SUBCONTRACTOR/SUPPLIER)

Subcontract Value: \$ _____.

Last Progress Payment: \$ _____.

Date: _____.

Total Paid to Date: \$ _____.

Date of Last Work: _____.

Check Applicable Box:

MBE WBE

The Undersigned hereby certifies that all costs, charges or expenses incurred by the undersigned or on behalf of the undersigned for any work, labor or services performed and for any materials, supplies or equipment provided on the above referenced Project or used in connection with the above referenced Subcontract (the "Work Effort") have been duly paid in full.

The Undersigned further certifies that each of the undersigned's subcontractors and suppliers that incurred or caused to be incurred, on their behalf, costs, charges or expenses in connection with the undersigned's Work Effort on the above referenced Project have been duly paid in full.

In consideration of \$ _____ representing the Last Progress Payment referenced above and in further consideration of the Total Paid to Date, also referenced above, and other good and valuable consideration received and accepted by the undersigned this _____ day of _____, 20__, the Undersigned hereby releases and discharges the City and County of Denver (the "City"), the above referenced City Project, the City's premises and property and the above referenced Contractor from all claims, liens, rights, liabilities, demands and obligations, whether known or unknown, of every nature arising out of or in connection with the performance of the work effort.

As additional consideration for the payments referenced above, the undersigned agrees to defend, indemnify and save and hold harmless the City, its officers, employees, agents and assigns and the above-referenced Contractor from and against all costs, losses, damages, causes of action, judgments under the subcontract and expenses arising out of or in connection with any claim or claims against the City or the Contractor which arise out of the Undersigned's performance of the Work Effort and which may be asserted by the Undersigned or any of its suppliers or subcontractors of any tier or any of their representatives, officers, agents, or employees.

It is acknowledged that this release is for the benefit of and may be relied upon by the City and the referenced Contractor.

The foregoing shall not relieve the undersigned of any obligation under the provisions of the Undersigned's subcontract, as the subcontract may have been amended, which by their nature survive completion of the Undersigned's work effort including, without limitation, warranties, guarantees, insurance requirements and indemnities.

STATE OF COLORADO) ss
CITY OF _____)

(Name of Subcontractor)

Signed and sworn before me this
day of _____, 20__.

By: _____

Notary Public/Commissioner of Oaths
My Commission Expires

Title: _____



Instructions for Completing the Contractor/Consultant Certification of Payment Form

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit
201 W. Colfax Ave. Dept. 807
Denver, CO 80202
Phone: 720-913-1999
DSBO@denvergov.org

Note: The attached Contractor/Consultant Certification of Payment form must be completed by the Contractor/Subconsultant and all subcontractors/subconsultant or suppliers used on the project at any tier and submitted with each pay application. The Contractor/Consultant is responsible for the accuracy of all information provided and is required to have each subcontractor/subconsultant or supplier fill out the appropriate forms. Please be sure to complete all information requested at the top of the form, including the name of the person who prepared this form.

If you reproduce this form, you must continue to list each of the originally listed firms, as well as any additional firms used during the performance period of the contract. Please complete an additional CCP if there is second tier-ing involved.

If you have any questions, please call the Compliance Unit of DSBO at 720.913.1999.

Instructions for Completing the Contractor/Consultant Certification of Payment Form, per Column

Contractor/Subcontractor or Subconsultant/Supplier Name: In the space provided, list all subcontractors/subconsultants and suppliers used on the project. For all M/W/S/E/DBEs use the exact name listed in the DSBO Directory.

M/W/S/E/DBE/NON: For each name listed, indicate whether the entity is a certified M/W/S/E/DBE.

Column A: Provide the contract amount, as listed at bid time, for the Contractor/Consultant and each subcontractor/subconsultant or supplier.

Column B: Provide the percentage portion of each listed subcontractor/subconsultant or supplier contract amount (Column A) compared to the total original contract amount in (I).

Column C: Provide the original contract amount (Column A) for each subcontractor/subconsultant or supplier plus any awarded alternate and/or change order amounts applicable. If an alternate/change order does not apply to the listed firm, re-enter the original contract amount (Column A).

Column D: Provide the percent portion of each listed subcontractor/subconsultant or supplier contract amount (Column C) compare to the current total contract amount in (II).

Column E: Provide the amount requested for work performed or materials supplied by each listed subcontractor/subconsultant or supplier for this pay application. The sum of the items in this column should equal the estimated amount requested for this pay application.

Column F: Provide the amount paid to each subcontractor/subconsultant or supplier on the previous pay application. Enter the previous pay application number in the column heading. The sum of the items listed in this column should equal the warrant amount paid to the Contractor/Consultant on the previous pay application. The amounts paid to the subcontractor/subcontractor or suppliers should be the actual amount of each check issued.

Column G: Provide the net paid to date for the Contractor/Subconsultant and each listed subcontractor/subconsultant or supplier.

Column H: Provide the percent portion of the net paid to date (Column G) for the Contractor/Subconsultant and each listed subcontractor/subconsultant or supplier of the current total contract amount in (II).

Rev: 031816

SC-10 CONTRACT FORMS

In accordance with the terms and conditions of the Contract Documents, the City requires the use of certain form documents in complying with or satisfying various obligations, notifications and conditions in contracting with the City or performing Work hereunder. These form documents are referenced by title throughout the Contract Documents for mandatory use as directed. The following are the forms that shall be detached and utilized in accordance with the Contract Documents:

1. Performance and Payment Bond
2. Performance and Payment Bond Surety Authorization Letter (Sample)
3. Final/Partial Lien Release.

The following are forms that will be issued by the City during construction:

1. Notice to Apparent Low Bidder (Sample)
2. Notice to Proceed (Sample)
3. Certificate of Contract Release (Sample)

SC-11 CONSTRUCTION INSPECTION BY THE CITY

General Condition 1701, CONSTRUCTION INSPECTION BY THE CITY, is modified as follows:

.1 Persons who are employees of the City or who are under contract to the City or the City as lessee will be assigned to inspect and test the Work. These persons may perform any tests and observe the Work to determine whether or not designs, materials used, manufacturing and construction processes and methods applied, and equipment installed satisfy the requirements of the drawings and specifications, accepted Shop Drawings, Product Data and Samples, and the General Contractor's warranties and guarantees. The General Contractor shall permit these inspectors unlimited access to the Work and provide means of safe access to the Work, which cost shall be included as a Cost of the Work without any increase to the Guaranteed Maximum Price. In addition, General Contractor shall provide whatever access and means of access are needed to off-site facilities used to store or manufacture materials and equipment to be incorporated into the Work and shall respond to any other reasonable request to further the inspector's ability to observe or complete any tests. Such inspections shall not relieve the General Contractor of any of its quality control responsibilities or any other obligations under the Contract. All inspections and all tests conducted by the City are for the convenience and benefit of the City. These inspections and tests do not constitute acceptance of the materials or Work tested or inspected, and the City may reject or accept any Work or materials at any time prior to the inspections pursuant to G.C. 2002, whether or not previous inspections or tests were conducted by the inspector or a City representative.

.2 Building Inspection will perform building code compliance inspections for structures designed for human occupancy. It is the General Contractor's responsibility to schedule and obtain these inspections. If a code compliance inspection results in identification of a condition which will be at variance to the Contract Documents, the General Contractor shall immediately notify the Project Manager and confirm such notification with formal correspondence no later than forty-eight (48) hours after the occurrence.

.3 When any unit of government or political subdivision, utility or Railroad Corporation is to pay a portion of the cost of the Work, its respective representatives shall have the right to inspect the Work. This inspection shall not make any unit of government or political subdivision, utility or Railroad Corporation a party to the Contract, and shall not interfere with the rights of either party.

SC-12 DISPOSAL OF NON-HAZARDOUS WASTE AT DADS

In accordance with the Landfill Agreement made between the City and Waste Management of Colorado, Inc., bidders will be required to haul dedicated loads (non-hazardous entire loads of waste) to the Denver-Arapahoe Disposal Site ("DADS") for disposal. DADS is located at Highway 30 and Hampden Avenue in Arapahoe County, Colorado. The City will pay all fees associated with such disposal but the bidder shall be responsible for the costs of transporting the loads. Non-hazardous waste is defined as those substances and materials not defined or classified as hazardous by the Colorado Hazardous Waste Commission pursuant to C.R.S. §25-15-101(6), as amended from time to time, and includes construction debris, soil and asbestos. Bidders shall not use Gun Club Road between I-70 and Mississippi Avenue as a means of access to DADS.

SC-13 PROHIBITION ON USE OF CCA-TREATED WOOD PRODUCTS

The use of any wood products pressure-treated with chromated copper arsenate (CCA) is prohibited. Examples of CCA-treated wood products include wood used in play structures, decks, picnic tables, landscaping timbers, fencing, patios, walkways and boardwalks.

SC-14 WAIVER OF: PART 8 OF ARTICLE 20 OF TITLE 13, COLORADO REVISED STATUTES

The Contractor specifically waives all the provisions of Part 8 of Article 20 of Title 13, Colorado Revised Statutes regarding defects in the Work under this Construction Contract.

SC-15 ATTORNEY'S FEES

Colorado Revised Statute 38-26-107 requires that in the event any person or company files a verified statement of amounts due and unpaid in connection with a claim for labor and materials supplied on this project, the City shall withhold from payments to the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver be made a party to any lawsuit to enforce such unpaid claims or any lawsuit arising out of or relating to such withheld funds, the Contractor agrees to pay to the City its costs and a reasonable attorney's fee which cost shall be included as a Cost of the Work.

Because the City Attorney Staff does not bill the City for legal services on an hourly basis, the Contractor agrees a reasonable fee shall be computed at the rate of one hundred dollars per hour of City Attorney time.

SC-16 INSURANCE

General Condition 1601 is hereby deleted in its entirety and replaced with the following:

(1) **General Conditions:** Contractor agrees to secure, at or before the time of execution of this Agreement, the following insurance covering all operations, goods or services provided pursuant to this Agreement. Contractor shall keep the required insurance coverage in force at all times during the term of the Agreement, or any extension thereof, during any warranty period, and for eight (8) years after termination of the Agreement. The required insurance shall be underwritten by an insurer licensed or authorized to do business in Colorado and rated by A.M. Best Company as "A-"VIII or better. Each policy shall contain a valid provision or endorsement requiring notification to the City in the event any of the required policies be canceled or non-renewed before the expiration date thereof. Such written notice shall be sent to the parties identified in the Notices section of this Agreement. Such notice shall reference the City contract number listed on the signature page of this Agreement. Said notice shall be sent thirty (30) days prior to such cancellation or non-renewal unless due to non-payment of premiums for which notice shall be sent ten (10) days prior. If such written notice is unavailable from the insurer, contractor shall provide written notice of cancellation, non-renewal and any reduction in coverage to the parties identified in the Notices section by certified mail, return receipt requested within three (3) business days of such notice by its insurer(s) and referencing the City's contract number. If any policy is in excess of a deductible or self-insured retention, the City must be notified by the Contractor. Contractor shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Agreement are the minimum requirements, and these requirements do not lessen or limit the liability of the Contractor. The Contractor shall maintain, at its own expense, any additional kinds or amounts of insurance that it may deem necessary to cover its obligations and liabilities under this Agreement.

(2) **Proof of Insurance:** Contractor shall provide a copy of this Agreement to its insurance agent or broker. Contractor may not commence services or work relating to the Agreement prior to placement of coverage. Contractor certifies that the certificate of insurance attached as part of the Contract Documents, preferably an ACORD certificate, complies with all insurance requirements of this Agreement. The City requests that the City's contract number be referenced on the Certificate. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Agreement shall not act as a waiver of Contractor's breach of this Agreement or of any of the City's rights or remedies under this Agreement. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements.

(3) **Additional Insureds:** For Commercial General Liability and Auto Liability, Contractor and subcontractor's insurer(s) shall name the City and County of Denver, its elected and appointed officials, employees and volunteers as additional insured.

(4) **Waiver of Subrogation:** For all coverages, Contractor's insurer shall waive subrogation rights against the City.

(5) **Subcontractors and Subconsultants:** All subcontractors and subconsultants (including independent contractors, suppliers or other entities providing goods or services required by this Agreement) shall be subject to all of the requirements herein and shall procure and maintain the same coverages required of the Contractor. Contractor shall include all such subcontractors as additional insured under its policies (with the exception of Workers' Compensation) or shall ensure that all such subcontractors and subconsultants maintain the required

coverages. Contractor agrees to provide proof of insurance for all such subcontractors and subconsultants upon request by the City.

(6) **Workers' Compensation/Employer's Liability Insurance:** Contractor shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits of \$100,000 per occurrence for each bodily injury claim, \$100,000 per occurrence for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims. Contractor expressly represents to the City, as a material representation upon which the City is relying in entering into this Agreement, that none of the Contractor's officers or employees who may be eligible under any statute or law to reject Workers' Compensation Insurance shall effect such rejection during any part of the term of this Agreement, and that any such rejections previously effected, have been revoked as of the date Contractor executes this Agreement.

(7) **Commercial General Liability:** Contractor shall maintain a Commercial General Liability insurance policy with limits of \$1,000,000 for each occurrence, \$1,000,000 for each personal and advertising injury claim, \$2,000,000 products and completed operations aggregate, and \$2,000,000 policy aggregate.

(8) **Business Automobile Liability:** Contractor shall maintain Business Automobile Liability with limits of \$1,000,000 combined single limit applicable to all owned, hired and non-owned vehicles used in performing services under this Agreement

(9) **Additional Provisions:**

- (a) For Commercial General Liability, the policies must provide the following:
 - (i) That this Agreement is an Insured Contract under the policy;
 - (ii) Defense costs in excess of policy limits;
 - (iii) A severability of interests or separation of insureds provision (no insured vs. insured exclusion); and
 - (iv) A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by the City.
- (b) For claims-made coverage:
 - (i) The retroactive date must be on or before the contract date or the first date when any goods or services were provided to the City, whichever is earlier
- (c) Contractor shall advise the City in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.

SC-17 GREENPRINT DENVER REQUIREMENTS

In accordance with the City and County of Denver Executive Order 123: Greenprint Denver Office and Sustainability Policy, as amended, Contractor shall adhere to sections of Executive Order 123 pertinent to the construction of the built environment. This includes but is not limited to: all construction and renovation of buildings shall follow instructions and memorandum for high performance buildings; horizontal projects shall include the use of fly ash concrete and recycled aggregate where possible; and, all projects shall recycle construction and demolition waste, and install materials that contain recycled content whenever possible using the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) as guidance. Non-hazardous solid waste that is eligible for reuse or recycling is not subject to the DADS disposal requirement defined in SC-12.

A completed "Greenprint Denver Closeout Form for Construction Projects" shall be delivered to the Project Manager as a submittal requirement of Final Acceptance.

<http://www.denvergov.org/constructioncontracts/Home/ContractorResources/tabid/443154/Default.aspx>

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned
AMERICAN CIVIL CONSTRUCTORS LLC DBA ACC MOUNTAIN WEST
a corporation organized and existing under and by virtue of the laws of the State of Colorado,
hereafter referred to as the "Contractor", and FIDELITY AND DEPOSIT COMPANY OF MARYLAND
a corporation organized and existing under and by virtue of the laws of the State of Maryland

and authorized to transact business in the State of Colorado, as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereinafter referred to as the "City", in the penal sum of One Million, One Hundred Ninety-Four Thousand, Six Hundred Ninety-Seven Dollars and Fifty-Five Cents (\$1,194,697.55) lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents;

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bounden Contractor has entered into a written contract with the aforesaid City for furnishing all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete the construction of **CONTRACT NO. 201844162 RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS**, Denver, Colorado, and has bound itself to complete the project within the time or times specified or pay liquidated damages, all as designated, defined and described in the said Contract and Conditions thereof, and in accordance with the Plans and Technical Specifications therefore, a copy of said Contract being made a part hereof;

NOW, THEREFORE, if the said Contractor shall and will, in all particulars well and truly and faithfully observe, perform and abide by each and every Covenant, Condition and part of said Contract, and the Conditions, Technical Specifications, Plans, and other Contract Documents thereto attached, or by reference made a part thereof and any alterations in and additions thereto, according to the true intent and meaning in such case, then this obligation shall be and become null and void; otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor shall satisfy all claims and demands incurred by the Contractor in the performance of said Contract, and shall fully indemnify and save harmless the City from all damages, claims, demands, expense and charge of every kind (including claims of patent infringement) arising from any act, omission, or neglect of said Contractor, its agents, or employees with relation to said work; and shall fully reimburse and repay to the City all costs, damages, and expenses which it may incur in making good any default based upon the failure of the Contractor to fulfill its obligation to furnish maintenance, repairs or replacements for the full guarantee period provided in the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if said Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools or equipment used or performed in the prosecution of work provided for in the above Contract and that if the Contractor will indemnify and save harmless the City for the extent of any and all payments in connection with the carrying out of such Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, gasoline, lubricating oils, fuel oils, grease, coal, or any other supplies or materials used or consumed by said Contractor or its subcontractors in performance of the work contracted to be done, or fails to pay any person who supplies rental machinery, tools or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety will pay the same in any amount not exceeding the amount of this obligation, together with interest as provided by law;

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to contracts with others in connection with this project, or the work to be performed thereunder, or the Technical Specifications and Plans accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract, or contracts, or to the work, or to the Technical Specifications and Plans.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this 2nd day of November, 2018

Attest:
Maureen McNeill
Secretary Maureen McNeill, Witness

AMERICAN CIVIL CONSTRUCTORS LLC
DBA ACC MOUNTAIN WEST
Contractor
By: Raul Under
President

FIDELITY AND DEPOSIT COMPANY OF MARYLAND
Surety
By: Sara Owens
Attorney-In-Fact Sara Owens

(Accompany this bond with Attorney-in-Fact's authority from the Surety to execute bond, certified to include the date of the bond).

APPROVED AS TO FORM:
Attorney for the City and County of
Denver
By: [Signature]
Assistant City Attorney

APPROVED FOR THE CITY AND COUNTY OF
DENVER
By: [Signature]
MAYOR
By: [Signature]
EXECUTIVE DIRECTOR OF PUBLIC WORKS

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Maryland, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Maryland (herein collectively called the "Companies"), by **DAVID MCVICKER, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Douglas R. WHEELER, Maureen MCNEILL, Wayne G. MCVAUGH, Elizabeth MARRERO, Jaquanda MARTIN, Patricia A. RAMBO, Sara OWENS, Kimberly G. SHERROD and Joanne C. WAGNER, all of Philadelphia, Pennsylvania, EACH** its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.


The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 14th day of August, A.D. 2017.

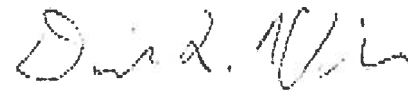
ATTEST:

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**



By: 

*Assistant Secretary
Joshua Lecker*



*Vice President
David McVicker*

State of Maryland
County of Baltimore

On this 14th day of August, A.D. 2017, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **DAVID MCVICKER, Vice President, and JOSHUA LECKER, Assistant Secretary**, of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, depose and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.





Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2019

THE FIDELITY AND DEPOSIT COMPANY

OF MARYLAND

600 Red Brook Blvd., Suite 600, Owings Mills, MD 21117

Statement of Financial Condition

As Of December 31, 2017

ASSETS

Bonds	\$ 131,463,323
Stocks	23,365,385
Cash and Short Term Investments.....	15,943,690
Reinsurance Recoverable	7,520,824
Federal Income Tax Recoverable.....	62,266
Other Accounts Receivable.....	35,672,323
TOTAL ADMITTED ASSETS	\$ 214,027,811

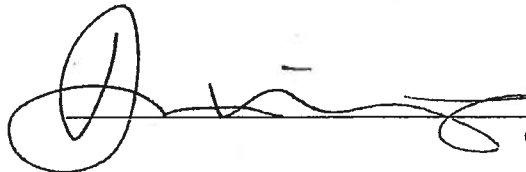
LIABILITIES, SURPLUS AND OTHER FUNDS

Reserve for Taxes and Expenses	\$ 580,990
Ceded Reinsurance Premiums Payable	42,235,595
Securities Lending Collateral Liability	0
TOTAL LIABILITIES	\$ 42,816,584
Capital Stock, Paid Up	\$ 5,000,000
Surplus	166,211,227
Surplus as regards Policyholders.....	171,211,226
TOTAL	\$ 214,027,811

Securities carried at \$62,198,396 in the above statement are deposited with various states as required by law.

Securities carried on the basis prescribed by the National Association of Insurance Commissioners. On the basis of market quotations for all bonds and stocks owned, the Company's total admitted assets at December 31, 2017 would be \$213,515,173 and surplus as regards policyholders \$170,698,588.

I, DENNIS F. KERRIGAN, Corporate Secretary of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing statement is a correct exhibit of the assets and liabilities of the said Company on the 31st day of December, 2017.



 Corporate Secretary

State of Illinois
 City of Schaumburg } SS:

Subscribed and sworn to, before me, a Notary Public of the State of Illinois, in the City of Schaumburg, this 9th day of March, 2018.



 Notary Public





**PERFORMANCE AND PAYMENT BOND
SURETY AUTHORIZATION**

FAX NUMBER: 720-913-3183
TELEPHONE NUMBER: 720-913-3267

Assistant City Attorney
201 W. Colfax Ave. Dept. 1207
Denver, Colorado 80202

RE: AMERICAN CIVIL CONSTRUCTORS LLC DBA ACC MOUNTAIN WEST

Contract No: 201844162
Project Name: Rude Park Ballfield and Access Improvements
Contract Amount: \$1,194,697.55
Performance and Payment Bond No.: 9300680

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through
FIDELITY AND DEPOSIT COMPANY OF MARYLAND insurance company,
on October 29, 2018

We hereby authorize the City and County of Denver, Department of Public Works, to date all bonds and powers of attorney to coincide with the date of the contract.

If you should have any additional questions or concerns, please don't hesitate to give me a call at 215-255-1750.

Thank you.

Sincerely,

Sara Owens, Attorney-in-Fact for
FIDELITY AND DEPOSIT COMPANY OF MARYLAND

Agency:
Aon Risk Services Central, Inc.
1650 Market St.
Philadelphia, PA 19103

Denver Public Works/Office of the Executive Director
201 West Colfax Avenue, Dept 608 | Denver, CO 80202
www.denvergov.org/dpw
p. 720.865.8630 | f. 720.865.8795

311 | POCKETGOV.COM | DENVERGOV.ORG | DENVER 8 TV

Contract No. 201844162
Rude Ballfield

BDP - 47

August 29, 2018

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Maryland, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Maryland (herein collectively called the "Companies"), by **DAVID MCVICKER, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Douglas R. WHEELER, Maureen MCNEILL, Wayne G. MCVAUGH, Elizabeth MARRERO, Jaquanda MARTIN, Patricia A. RAMBO, Sara OWENS, Kimberly G. SHERRON and Joanne C. WAGNER**, all of Philadelphia, Pennsylvania, EACH its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.


The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

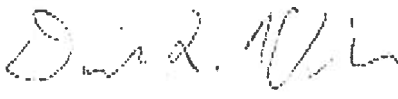
IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND, this 14th day of August, A.D. 2017.

ATTEST:

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**



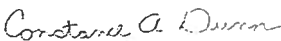
By: 
Assistant Secretary
Joshua Lecker


Vice President
David McVicker

State of Maryland
County of Baltimore

On this 14th day of August, A.D. 2017, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **DAVID MCVICKER, Vice President**, and **JOSHUA LECKER, Assistant Secretary**, of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, depose and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2019



EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 21st day of October, 2018.



Michael Bond, Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT ALL REQUIRED INFORMATION TO:

Zurich American Insurance Co.
Attn: Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056



CERTIFICATE OF LIABILITY INSURANCE

12/31/2018

DATE (MM/DD/YYYY)

11/1/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lockton Insurance Brokers, LLC CA License #0F15767 725 S. Figueroa Street, 35th fl. Los Angeles CA 90017 213-689-0065	CONTACT NAME:		
	PHONE (A/C, No, Ext):	FAX (A/C, No):	
INSURED 1453577 American Civil Constructors LLC dba ACC Mountain West 4901 South Windemere Street Littleton CO 80120	INSURER(S) AFFORDING COVERAGE		NAIC #
	INSURER A : Twin City Fire Insurance Company		29459
	INSURER B : Hartford Fire Insurance Company		19682
	INSURER C : Hartford Casualty Insurance Company		29424
	INSURER D : Trumbull Insurance Company		27120
	INSURER E : American Guarantee and Liab. Ins. Co.		26247
	INSURER F : AXIS Surplus Insurance Company		26620

COVERAGES ACCL01 CERTIFICATE NUMBER: 15644207 REVISION NUMBER: XXXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> GL SIR: \$250K GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:	Y	Y	72 ECX WQ0020	12/31/2017	12/31/2018	EACH OCCURRENCE \$ 2,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 2,000,000 GENERAL AGGREGATE \$ 4,000,000 PRODUCTS - COMP/OP AGG \$ 4,000,000 \$
B	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO OWNED AUTOS ONLY <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> Ded: None <input type="checkbox"/> SCHEDULED AUTOS NON-OWNED AUTOS ONLY	Y	Y	72 UEL WQ0019	12/31/2017	12/31/2018	COMBINED SINGLE LIMIT (Ea accident) \$ 2,000,000 BODILY INJURY (Per person) \$ XXXXXXXX BODILY INJURY (Per accident) \$ XXXXXXXX PROPERTY DAMAGE (Per accident) \$ XXXXXXXX \$ XXXXXXXX
C	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> DED <input type="checkbox"/> RETENTION \$ <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS-MADE	Y	Y	72 XSJ WQ0056	12/31/2017	12/31/2018	EACH OCCURRENCE \$ 10,000,000 AGGREGATE \$ 10,000,000 \$ XXXXXXXX
D	<input checked="" type="checkbox"/> WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	Y	72 WV WQ0018	12/31/2017	12/31/2018	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
E	2nd Excess Liability	N	N	AEC-5087743-13	12/31/2017	12/31/2018	\$15M Each Occ./\$15M Pol Agg
F	Prof & Poll Liability	N	N	CM002881-02-2018	10/1/2018	12/31/2019	\$10M Each Claim/\$10M Pol Agg

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
 THIS CERTIFICATE SUPERSEDES ALL PREVIOUSLY ISSUED CERTIFICATES FOR THIS HOLDER, APPLICABLE TO THE CARRIERS LISTED AND THE POLICY TERM(S) REFERENCED.
 NAMED INSUREDS ADDED TO REFERENCED POLICIES EFFECTIVE 10/1/2018. Re: All projects as per contract with the Named Insured. The City and County of Denver, its elected and appointed officials, employees and volunteers are Additional Insured(s) for commercial general liability and business auto liability as per the attached endorsement or policy language. Insurance provided to Additional Insured(s) is primary and non-contributory as per the attached endorsements or policy language. Waiver of subrogation applies as per the attached endorsements or policy language.

CERTIFICATE HOLDER**CANCELLATION** See Attachments

15644207

City and County of Denver
 Department of Public Works
 Parks and Recreation
 201 W. Colfax Ave Dept.614
 Denver CO 80202

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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NOTICE OF APPARENT LOW BIDDER
(SAMPLE)

Current Date

To:

Gentlemen:

The EXECUTIVE DIRECTOR OF PUBLIC WORKS has considered the Bids submitted on September 27, 2018 for work to be done and materials to be furnished in and for:

PROJECT No. 201844162 RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

as set forth in detail in the Contract Documents for the City and County of Denver, Colorado. It appears that your Bid is fair, equitable, and to the best interest of the City and County; therefore, said Bid is hereby accepted at the bid price contained herein, subject to execution of the Contract Documents and your furnishing the items specified below, the total cost thereof (Contract Amount Written), (Contract Amount Numeric).

It will be necessary for you to appear forthwith at the office of the Department of Public Works, Finance and Administration, 201 W. Colfax Ave. Dept 614, Denver, Colorado 80202, to receive the said Contract Documents, execute the same and return them to the Department of Public Works, Finance and Administration, within the time limit set forth in the Bid Proposal.

In accordance with the requirements set forth in the Contract Documents, you are required to furnish the following documents:

- a. Insurance Certificates: General Liability and Automotive Liability, Workman's Compensation and Employer Liability; or any other coverage required by the contract; and
- b. One original plus four copies of the Power of Attorney relative to Performance and/or Payment Bond;

All construction Contracts made and entered into by the City and County of Denver are subject to Affirmative Action and Equal Opportunity Rules and Regulations, as adopted by the Manager of Public Works, and each contract requiring payment by the City of one-half million dollars (\$500,000.00) or more shall first be approved by the City Council acting by ordinance and in accordance with Section 3.2.6 of the Charter of the City and County of Denver.

Prior to issuance of Notice to Proceed, all Equal Opportunity requirements must be completed. Additional information may be obtained by contacting the Director of Contract Compliance at (720-913-1700).

**NOTICE OF APPARENT LOW BIDDER
(SAMPLE)**

PROJECT NO. 201844162

Page 2

The Bid Security submitted with your Bid, will be returned upon execution of the Contract and furnishing of the Performance Bond. In the event you should fail to execute the Contract and to furnish the performance Bond within the time limit specified, said Bid Security will be retained by the City and County of Denver as liquidated damages, and not as a penalty for the delay and extra work caused thereby.

Dated at Denver, Colorado this _____ day of _____ 20__.

CITY AND COUNTY OF DENVER

By _____

Manager of Public Works

Denver Public Works/Office of the Executive Director
201 West Colfax Avenue, Dept 608 | Denver, CO 80202
www.denvergov.org/dpw
p. 720.865.8630 | f. 720.865.8795

311 | POCKETGOV.COM | DENVERGOV.ORG | DENVER 8 TV



Current Date

**NOTICE TO PROCEED
(SAMPLE)**

Name
Company
Street
City/State/Zip

CONTRACT NO. 201844162, RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

In accordance with General Contract Condition 302 of the Standard Specifications for Construction, General Contract Conditions, 2011 Edition, you are hereby authorized and directed to proceed on _____ with the work of constructing contract number 201844162, as set forth in detail in the contract documents for the City and County of Denver.

With a contract time of _____ calendar days, the project must be complete on or before _____.

If you have not already done so, you must submit your construction schedule, in accordance with General Contract Condition 306.2.B, to the Project Manager within 10 days. Additionally, you must submit your tax exempt certificate, and copies of your subcontractors' certificates, in accordance with General Contract Condition 323.5, to the Project Manager as soon as possible. Failure to submit these certificates will delay processing of payment applications.

Sincerely,

Lesley B. Thomas
City Engineer

cc:

Denver Public Works/Office of the Executive Director
201 West Colfax Avenue, Dept 608 | Denver, CO 80202
www.denvergov.org/dpw
p. 720.865.8630 | f. 720.865.8795

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Certificate of Contract Release
(SAMPLE)

Date

Name
Company
Street
City/State/Zip

RE: Certificate of Contract Release for
201844162, RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

Received this date of the City and County of Denver, as full and final payment of the cost of the improvements provided for in the foregoing contract, _____ dollars and _____ cents (\$ _____), in cash, being the remainder of the full amount accruing to the undersigned by virtue of said contract; said cash also covering and including full payment for the cost of all extra work and material furnished by the undersigned in the construction of said improvements, and all incidentals thereto, and the undersigned hereby releases said City and County of Denver from any and all claims or demands whatsoever, regardless of how denominated, growing out of said contract.

And these presents are to certify that all persons performing work upon or furnishing materials for said improvements under the foregoing contract have been paid in full and this payment to be made is the last or final payment.

Contractor's Signature

Date Signed

If there are any questions, please contact me by telephone at (720) 913-XXXX. Please return this document via facsimile at (720) 913-1805 and mail to original to the above address.

Denver Public Works/Office of the Executive Director
201 West Colfax Avenue, Dept 608 | Denver, CO 80202
www.denvergov.org/dpw
p. 720.865.8630 | f. 720.865.8795

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CITY AND COUNTY OF DENVER

STATE OF COLORADO



DENVER
THE MILE HIGH CITY

DEPARTMENT OF PUBLIC WORKS

Addenda

Contract Number: 201844162



Rude Park Ballfield and Access Improvements

August 29, 2018

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

CONTRACT NO. 201844162

PROJECT NAME: RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

ADDENDUM NO. 1 TO CONTRACT DOCUMENTS

Bidders are hereby instructed that the drawings, specifications, and other contract documents are modified, corrected, supplemented and/or superseded for the above-mentioned project as hereinafter described in the following attachments:

Modification of Prequalification Category Requirement

City and County of Denver
Department of Public Works
Prequalification Change Notice

Contract No. 201844162
Rude Park Ballfield and Access Improvements

Notice is hereby given that the Prequalification Requirements have been changed for Contract No. 201844162 – Rude Park Ballfield and Access Improvements, from **1A General Civil in the \$1,500,000.00 monetary level to 1A General Civil in the \$1,500,000.00 monetary level or 1C (1) Landscape Improvements in the \$1,500,000.00 monetary level** in accordance with the City's Rules and Regulations Governing Prequalification of Contractors.

Prior to submitting a bid, the bidder shall consult the Contractor's bulletin board, located on the 2nd floor at 201 W. Colfax Avenue, Denver, CO 80202 and www.work4denver.com.

Eulois Cleckley
Executive Director of Public Works
Published in the Daily Journal on September 10, 11, and 12, 2018.

This ADDENDUM shall be attached to, become a part of, and be returned with the Bid Proposal.


Lesley B. Thomas
City Engineer

9.6.18

Date

The undersigned bidder acknowledges receipt of this Addendum. The Proposal submitted herewith is in accordance with the stipulations set forth herein.

Contractor

DATE: _____

ADDENDUM NO. 1
Contract No. 201844162
Rude Park

ADD #1

September 7, 2018

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

CONTRACT NO. 201844162

PROJECT NAME: RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

ADDENDUM NO. 2 TO CONTRACT DOCUMENTS

Bidders are hereby instructed that the drawings, specifications, and other contract documents are modified, corrected, supplemented and/or superseded for the above-mentioned project as hereinafter described in the following attachments:

POSTPONEMENT OF BID OPENING

**City and County of Denver
Department of Public Works
Bid Postponement Notice**

**Contract No. 201844162
Rude Park Ballfield and Access Improvements**

Notice is hereby given that the Sealed Bid Opening for Contract No. 201844162- Rude Park Ballfield and Access Improvements, is hereby postponed. Sealed bids will be received in Room 6.G.7., 201 W. Colfax Ave., Denver, CO 80202, no later than:

**11:00a.m., local time
October 4, 2018**

Published in the Daily Journal on September 24, 25, 26, 2018.

REVISIONS AND/OR ADDED DOCUMENTS

- 1. Construction Plan Set shall be deleted and replaced in its entirety with the attached Revised Construction Plan Set.**
- 2. Technical Specification section 32 97 00 Landscape Maintenance is removed in its entirety.**

QUESTIONS & ANSWERS

Q1- Will CAD files with respect to the upfill on the project site be made available?
A1- No, they will be issued to successful bidder after award, if requested

Q2- Can an as-built for the bleachers be provided?
A2- No As-Builts are available

Contract No. 201844162

ADD #2

September 20, 2018

Rude Park

Q3- What are the expectations of the awarded contractor with respect to sod establishment? And will considerations be made for sod establishment regarding the opening date of ballfield and maintenance?

A3 - Awarded contractor is responsible for protecting sod as outlined in the contract documents until establishment has been achieved or Substantial Completion, whichever comes first.

Q4- Is this project a unit price or lump sum bid?

A4 – Contract is Unit Price, per the bid tabulation

Q5- Can you explain what the line for the CABI is for?

A5 – As identified in the MMP, a Certified Asbestos Building Inspector (CABI) is required to be on-site during work within the Area of Environmental Concern.

Q6- Referring to page 3 of 31 of the drawings, at the bottom right corner of the page there it is called out “Add Alternate Work.” However, in the bid documents there is no place holder for the add alternate work. Can you please provide us with a new bid form or give us direction where to include that cost?

A6 – A complete REVISED set of drawing are included with this addendum.

Q7- Referring to page 11 of 31 of the drawings, the Storm water Mgmt Plan shows the VTC & SSA along Lakewood Gulch Trail, Can we stage out of the parking lot? Does the parking lot have to remain open while we are working? Can we close the western entrance/exit?

A7- No long-term staging will be allowed in the parking lot, parking lot must remain open and all entrances need to remain accessible for the duration of construction. As approved by the City and Project Manager, Contractor may be allowed to close western side of parking lot and west entrance for short durations during pre-approved construction activities.

Q8- Will we need traffic control for project? If so, can you please provide us with a new bid form or give us direction where to include that cost?

A8 – See Technical Specifications 01 55 00, TRAFFIC CONTROL

Q9- When is the anticipated start date for the project?

A9- January 2019, depending on how quickly the awarded contractor gets the required paperwork submitted.

Q10- Can you please confirm the Denver Prevailing Wages are *Construction Type: Heavy* for the entire project?

A10 – HEAVY is the correct wage table, which are included in the bid package

Q11- Referring to Item No. 26 05 00-1 Reset Utilities / Electrical Work, can you please further explain what utilities need to be reset? Can you please provide us with a pay item description as this unit is very vague and usually are not in the same bid item?

A11 – Item 26 05 00-1 Reset utilities/Electrical work includes all work described on E-1 and E-2 other than items described in 26 05 00-2, 26 05 00-3 and 26 05 00-4

Q12- Can you please Confirm we will have to maintain the ball park for 2 Years?

A12 – Technical Specifications Section Sodding 32 92 23 subsection 3.6 Maintenance A. shall be amended, removing the period of 2 years from Substantial Completion and replacing it with a period of 60 days from Substantial Completion.

Technical Specification section 32 97 00 Landscape Maintenance is removed in its entirety.

Q13- Who is responsible for Surveying? I don't see a line item for survey.

A13 – Contractor is responsible for surveying, as called out in Technical Specifications page 01 31 31 – 1, PART 1, 1.3, F and Technical Specifications 01 71 23; LAYOUT OF WORK AND SURVEYS.

Contract No. 201844162

ADD #2

September 20, 2018

Rude Park

Q14- Who is responsible for Material Testing?

A14 – Concrete testing responsibility is called out in Technical Specifications page 32 13 13 – 10; under PART 3, 3.1, D Earthwork testing responsibility is called out in Technical Specifications page 31 20 00 – 2; under PART 1, 1.5, A.

Q15- Can you please provide us with the grading CAD files for the project?

A15 – See answer to Q1

Q16- Can you please provide us with the Bid Form/ Bid Schedule in electronic form?

A16 – NO

Q17- Can you explain how to use the chart BF-3 for the Textura fee? It used to be a percentage and now it's a dollar amount, do I use the whole dollar amount for the bracket the proposal falls into? Can you give an example?

A17 – Find which bracket your proposal price falls into under the left column titled PROJECT VALUE and use the fee in the right column titled PRO CT FEE on the same line as the bracket your price range, i.e. for a proposal total between \$500,000 to \$999,999.99 the fee you should use would be \$3,250

Q18- 1.The electrical switchgear is being relocated and according to the drawing (E-1) and the relocated equipment will be mounted in a new Electrical cabinet. There is not a spec for the cabinet nor do the drawings indicate the size of the cabinet. Can you please give us more information on the electrical cabinet? Please include information such as: the size, does it have to be heated, lighted, fully enclosed, lockable, painted or powder coated, will this cabinet be on a housekeeping pad etc...

A18 - Cabinet specification in called out in SECTION 26 05 33 raceways and boxes for electrical systems, 2.4, M. Provide lockable, powder-coated cabinet with lit interior. No heating.

Detail 2/E-1 depicts the cabinet diagram on drawing sheet E-1. Per note 2 on sheet E-1, contractor is to submit a dimensioned shop drawing of layout of the equipment in the cabinet and receive approval before purchasing cabinet.

This ADDENDUM shall be attached to, become a part of, and be returned with the Bid Proposal.

ADDENDUM NO. 2

Lesley B. Thomas
Lesley B. Thomas
City Engineer
9.20.18
Date

The undersigned bidder acknowledges receipt of this Addendum. The Proposal submitted herewith is in accordance with the stipulations set forth herein.

Contractor

Date

Contract No. 201844162

ADD #2

September 20, 2018

Rude Park

REVISED CONSTRUCTION PLAN SET

RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

BID DOCUMENTS

MARCH 31, 2017

PROJECT # 2016-PROJMSTR - 0000179

DP2017-001

STUDIO CPG

CITY & COUNTY OF DENVER DEPT. OF PARKS & RECREATION

PROJECT: RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

SHEET TITLE: COVER SHEET

SCALE: 1"=20'-0"

DESIGNED BY: JF

DRAWN BY: NL

CHECKED BY: JF

DATE: 03/17/17

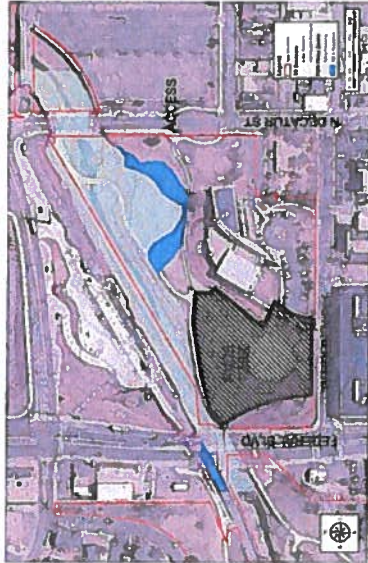
REVISIONS: BID DOCUMENTS

DWG. NO. COVER

SHEET NUMBER 1 OF 31

GENERAL NOTES

1. BASE SITE SURVEY INFORMATION WAS PROVIDED BY JIM ENGINEERING. CONTRACTORS SHALL BE RESPONSIBLE FOR NOTIFYING THE PROJECT MANAGER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THESE PLANS PRIOR TO CONSTRUCTION ACTIVITY.
2. THE SIZE, TYPE AND LOCATION OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THESE DRAWINGS AND ARE INCLUDED ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE APPROPRIATE UTILITY COMPANIES OWNERS TO EXCAVATE THE UTILITIES IN THE AREA OF THE UTILITIES SHALL BE PERFORMED ACCORDING TO THE REQUIREMENTS OF THESE AGENCIES. THE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER OF ANY EXISTING UTILITIES WHICH MAY BE DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.
3. CONTACT UTILITY NOTIFICATION CENTER OF COLORADO 1-800-463-1867. PRIOR TO ANY CONSTRUCTION ACTIVITY.
4. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR THE CONDITIONS AT AND ADJACENT TO THE WORK SITE INCLUDING SAFETY OF PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL AFFECTING AGENCIES. THE CONTRACTOR SHALL OBTAIN PROJECT MANAGER APPROVAL PRIOR TO REMOVAL OF ANY OBSTRUCTION INTERFERING WITH PROPOSED IMPROVEMENTS.
5. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ANY EXISTING MATERIALS THAT ARE DAMAGED DURING CONSTRUCTION WITHIN LIMITS OF CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM ALL AFFECTING AGENCIES. THE CONTRACTOR SHALL OBTAIN PROJECT MANAGER APPROVAL PRIOR TO REMOVAL OF ANY OBSTRUCTION INTERFERING WITH PROPOSED IMPROVEMENTS.
6. CONTRACTOR SHALL OBTAIN AT HIS OWN EXPENSE, ALL APPLICABLE CODES, LICENSES, STANDARDS, SPECIFICATIONS, ORDINANCES, ETC. NECESSARY TO PERFORM THE PROPOSED WORK 72 HOURS PRIOR TO THE START OF ANY CONSTRUCTION.
7. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THESE PLANS PRIOR TO CONSTRUCTION ACTIVITY.
8. CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THESE PLANS PRIOR TO CONSTRUCTION ACTIVITY.
9. ANY CONSTRUCTION DONE OR TO BE DONE IN THE VICINITY OF EXISTING ROADWAYS SHALL BE DONE IN ACCORDANCE WITH THE CITY OF DENVER'S STANDARD SPECIFICATIONS FOR ROADWAY CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL AFFECTING AGENCIES. THE CONTRACTOR SHALL OBTAIN PROJECT MANAGER APPROVAL PRIOR TO REMOVAL OF ANY OBSTRUCTION INTERFERING WITH PROPOSED IMPROVEMENTS.
10. LAYOUT AND STAKING OF ALL IMPROVEMENTS SHALL BE APPROVED BY THE PROJECT MANAGER PRIOR TO INSTALLATION OF ALL IMPROVEMENTS. DISCREPANCIES IN THE BASE INFORMATION SHALL BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR A DECISION PRIOR TO COMMENCING WORK. THE WORK NOTIFICATION OF REQUEST FOR FIELD REVIEW SHALL BE MADE A MINIMUM OF 72 HOURS IN ADVANCE.
11. PER CITY CODE, ANY PERSON ENGAGED IN THE CUTTING, PRUNING OR REMOVAL OF TREES MUST BE LICENSED THROUGH THE CITY OF DENVER. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM ALL AFFECTING AGENCIES. THE CONTRACTOR SHALL OBTAIN PROJECT MANAGER APPROVAL PRIOR TO REMOVAL OF ANY OBSTRUCTION INTERFERING WITH PROPOSED IMPROVEMENTS.
12. FOR THE REMOVAL OF TREES ON PRIVATE PROPERTIES, A FORESTER ISSUED TREE REMOVAL PERMIT IS GENERALLY NOT REQUIRED PRIOR TO REMOVAL. IN SOME CASES PERMITS ARE REQUIRED. TREE REMOVAL PERMITS MUST BE OBTAINED PRIOR TO REMOVAL OF TREES ON RESIDENTIAL LOTS. HOWEVER, PER CITY CODE, ANY TREE REMOVALS IN PARKS MUST BE PERFORMED BY PROPERTY OWNERS OR THE CONTRACTOR LICENSED BY THE OFFICE OF THE CITY FORESTER. PUBLIC TREES REMOVED WITHOUT A PERMIT MAY BE APPRAISED FOR THEIR TOTAL VALUE AND THIS LIST VALUE INVOICED TO THE RESPONSIBLE PARTY.
13. A FORESTER ISSUED TREE PLANTING PERMIT IS REQUIRED FOR ALL TREES TO BE PLANTED IN PUBLIC RIGHTS OF WAY. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM ALL AFFECTING AGENCIES. THE CONTRACTOR SHALL OBTAIN PROJECT MANAGER APPROVAL PRIOR TO REMOVAL OF ANY OBSTRUCTION INTERFERING WITH PROPOSED IMPROVEMENTS.
14. EXISTING TREES TO BE PRESERVED IN PUBLIC RIGHTS OF WAY, PARKWAYS, OR OTHER PUBLIC AREAS SHALL BE PROTECTED PER FORESTRY STANDARDS & PRACTICES. TREE PROTECTION SHALL BE INSTALLED PRIOR TO INSTALLATION OF CONSTRUCTION. TREE PROTECTION SHALL BE INSTALLED PRIOR TO INSTALLATION OF CONSTRUCTION. TREE PROTECTION SHALL BE INSTALLED PRIOR TO INSTALLATION OF CONSTRUCTION. TREE PROTECTION SHALL BE INSTALLED PRIOR TO INSTALLATION OF CONSTRUCTION.
15. ANY PLANNING, PLANT REMOVAL OR OTHER LANDSCAPE MAINTENANCE DEEMED NECESSARY FOR THE CONSTRUCTION OF PROPOSED IMPROVEMENTS SHALL BE PRESENTED TO AND AUTHORIZED BY THE PROJECT MANAGER PRIOR TO COMMENCING WORK WITH PERMITS FOR TREE RETENTION AND PROTECTION, ALL PRUNING, TREE REMOVAL, AND TREE PLANTING BY CITY.
16. MAINTAIN ALL WALKING, BICYCLING AND DRIVING SURFACES IN A DIRT/MUD FREE USABLE CONDITION. LOCATE ACCESS POINTS TO CONSTRUCTION SITE SO THAT MINIMAL IMPACT IS CAUSED TO SURROUNDING WALKS, BIKE PATHS AND DRIVEWAYS.
17. PROTECT EXISTING PLUG PERSONS AND TEMPORARY BIOWASH WHEN CONDITIONS INTERFERE WITH VEHICULAR, BIKE OR PEDESTRIAN TRAFFIC.
18. IF IT IS THE CONTRACTOR'S RESPONSIBILITY TO RETURN ALL CONSTRUCTION STAGING SITES TO THEIR ORIGINAL CONDITION UPON COMPLETION OF THE CONSTRUCTION PROJECT, STAGING LOCATION TO BE DETERMINED BY PROJECT MANAGER.
19. NO CONSTRUCTION IMPACTS ARE PERMITTED IN THE RECREATION PARKING LOT. PARKING LOT IS TO REMAIN FREE OF CONSTRUCTION IMPACTS EXCEPT AS REQUIRED FOR THE IDENTIFIED WORK OR AS APPROVED BY THE PROJECT MANAGER.
20. ELEVATIONS SHOWN ARE TOP OF FINISH GRADE. PROVIDE SUBGRADE ELEVATIONS AS REQUIRED.



PROJECT LOCATION

PUBLIC WORKS CONSTRUCTION ENGINEERING NOTES

1. ALL WORK IN THE CITY ROW SHALL MEET CDD TRAD TRANSPORTATION STANDARDS AND DETAILS, LATEST EDITION.
2. WHEN ANY SIDEWALK, BIKE LANE OR STREET LANE CLOSURES ARE NEEDED, THE CONTRACTOR MUST SUBMIT REQUEST FOR A PW PERMIT/ASCP (REVOCABLE STREET OCCUPANCY PERMIT). SEND REQUEST FORM AND TEMPORARY TRAFFIC CONTROL PLANS TO PUBLIC WORKS PERMIT INTAKE (BEND TO STREET OCCUPANCY PERMIT). INCLUDE BUSINESS DATE, PRESENT LOWER, PRIOR TO HEEDING ANY PW REVIEW AND ISSUE PERMIT. (INCLUDING GENERAL CLOSURES, SO THAT CONSTRUCTION ENGINEERING CAN REVIEW AND ISSUE PERMIT).
3. THE USE OF TYPICAL TRAFFIC CONTROL PLANS (TCP) IS LIMITED TO USE ON LOCAL OR RESIDENTIAL STREETS. SITE SPECIFIC METHODS (METHOD OF HANDLING TRAFFIC) ARE REQUIRED FOR LANE OR SIDEWALK CLOSURES ON COLLECTOR OR ARTERIAL STREETS.
4. CALL 303-445-3489 TO BE DIRECTED TO THE PROPER PW ROWS DISTRICT INSPECTOR OR ENGINEER FOR PUBLIC WORKS CONSTRUCTION ENGINEERING NOTES.
5. ALL CLOSURES SHALL BE MADE TO THE PW ROWS DISTRICT INSPECTOR TO YOUR PRECONSTRUCTION MEETING. PRIOR TO THE START OF ANY BLOCK OF WAY PUBLIC WORKS CONSTRUCTION ENGINEERING CALL 303-445-3489 TO BE DIRECTED TO THE PROPER PW ROWS DISTRICT INSPECTOR OR ENGINEER FOR PUBLIC WORKS CONSTRUCTION ENGINEERING NOTES.
6. CONTRACTOR MUST CONTACT PUBLIC WORKS CONSTRUCTION ENGINEERING CALL 303-445-3489 TO BE DIRECTED TO THE PROPER PW ROWS DISTRICT INSPECTOR OR ENGINEER FOR PUBLIC WORKS CONSTRUCTION ENGINEERING NOTES.
7. CONTRACTOR WILL NEED DENVER PARKS PERMIT IF ATTENDING TO TOUCH AND DENVER PARKS PARKS OR PARKWAYS ON PARKS EASEMENTS) CONTACT PUBLIC WORKS CONSTRUCTION ENGINEERING CALL 303-445-3489 TO BE DIRECTED TO THE PROPER PW ROWS DISTRICT INSPECTOR OR ENGINEER FOR PUBLIC WORKS CONSTRUCTION ENGINEERING NOTES.
8. ITD REQUIRES A THREE-DAY NOTIFICATION FOR ALL BUS STOP CLOSURES. ALL REQUESTS NEED TO BE SENT TO PASTE MARSHAL@DENVER.CO. ANY EMERGENCY CLOSURES SHOULD BE SENT TO PASTE MARSHAL@DENVER.CO.

- 1 COVER SHEET
- 2 SITE SURVEY
- 3 SP-1 SITE PREPARATION PLAN
- 4 CD-1 GENERAL CIVIL NOTES
- 5 CD-2 SITE PLAN AND DETAILS
- 6 CD-3 STAIR PLAN AND SECTION
- 7 CD-4 DETAILED GRADING PLAN
- 8 CD-5 DETAILED GRADING PLAN
- 9 CD-6 DETAILED GRADING PLAN
- 10 CD-7 CONSTRUCTION DETAILS
- 11 EC-1 CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT INITIAL PLAN
- 12 EC-2 CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT INTERIM PLAN
- 13 EC-3 CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT FINAL PLAN
- 14 EC-4 CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT DETAILS
- 15 G-1 GENERAL STRUCTURAL NOTES
- 16 SP-1 SITE PLAN AND DETAILS
- 17 SP-2 STAIR PLAN AND SECTION
- 18 SP-3 FIELD IMPROVEMENT PLAN
- 19 SP-4 FIELD IMPROVEMENT DETAILS
- 20 SP-5 PLANTING PLAN FINAL STABILIZATION PLAN
- 21 SP-6 PLANTING DETAILS
- 22 SP-7 IRRIGATION NOTES AND SCHEDULE
- 23 SP-8 IRRIGATION DETAILS
- 24 SP-9 IRRIGATION DETAILS
- 25 SP-10 ELECTRICAL DETAILS
- 26 SP-11 ELECTRICAL PLAN

LANDSCAPE ARCHITECT
A. FREDERICK CONSULTANT
 303.445.3489
 Contact: Steve Poir
 Email: Steve@afconsultant.com

PROJECT MANAGER
 JCD Denver Parks & Recreation
 Contact: John Quisenberry
 Email: john@denverparks.com

STRUCTURAL ENGINEER
 SALVAC
 303.774.8666
 Contact: STEPHEN@salvac.com

CIVIL ENGINEER
 Merritt Fischer Group
 303.445.3489
 Contact: Merritt Fischer
 Email: merritt@mfgroup.com

IRRIGATION CONSULTANT
 Hydrosystems-SON, Inc.
 303.445.3489
 Contact: John Quisenberry
 Email: john@hydrosystems.com

ELECTRICAL ENGINEER
 GARDNER & ASSOCIATES
 303.445.3489
 Contact: Elizabeth Quisenberry
 Email: elizabeth@gardner.com

CITY AND COUNTY OF DENVER
DIVISION OF PUBLIC WORKS

APPROVED BY: *[Signature]* DATE: 6/15/17

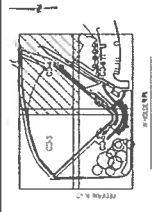
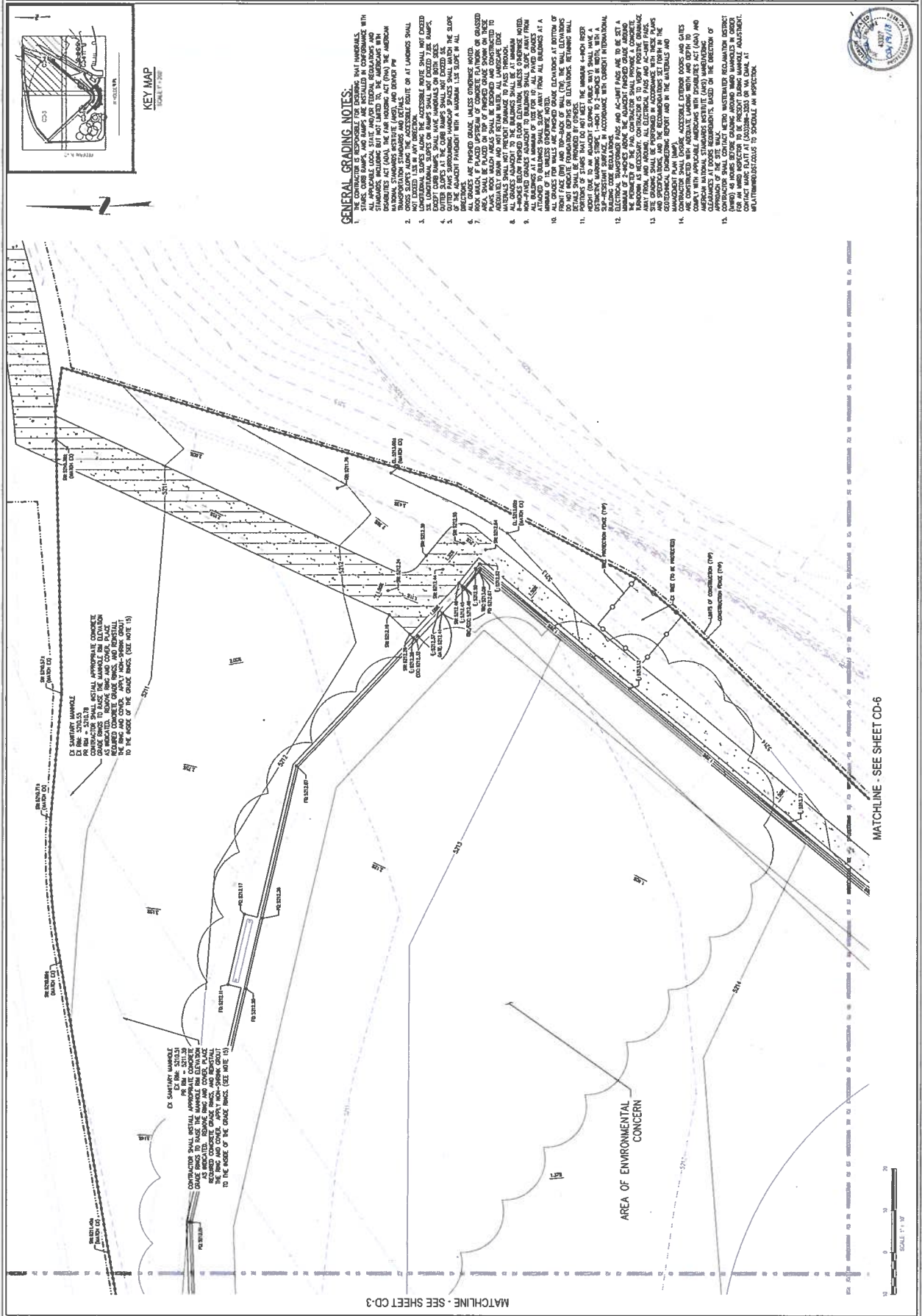
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KEY MAP
SCALE 1" = 200'

- GENERAL GRADING NOTES:**
1. THE CONTRACTOR SHALL VERIFY THE EXISTING GRADE WITH THE CONTRACTOR'S SURVEYOR AND SHALL VERIFY THE EXISTING GRADE WITH ALL APPLICABLE LOCAL, STATE AND/OR FEDERAL REGULATIONS AND AGENCIES. THE CONTRACTOR SHALL VERIFY THE EXISTING GRADE WITH THE AMERICAN SURVEYING AND MAPPING ACT (ASMA) AND THE AMERICAN SURVEYING AND MAPPING ACT (ASMA) AND THE AMERICAN SURVEYING AND MAPPING ACT (ASMA).
 2. EXISTING GRADE SHALL BE MAINTAINED UNLESS OTHERWISE NOTED.
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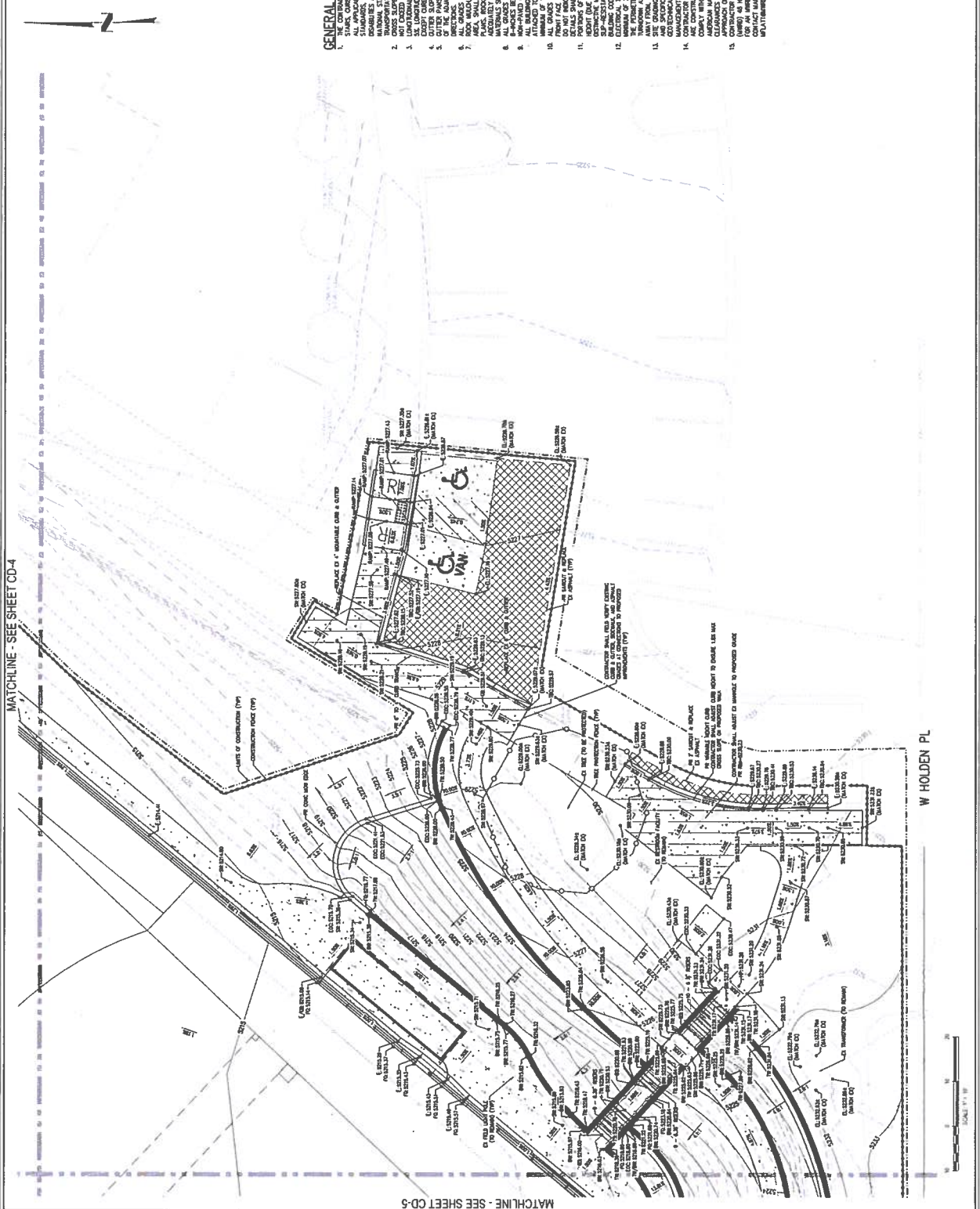
MATCHLINE - SEE SHEET CD-6

MATCHLINE - SEE SHEET CD-3



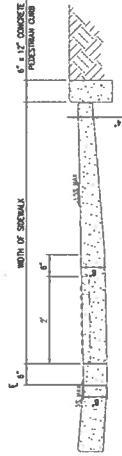
SCALE 1" = 30'

GENERAL GRADING NOTES:
 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS AND AGENCIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AND THE FEDERAL AIRPORT ADMINISTRATION (FAA) FOR THE AIRPORT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AND THE FEDERAL AIRPORT ADMINISTRATION (FAA) FOR THE AIRPORT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AND THE FEDERAL AIRPORT ADMINISTRATION (FAA) FOR THE AIRPORT.





- NOTES:**
1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION. THE CURB SHALL BE CONCRETE AND SHALL BE FINISHED WITH A POLISHED CONCRETE FINISH. LOCAL, STATE, AND/OR FEDERAL REGULATIONS AND STANDARDS SHALL BE REFERRED TO FOR MORE INFORMATION. THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION SHALL BE REFERRED TO FOR MORE INFORMATION. THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION SHALL BE REFERRED TO FOR MORE INFORMATION. THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION SHALL BE REFERRED TO FOR MORE INFORMATION.
 2. ALL RAMP SLOPES SHALL BE IN ACCORDANCE WITH THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION. THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION SHALL BE REFERRED TO FOR MORE INFORMATION. THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION SHALL BE REFERRED TO FOR MORE INFORMATION. THE DENVER CITY AND COUNTY DESIGN STANDARDS FOR CONSTRUCTION SHALL BE REFERRED TO FOR MORE INFORMATION.
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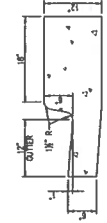
SECTION B-B
 CGD-PW-IS&D TYPE 4 HANDICAP RAMP



2' ACCESSIBLE VALLEY PAN

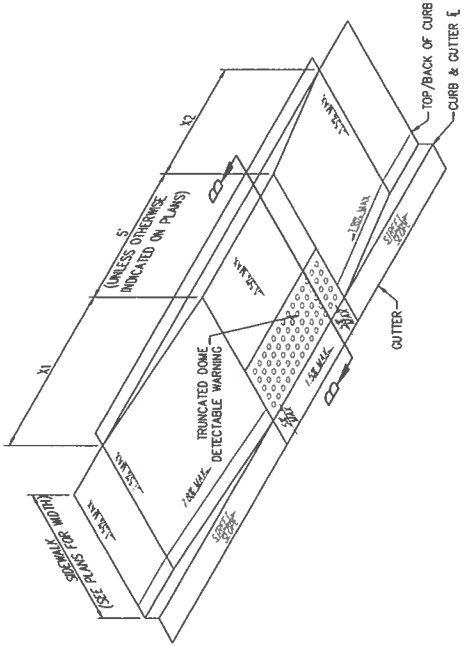


2' VALLEY PAN

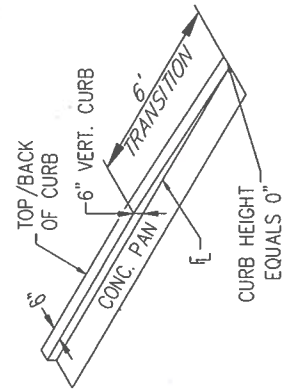


6" CURB & GUTTER-1' CATCH PAN
 (MODIFIED CGD STD. DETAIL 5.3A)

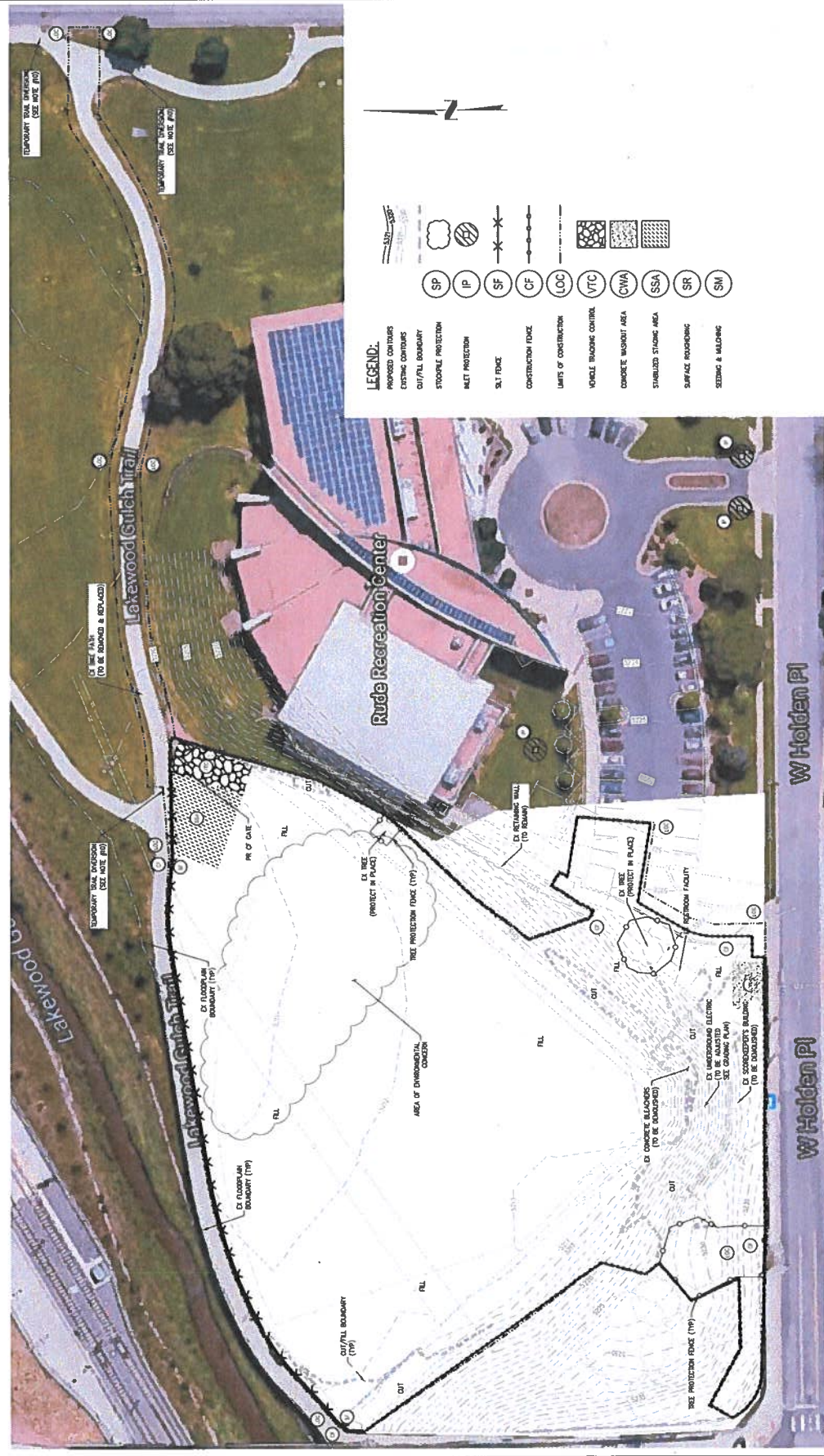
CURB DETAIL MODIFICATIONS INCLUDE REDUCED PAN (12") AND INCREASED CURB HEAD (18") TO ACCOMMODATE FENCE POSTS (REFER TO SHEET PP-3). ALL OTHER DETAILS SHALL BE BUILT TO DETAIL 5.3A STANDARD SPECIFICATION.



HANDICAP RAMP CGD-PW-IS&D TYPE 4 LENGTH DETAIL



6" VERTICAL CURB TO 0" CURB TRANSITION



NOTES:

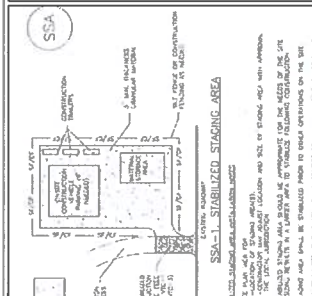
- SEE DETAIL SHEETS EC-3 & EC-4 FOR EROSION CONTROL MEASURES. CONSTRUCTION SHALL BE IN ALL DESIGNATED AREAS NOT FORMALLY LANDSCAPED FOR THE APPROVED LANDSCAPE PLAN.
- ALL LANDSCAPE DRAIN AREA DETAILS SHALL HAVE MELT PROTECTION AND MOLT PROTECTION SHALL BE INSTALLED TO THE PROPOSED STORM WATER PAVEMENT SURFACE.
- ROOF SCODS MAY BE SUBSTITUTED FOR SALT FENCE AS LONG AS THEY MEET THE FOLLOWING CRITERIA:
 - ALL EROSION AND SEDIMENT CONTROL PRACTICES AND OTHER PROTECTIVE MEASURES INSTALLED IN THE SWMP MUST BE SELECTED AND INSTALLED IN ACCORDANCE WITH THE SWMP.
 - ALL EROSION AND SEDIMENT CONTROL PRACTICES AND OTHER PROTECTIVE MEASURES INSTALLED IN THE SWMP MUST BE INSTALLED IN ACCORDANCE WITH THE SWMP.
 - ALL EROSION AND SEDIMENT CONTROL PRACTICES AND OTHER PROTECTIVE MEASURES INSTALLED IN THE SWMP MUST BE INSTALLED IN ACCORDANCE WITH THE SWMP.
- ALL EROSION AND SEDIMENT CONTROL PRACTICES AND OTHER PROTECTIVE MEASURES INSTALLED IN THE SWMP MUST BE INSTALLED IN ACCORDANCE WITH THE SWMP.

LEGEND:

- PROPOSED CONTOURS
- CUT/FILL BOUNDARY
- STOCKPILE PROTECTION
- MELT PROTECTION
- SALT FENCE
- CONSTRUCTION FENCE
- LIMITS OF CONSTRUCTION
- VEHICLE TRACKING CONTROL
- CONCRETE WASHOUT AREA
- STABILIZED STORAGE AREA
- SURFACE ROUGHENING
- SEEDING & MULCHING

9. THE CONTRACTOR SHALL SUBMIT A COMPLETE SWMP AND APPLICATION TO THE PERMITS AUTHORITY TO OBTAIN THE NECESSARY PERMITS. THE SWMP SHALL BE REVIEWED AND APPROVED BY THE PERMITS AUTHORITY. THE SWMP SHALL BE REVIEWED AND APPROVED BY THE PERMITS AUTHORITY. THE SWMP SHALL BE REVIEWED AND APPROVED BY THE PERMITS AUTHORITY.

10. THE CONTRACTOR SHALL PROVIDE TEMPORARY SWMP MEASURES TO PROTECT THE EXISTING AND PROPOSED SWMP MEASURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND REPAIR OF ALL SWMP MEASURES THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND REPAIR OF ALL SWMP MEASURES THROUGHOUT THE CONSTRUCTION PERIOD.

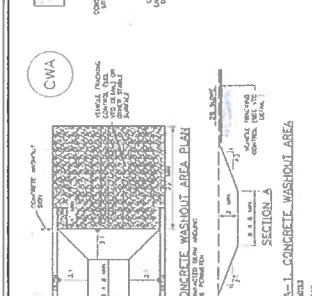


CF - CELL PLASTIC MESH CONSTRUCTION FENCE

1. CELL PLASTIC MESH CONSTRUCTION FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

2. CONSTRUCTION FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

3. CONSTRUCTION FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

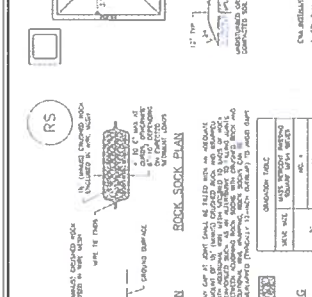


ST - SILL FENCE

1. SILL FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

2. SILL FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

3. SILL FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

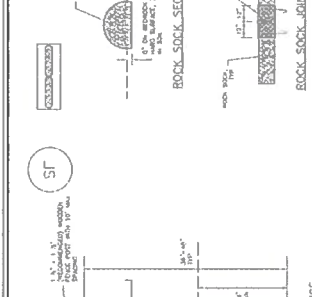


RS - ROCK SOCK PERIMETER CONTROL

1. ROCK SOCK PERIMETER CONTROL SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

2. ROCK SOCK PERIMETER CONTROL SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

3. ROCK SOCK PERIMETER CONTROL SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

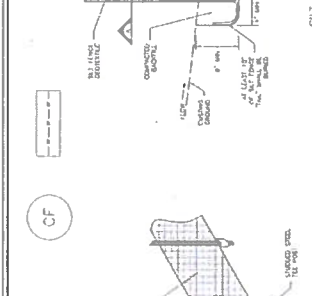


CWA - CONCRETE WASHOUT AREAS

1. CONCRETE WASHOUT AREAS SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

2. CONCRETE WASHOUT AREAS SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

3. CONCRETE WASHOUT AREAS SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.



SSA - STABILIZED STAGING AREA

1. STABILIZED STAGING AREA SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

2. STABILIZED STAGING AREA SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

3. STABILIZED STAGING AREA SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.

CONSTRUCTION FENCE MAINTENANCE NOTES

1. SILL FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.
2. SILL FENCE SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.
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CONCRETE WASHOUT AREAS MAINTENANCE NOTES

1. CONCRETE WASHOUT AREAS SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.
2. CONCRETE WASHOUT AREAS SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.
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STABILIZED STAGING AREA MAINTENANCE NOTES


1. STABILIZED STAGING AREA SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.
2. STABILIZED STAGING AREA SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.
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10. STABILIZED STAGING AREA SHALL BE INSTALLED TO PREVENT CONSTRUCTION ACTIVITIES FROM SPREADING TO ADJACENT AREAS.



BMP MAINTENANCE NOTE:

ALL DESIGN AND STANDARD CONSTRUCTION PRACTICES AND OTHER PROCEDURES SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL BMPs AND CONSTRUCTION PRACTICES THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL BMPs AND CONSTRUCTION PRACTICES THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL BMPs AND CONSTRUCTION PRACTICES THROUGHOUT THE CONSTRUCTION PERIOD.

EC-4 Matching (MU)



Description
 This material shall be used for all areas where the existing surface is to be replaced with a new surface. The material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density. The material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density. The material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.

Appropriate Uses
 This material is suitable for use in all areas where the existing surface is to be replaced with a new surface. The material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density. The material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.

Design and Installation
 This material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density. The material shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.

Notes
 1. Match existing material to the existing surface.
 2. Match existing material to the existing surface.

EC-2 Temporary and Permanent Seeding (TS/PS)

Table 11.1-1 Minimum Seed Rates for Perennial Grasses

Seed Type	Area	Seed Rate (lb/1000 sq ft)	Notes
Perennial Grasses	Open Areas	10	
Perennial Grasses	Shaded Areas	15	
Perennial Grasses	Wet Areas	20	
Perennial Grasses	Highly Erosive Areas	25	

Notes
 1. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.
 2. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.

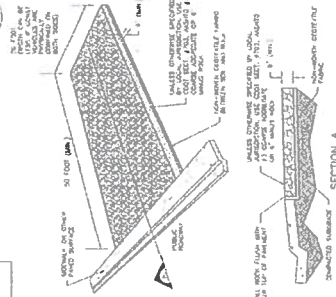
EC-2 Temporary and Permanent Seeding (TS/PS)

Table 11.1-2 Minimum Seed Rates for Annual Grasses

Seed Type	Area	Seed Rate (lb/1000 sq ft)	Notes
Annual Grasses	Open Areas	5	
Annual Grasses	Shaded Areas	7	
Annual Grasses	Wet Areas	10	
Annual Grasses	Highly Erosive Areas	15	

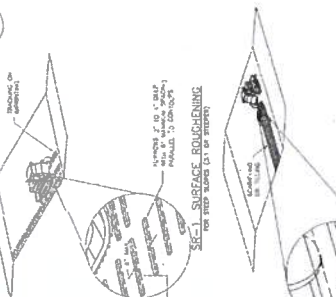
Notes
 1. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.
 2. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.

VTC-1 AGGREGATE VEHICLE TRACKING CONTROL



Notes
 1. Aggregate shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.
 2. Aggregate shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.

SR-2 SURFACE ROUGHENING



Notes
 1. Surface shall be roughened to a minimum depth of 1/4" and a maximum depth of 1/2".
 2. Surface shall be roughened to a minimum depth of 1/4" and a maximum depth of 1/2".

EC-4 Matching (MU)

Notes
 1. Match existing material to the existing surface.
 2. Match existing material to the existing surface.

EC-2 Temporary and Permanent Seeding (TS/PS)

Table 11.1-3 Minimum Seed Rates for Perennial Grasses

Seed Type	Area	Seed Rate (lb/1000 sq ft)	Notes
Perennial Grasses	Open Areas	10	
Perennial Grasses	Shaded Areas	15	
Perennial Grasses	Wet Areas	20	
Perennial Grasses	Highly Erosive Areas	25	

Notes
 1. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.
 2. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.

EC-2 Temporary and Permanent Seeding (TS/PS)

Table 11.1-4 Minimum Seed Rates for Annual Grasses

Seed Type	Area	Seed Rate (lb/1000 sq ft)	Notes
Annual Grasses	Open Areas	5	
Annual Grasses	Shaded Areas	7	
Annual Grasses	Wet Areas	10	
Annual Grasses	Highly Erosive Areas	15	

Notes
 1. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.
 2. Seed shall be applied in a layer of 1/4" to 1/2" and compacted to a minimum density of 95% of the maximum dry density.

VTC-1 AGGREGATE VEHICLE TRACKING CONTROL

Notes
 1. Aggregate shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.
 2. Aggregate shall be placed in a layer of 4" to 6" and compacted to a minimum density of 95% of the maximum dry density.

SR-2 SURFACE ROUGHENING

Notes
 1. Surface shall be roughened to a minimum depth of 1/4" and a maximum depth of 1/2".
 2. Surface shall be roughened to a minimum depth of 1/4" and a maximum depth of 1/2".

BMP MAINTENANCE NOTE:
 ALL DESIGN AND CONSTRUCTION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE CITY AND COUNTY OF DENVER'S BEST MANAGEMENT PRACTICES (BMP) MANUAL. THE BMP MANUAL IS AVAILABLE AT: www.denvergov.org/BMPManual. THE BMP MANUAL IS A REQUIRED PART OF THE CONSTRUCTION PERMITTING PROCESS. THE BMP MANUAL IS A REQUIRED PART OF THE CONSTRUCTION PERMITTING PROCESS. THE BMP MANUAL IS A REQUIRED PART OF THE CONSTRUCTION PERMITTING PROCESS.

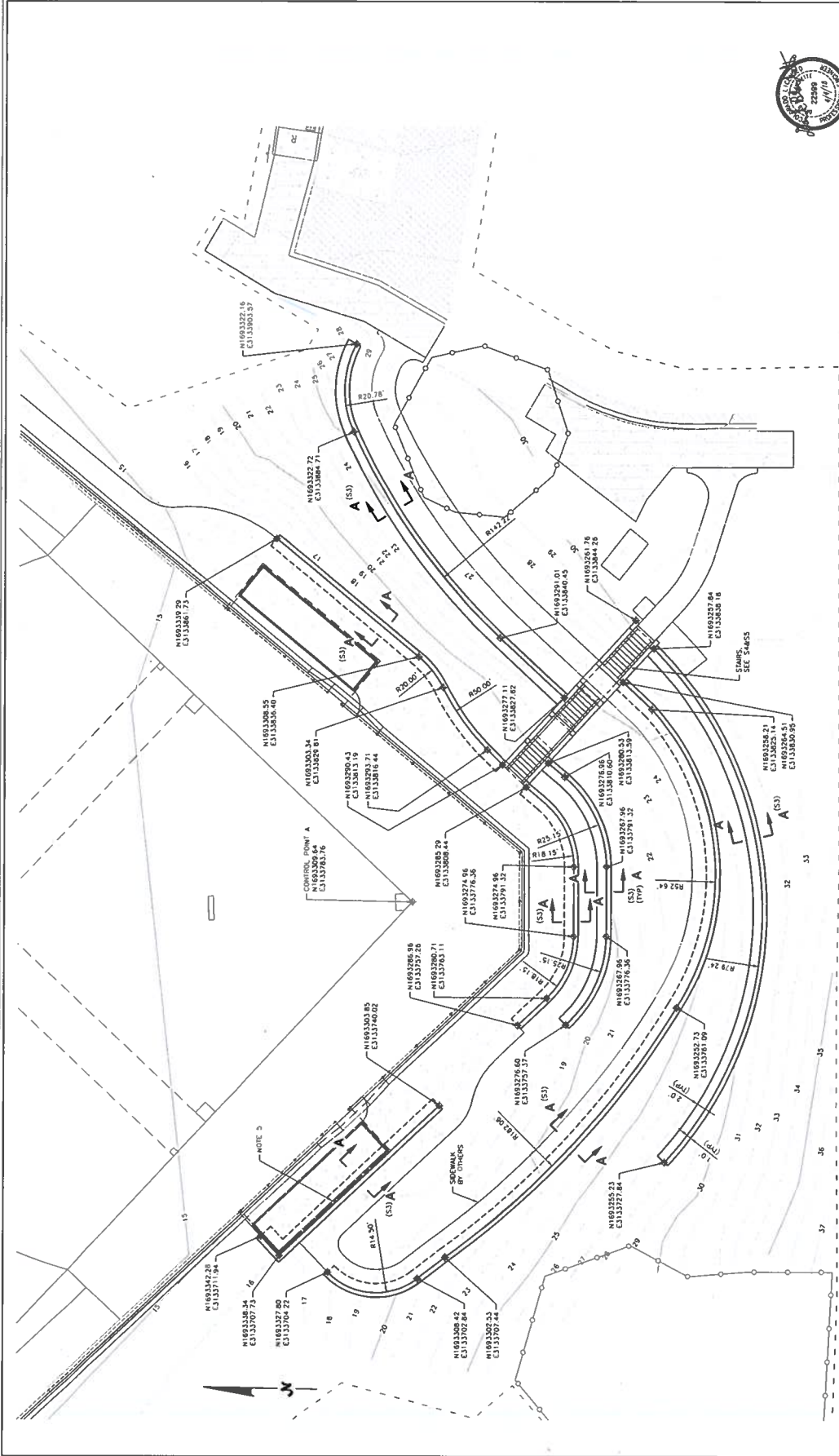
Notes
 1. Match existing material to the existing surface.
 2. Match existing material to the existing surface.

Notes
 1. Match existing material to the existing surface.
 2. Match existing material to the existing surface.

Notes
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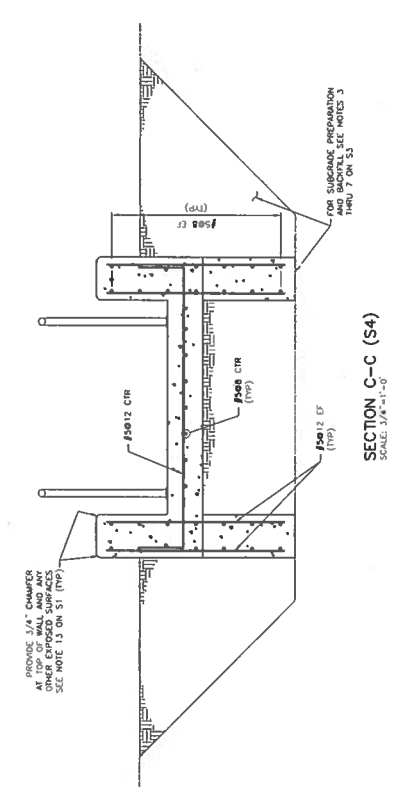
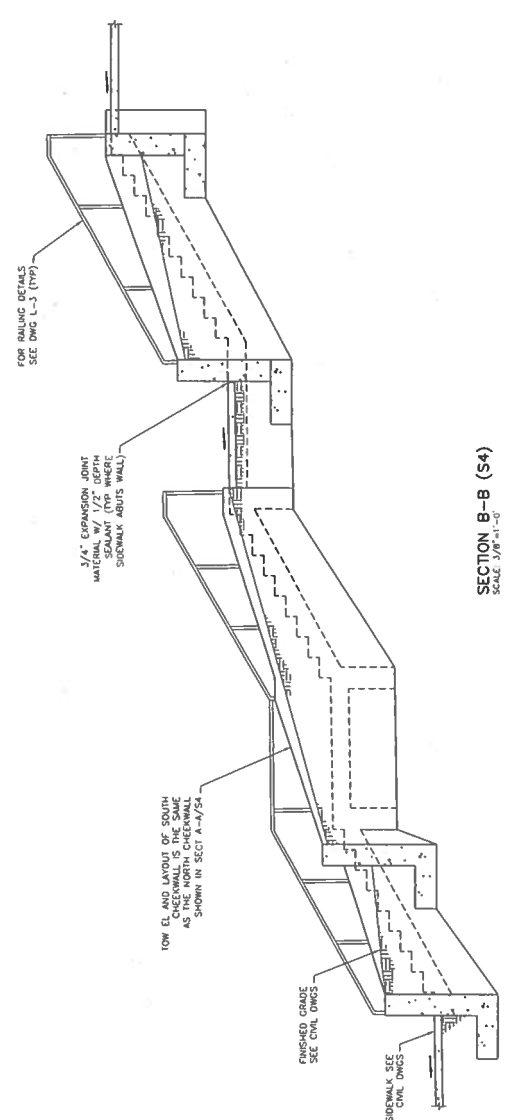


- NOTES:**
- FOR LEGEND, ABBREVIATIONS AND STRUCTURAL NOTES SEE 51.
 - THE CONTROL POINT FOR THE LAYOUT OF THE RETAINING WALLS, WALL TOP SURFACE OR FACE OF THE WALL SHALL BE THE CONTROL POINT COORDINATES AND ELEVATION UNLESS OTHERWISE NOTED.
 - COORDINATES SHOWN FOR THE RETAINING WALLS ARE ON THE NORTH FACE OF THE WALL UNLESS NOTED OTHERWISE.
 - THE TOP OF WALL ELEVATION FOR THE RETAINING WALLS VARIES. SEE THE WALL ELEVATION FOR EACH RETAINING WALL.
 - DO NOT CUT INTO EXISTING WALL FOR REVIEW BY ENGINEER PRIOR TO CONSTRUCTION.

SITE PLAN - RETAINING WALLS
SCALE: 1"=10'


UNICC *Utah's Utility Industry*
 CALL 811 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE OR EXCAVATE FOR MAINTENANCE OF UNDERGROUND UTILITY UTILITIES.

811 *Utah's Utility Industry*
 Call 811 before you dig.



NOTES:
 1 FOR LEGEND, ABBREVIATIONS AND STRUCTURAL NOTES SEE S1

UNCC UNIVERSITY OF NORTHERN COLORADO
811 Know what's below. Call before you dig.
 CALL 811 24 HOURS A DAY IN ADVANCE BEFORE YOU DIG, GRAVE OR EXCAVATE FOR WARNING OF UNDERGROUND UTILITY



PLANTING PLAN/FINAL STABILIZATION PLAN

PROJECT: RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS

SHEET TITLE:

CITY & COUNTY OF DENVER DEPT. OF PARKS & RECREATION



SCALE: 1"=20'-0"

DESIGNED BY: IF

DRAWN BY: AU

CHECKED BY: IF

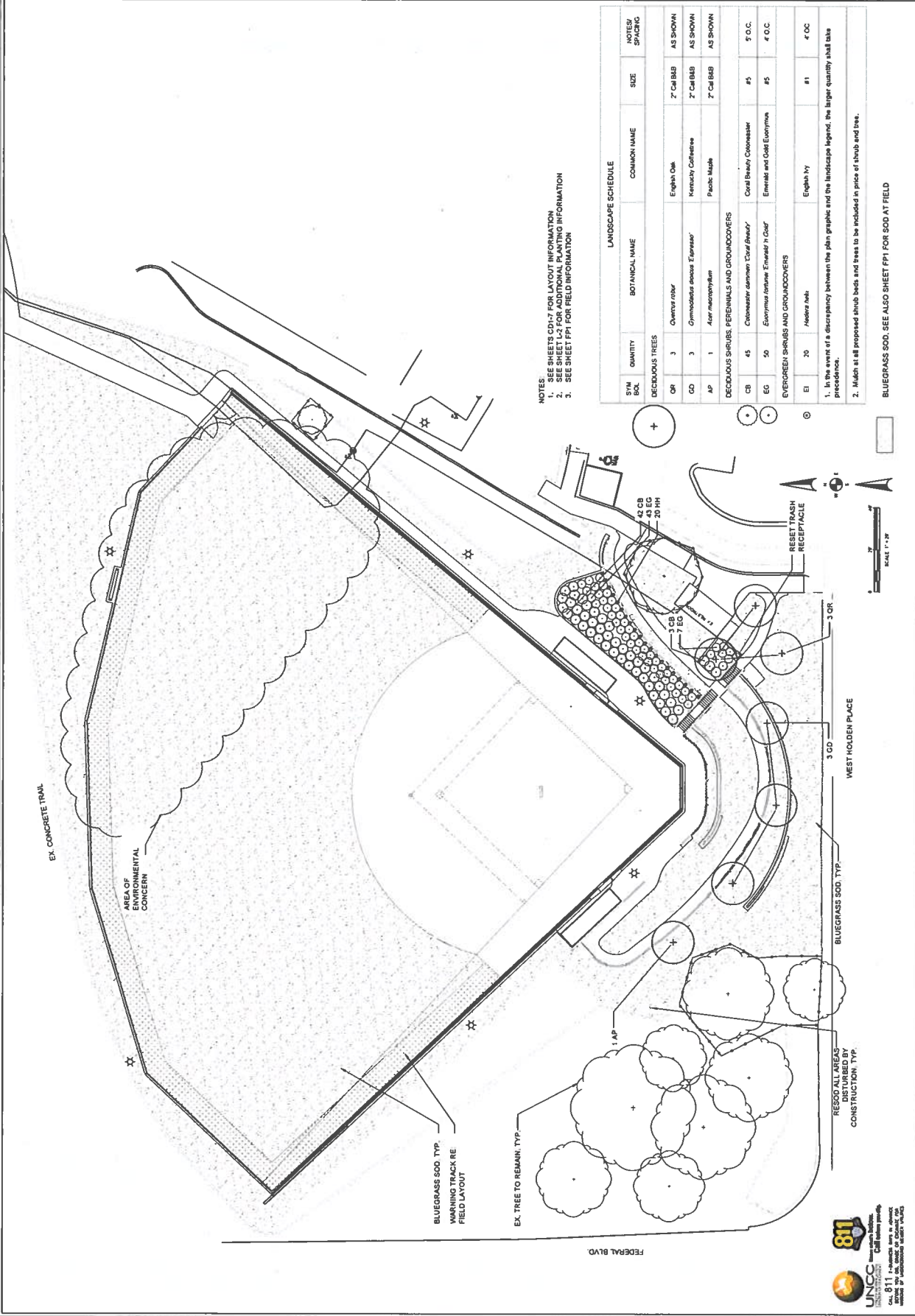
DATE: 04/04/2018

REVISIONS:

BID DOCUMENTS

DWG. NO. L-1

SHEET NUMBER: 23 OF 31



- NOTES:
 1. SEE SHEETS ONLY FOR LAYOUT INFORMATION
 2. SEE SHEET L-2 FOR ADDITIONAL PLANTING INFORMATION
 3. SEE SHEET FPI FOR FIELD INFORMATION

SYM	QTY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES/ SPACING
DECIDUOUS TREES					
OR	3	Quercus robur	English Oak	2" Call B&B	AS SHOWN
OD	3	Gymnocladia dioica 'Emperor'	Kentucky Coffeetree	2" Call B&B	AS SHOWN
AP	1	Acer macrocarpum	Pacific Maple	2" Call B&B	AS SHOWN
DECIDUOUS SHRUBS, PERENNIALS AND GROUNDCOVERS					
CB	45	Cotoneaster japonicus 'Cloud Beauty'	Coral Beauty Cotoneaster	#5	9" O.C.
EG	50	Eryngium yuccifolium 'Emerald N' Clair'	Emerald and Gold Eryngium	#5	4" O.C.
EVERGREEN SHRUBS AND GROUNDCOVERS					
EI	20	Hedera helix	English Ivy	#1	4" O.C.



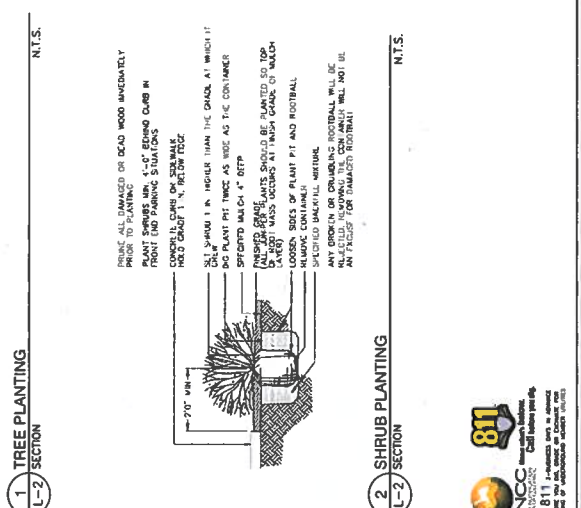
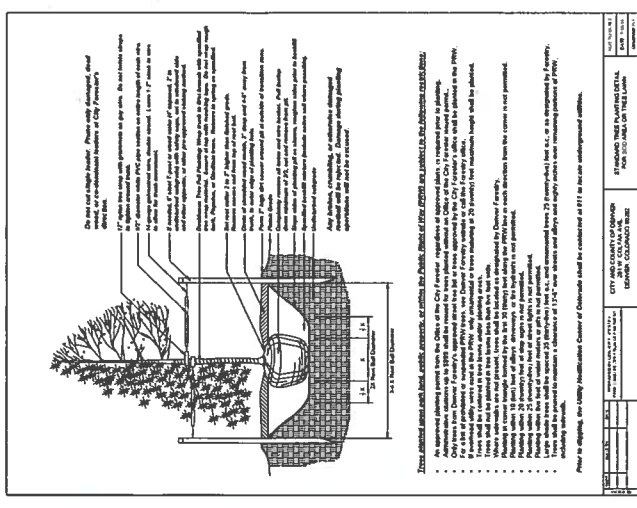
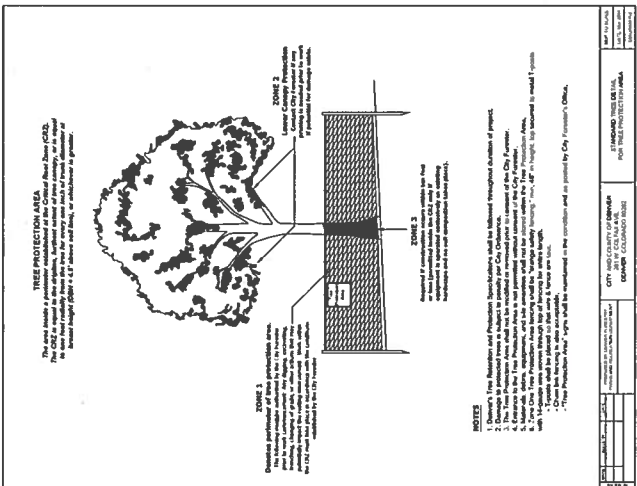
UNCC
 UNIVERSITY OF NORTHERN COLORADO
 811 CALL BEFORE YOU DIG
 811 CALL BEFORE YOU DIG
 811 CALL BEFORE YOU DIG

BLUEGRASS SOO. SEE ALSO SHEET FPI FOR SOO AT FIELD

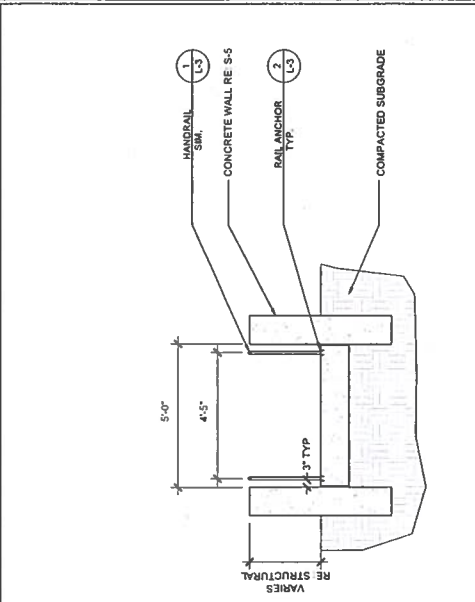
1. In the event of a discrepancy between the plan graphic and the landscape legend, the larger quantity shall take precedence.
 2. Match all proposed shrub beds and trees to be included in price of shrub and tree.

LANDSCAPE NOTES

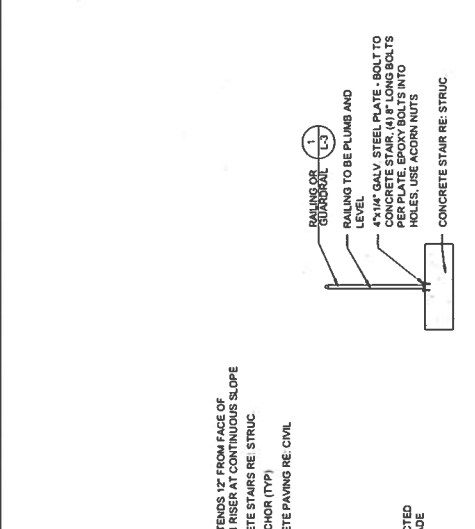
- EXISTING CONDITIONS: CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH CONSTRUCTION AS DESIGNED WHEN IT IS DETERMINED THAT THE EXISTING CONDITIONS ARE NOT AS SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR DECISION. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR DECISION.
- EXISTING PLANTINGS: PROTECT IN PLACE ALL EXISTING PLANTINGS. ANY TREES LOCATED WITHIN THE LIMIT OF WORK TO BE PROTECTED PER TREE PROTECTION DETAIL.
- UTILITIES: THESE DRAWINGS REPRESENT ONLY THE APPROXIMATE LOCATION OF UTILITIES AND ARE INCLUDED ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. CONTRACTOR TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO BEFORE DIGGING, INCLUDING BUT NOT LIMITED TO, TRENCHING AND SHRUB AND TREE PLANTING PITS. IF CONTRACTOR IS UNABLE TO LOCATE UTILITIES, CONTRACTOR SHALL REPORT SUCH CONDITIONS TO THE PROJECT MANAGER. DAMAGE TO EXISTING UTILITIES BY THE CONTRACTOR SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR.
- SITE PREPARATION: LANDSCAPE CONTRACTOR TO REMOVE ALL ROCK AND DEBRIS OVER 1" IN SIZE AND REMOVE OFF SITE. PROVIDE FINISH GRADES WHILE MAINTAINING POSITIVE DRAINAGE. CONTRACTOR TO NOTIFY THE PROJECT MANAGER OF ANY POORLY DRAINED AREAS PRIOR TO COMMENCING WORK.
- SOIL AMENDMENT: SOIL CONDITIONER AMEND SOIL AT A RATE OF FOUR (4) CUBIC YARDS PER ONE THOUSAND (1,000) SQUARE FEET OF SOIL. SOIL CONDITIONER SHALL BE APPLIED TO ALL EXISTING AND NEW PLANTING AREAS. THE FOLLOWING CHARACTERISTICS BASED ON A NUTRIENT TEST PERFORMED NO LONGER THAN 3 MONTHS PRIOR TO ITS INCORPORATION INTO THE PROJECT:
 ORGANIC MATTER: TWENTY FIVE PERCENT (25%) MAXIMUM.
 SALT CONTENT: FIVE (5.0) MHROS/CM MAXIMUM.
 PH: 7.5, MAXIMUM.
 CARBON TO NITROGEN RATIO SHALL BE LESS THAN 20:1.
- PLANT MATERIAL:
 ALL PLANT MATERIAL SHALL MEET REQUIREMENTS OF ALL CONTRACT DOCUMENTS. ALL PLANT MATERIAL SHALL MEET OR EXCEED CURRENT AMERICAN STANDARD FOR NURSERY STOCK ANSI Z60.1 AND THE COLORADO NURSERY ACT AND ACCOMPANYING RULES AND REGULATIONS.
 ALL TREES, SHRUBS AND OTHER PLANT MATERIALS ARE TO BE APPROVED BY THE PROJECT MANAGER PRIOR TO DELIVERY AND AGAIN AFTER DELIVERY TO SITE. ANY PLANT NOT MEETING APPROVAL MAY BE REJECTED AT ANY TIME PRIOR TO FINAL ACCEPTANCE PER SPECIFICATIONS.
 ALL PLANT MATERIAL LOCATIONS ARE TO BE STATED BY THE CONTRACTOR FOR REVIEW BY THE PROJECT MANAGER. ALL ADJUSTMENTS SHALL BE MADE BY THE CONTRACTOR.
 THE CONTRACTOR SHALL NOT DIG PLANT PITS UNTIL LOCATIONS ARE APPROVED. PREGIDDING OF PLANT PITS IS REQUIRED. PLANT PITS ARE TO BE 50% AFTER TREE IS PLACED AT THE FINAL LOCATION TO ALLOW FOR PROPER TREE PIT DEPTH.
 SITE MAINTENANCE: ALL LANDSCAPE AREAS SHALL BE MAINTAINED, INCLUDING MOWING, WATERING AND FERTILIZING BY CONTRACTOR, UP TO FINAL ACCEPTANCE. AT SUCH TIME OWNER WILL BE RESPONSIBLE FOR ALL MAINTENANCE.
 MULCH: MULCH AT TREES AND SHRUB BEDS TO BE SHREDDED CEDAR MULCH OF MEDIUM TEXTURE.
 IRRIGATION OR PLANT MATERIAL: IF DAMAGED DURING CONSTRUCTION, AT THE CONTRACTOR'S EXPENSE.
 CLEANUP: ANY CONSTRUCTION DEBRIS OR MUD DROPPED INTO MANHOLES, PILES, OR TRACKS ONTO EXISTING OR PAVED AREAS SHALL BE REMOVED IMMEDIATELY BY CONTRACTOR. CONTRACTOR SHALL REPAIR ANY EXCAVATIONS OR PAVEMENT FAILURES CAUSED BY CONSTRUCTION WITHIN OR IN THE VICINITY OF THE LIMITS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE DUE TO CONSTRUCTION AT NO ADDITIONAL COSTS TO OWNER.
- DENVER FORESTRY NOTES:
 A. PER CITY CODE, ALL TREE REMOVALS IN DENVER LIMITS MUST BE PERFORMED BY PROPERTY OWNER OR A TREE CONTRACTOR LICENSED BY DENVER FORESTRY (INCLUDING TREES IN ROWS AND ON PRIVATE PROPERTY). FOR A CURRENT LIST OF LICENSED TREE CONTRACTORS, VISIT WWW.DENVERGOV.GOV/FORESTRY. TREE REMOVAL PERMITS MUST BE OBTAINED PRIOR TO REMOVAL. IN ORDER TO OBTAIN TREE REMOVAL PERMIT, CONTACT FORESTRY (DENVERGOV.ORG) WITH NAME OF LICENSED CONTRACTOR OR PROPERTY OWNER PERFORMING REMOVAL. INCLUDE D-LOG NUMBER WHEN REQUESTING PERMIT.
 B. FOR TREES ON PRIVATE PROPERTY, A FORESTRY-ISSUED TREE REMOVAL PERMIT IS NOT REQUIRED PRIOR TO REMOVAL. HOWEVER, PER CITY CODE, ALL TREE REMOVALS IN DENVER MUST BE PERFORMED BY PROPERTY OWNER OR A TREE CONTRACTOR LICENSED BY THE OFFICE OF THE CITY FORESTER.
 C. FORESTRY-ISSUED TREE PLANTING PERMIT IS REQUIRED FOR ALL TREES TO BE PLANTED IN PUBLIC RIGHTS OF WAY. CONTACT FORESTRY (DENVERGOV.ORG) WITH NAME OF CONTRACTOR OR PROPERTY OWNER OBTAINING PERMIT PRIOR TO INSTALLATION.
 D. EXISTING TREES TO BE PRESERVED IN PUBLIC RIGHT OF WAY SHALL BE PROTECTED PER FORESTRY STANDARDS & PRACTICES. TREE PROTECTION SHALL BE INSTALLED PRIOR TO ISSUE OF DEMOLITION PERMIT. APPROVED BY FORESTRY, AND SHALL REMAIN IN PLACE THROUGHOUT CONSTRUCTION. NO CONSTRUCTION ACTIVITIES OR STORAGE OF MATERIALS SHALL TAKE PLACE WITHIN TREE PROTECTION ZONES WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE OFFICE OF THE CITY FORESTER.
 E. EXISTING ROW TREES APPROVED FOR REMOVAL BY THE OFFICE OF THE CITY FORESTER (OCF) MUST BE REMOVED IMMEDIATELY UPON RECEIVING A TREE REMOVAL PERMIT. A TREE REMOVAL PERMIT MUST ALSO BE OBTAINED FROM THE OCF PRIOR TO CONSTRUCTION ACTIVITIES. A TREE REMOVAL PERMIT MUST ALSO BE OBTAINED FROM THE OCF PRIOR TO REMOVAL. FAILURE TO REMOVE SUCH TREES WITHIN THE 15-DAY TIMEFRAME OR REMOVAL WITHOUT A PERMIT WILL RESULT IN NOTICE OF VIOLATION AND MAY INCLUDE CITATIONS/FINES.
 F. REQUIRED SOIL REMEDIATION WHEN REMOVING HARDCAPE (CONCRETE/ASPHALT/PAVERS/ETC.) TO PLANT:
 * SOIL ANALYSIS: BULK DENSITY TESTING AND REMEDIATION REQUIRED WHEN REMOVING HARDCAPE TO PLANT TREES, INCLUDING BUT NOT LIMITED TO CONCRETE, ASPHALT, PAVERS, BRICK
 * DEEP SOIL ANALYSIS TO 24" DEPTH REQUIRED FROM CREDITED, LOCAL SOIL ANALYSIS LABORATORY WITH EXPERTISE IN LOCAL CLIMATE. SOILS MUST DETERMINE SOIL TEXTURE AND TYPE, PH BALANCE IN LOCAL CLIMATE, AVAILABLE NUTRIENTS, AVAILABLE PHOSPHORUS, AND PLANT AVAILABLE NUTRIENTS. SOIL REMEDIATION MAY BE REQUIRED BASED ON SOIL ANALYSIS.



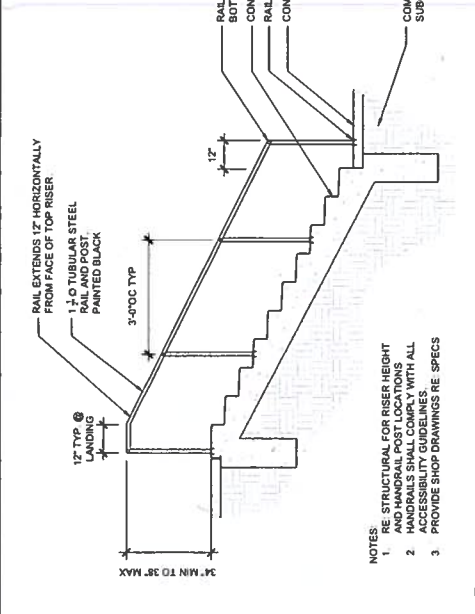
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DESIGNED BY	BG/IF
DRAWN BY	AU
CHECKED BY	IF
DATE	04/04/2018
REVISIONS	BID DOCUMENTS
DWG. NO.	L-3
SHEET NUMBER	25 OF 31



1 TYPICAL RAILING SECTION
SCALE: 1/4" = 1'-0"



2 RAIL ANCHOR SECTION
SCALE: 1" = 1'-0"



3 STAIR SECTION
SCALE: 1/2" = 1'-0"

TUBULAR STEEL CONSTRUCTION NOTES:

- THE CONTRACTOR ASSURES THAT ALL COMPONENTS, SPECIFIED OR REQUIRED TO SATISFACTORILY COMPLETE THE INSTALLATION ARE COMPATIBLE WITH EACH OTHER, WITH THE SUBSTRATE AND WITH THE LOCAL ENVIRONMENT AND MEET THE SPECIFIED CONDITIONS OF INSTALLATION AND EXPECTED USE.
- ALL METAL SHALL BE 16 GA. SHEET IN RESOURCE FINISHES AND SPRAYED WITH 7 COATS GLOSS BLACK PAINT AS APPROVED BY OWNERS REPRESENTATIVE. CONTRACTOR MUST PROVIDE SAMPLE.
- THE FIELD MEASUREMENTS PRIOR TO PREPARATION OF SHOP DRAWINGS AND FABRICATION SHALL BE TAKEN TO ENSURE PROPER FITTING OF THE WORK. HOWEVER, DO NOT DELAY PROGRESS; ALLOW FOR ADJUSTMENTS AND FITTINGS WHEREVER THE TANKING OF FIELD MEASUREMENTS BEFORE FABRICATION MIGHT DELAY THE WORK.
- PRE-ASSEMBLE ITEMS IN THE SHOP TO THE GREATEST EXTENT POSSIBLE SO AS TO MINIMIZE FIELD SPlicing AND ASSEMBLY OF UNITS AT THE PROJECT SITE. DISASSEMBLE UNITS ONLY TO THE EXTENT NECESSARY FOR SHIPPING AND HANDLING LIMITATIONS. CLEARLY MARK UNITS FOR RE-ASSEMBLY AND COORDINATED INSTALLATION.
- SUBMIT SHOP DRAWINGS FOR THE FABRICATION AND INSTALLATION OF ALL CUSTOM FABRICATED ORNAMENTAL METAL WORK. INCLUDE PLANS, ELEVATIONS AND DETAIL DRAWINGS. THE DRAWINGS SHALL SHOW THE FIELD MEASUREMENTS AND DIMENSIONS. FURNISH SETTING DIAGRAMS AND TEMPLATES FOR ITEMS SET IN OTHER WORK, ESPECIALLY SHOW DETAILS FOR TUBULAR STEEL JOINTS AT BRICK COLUMNS AND ALL TUBULAR STEEL CONNECTIONS.
- SUBMIT SAMPLES OF (0.15 M) SQUARE METAL FINISH REQUIRED. SHOW EACH COMBINATION OF MECHANICAL AND CHEMICAL TREATMENTS TO BE USED ON EACH ALLOY. WHEN VISIBLE VARIATIONS WILL OCCUR, SAMPLES SHALL INDICATE THE EXTREMES. PREPARE SAMPLES ON 1/2" SQUARE METAL. PROVIDE SAMPLES FOR COMPATIBLE FINISH. ADDITIONALLY, PROVIDE COMPLETED PAINTED SAMPLE FOR APPROVAL.
- SAMPLES SHALL BE SUBMITTED PRIOR TO FABRICATION OF ITEMS. APPROVED WORKING MODELS SHALL BE USED ON THE PROJECT AS BASIS FOR APPROVAL OF ALL FUTURE WORK.
- STORE ALL ORNAMENTAL METAL ITEMS UNDER COVER AND OFF THE GROUND. HANDLE IN SUCH A MANNER AS TO PREVENT DAMAGE TO FABRICATED PIECES DURING STORAGE, ERECTION AND DURING CONSTRUCTION.

4 MOW BAND SECTION
SCALE: 1/4" = 1'-0"

5 EXPANSION JOINT SECTION
SCALE: 1/4" = 1'-0"

6 RAILING SECTION
SCALE: 1/4" = 1'-0"

7 RAIL ANCHOR SECTION
SCALE: 1/4" = 1'-0"

8 STAIR SECTION
SCALE: 1/2" = 1'-0"

9 ARCHITECTURAL METALS SHALL BE OF THE BEST COMMERCIAL QUALITY AND THEIR VARIOUS FORMS SHALL BE STRAIGHT AND TRUE. ALL STEEL TO BE PY 36KSI, ASTM A588, ALL THICKNESSES SHALL BE NO SCRATCHES, SCARS OR GREASES, BUCKLES, RIPPLES, OR CHATTER MARKS. FINISHED SURFACES MUST BE SMOOTH AND TRUE.

10 MATERIAL SHALL BE SELECTED FOR SURFACE FLATNESS, SMOOTHNESS AND FREEDOM FROM SURFACE BLEMISHES WHEN EXPOSED TO VIEW IN THE FINISHED UNIT. EXPOSED-TO-VIEW SURFACES WHICH EXHIBIT PITTING, SEAM MARKS, ROLLER MARKS, "OIL CANNING", STAINS, DISCOLORATIONS OR OTHER IMPERFECTIONS ON THE FINISHED UNITS WILL NOT BE ACCEPTABLE.

11 AFTER COMPLETION OF SPECIFIED FINISHES ON WORK, COAT CONCEALED SURFACES WHICH WILL BE IN CONTACT WITH CONCRETE OR FOOTINGS WITH A HEAVY COAT OF BITUMINOUS POLYURETHANE SEALANT AND GALVANIC ANODE. DO NOT EXTEND COATING ONTO EXPOSED SURFACES.

12 ITEMS SHALL BE SHOP FABRICATED SO FAR AS PRACTICAL. JOINTS SHALL BE FLUSH TO THE SURFACE OF THE UNITS. ALL WELDS SHALL BE GROUNDED SMOOTH AND FREE OF JAGGED EDGES OR LUMPS.

13 CONTACT SURFACES OF CONNECTED MEMBERS SHALL BE GROUNDED TRUE. PARTS SHALL BE GROUNDED SMOOTH AND FREE OF JAGGED EDGES OR LUMPS.

14 PERFORM ALL CUTTING, DRILLING, AND FITTING REQUIRED FOR THE INSTALLATION OF THE UNITS. ALL CUTTING SHALL BE DONE WITH THE APPROPRIATE TOOLS AND EQUIPMENT. PROVIDE TEMPORARY BRACING OR ANCHORS IN FORMWORK FOR ITEMS WHICH ARE TO BE BUILT INTO CONCRETE.

15 FORM TIGHT JOINTS WITH EXPOSED CONNECTIONS ACCURATELY FITTED WITH UNIFORM REVEALS AND SPACES FOR SEALANTS AND JOINT FILLERS. ALL TUBE TO TUBE WELDS SHALL BE FULL PENETRATION GROOVE WELDS. WHERE CUTTING, WELDING AND DRILLING ARE REQUIRED FOR PROPER BRACING AND JOINTING OF THE WORK, RESTORE FINISHES AND REPAIRS.

16 DO NOT USE FINISHES WHICH CANNOT BE COMPLETELY RESTORED IN THE FIELD. RETURN ITEMS WITH SUCH FINISHES TO THE SHOP FOR REQUIRED ALTERATIONS. FOLLOWED BY COMPLETE REFINISHING OR PROVIDE NEW UNITS AT CONTRACTOR'S OPTION.

Irrigation Construction Notes

- SOILS AND BASE INFORMATION** - ALL BASE AND PLANTING INFORMATION HAS BEEN PROVIDED BY STUDY CIP. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY HYDROSYSTEMSTM OF ANY DISCREPANCIES BETWEEN THE UTILITY OR PLANTING PLANS AND THE IRRIGATION PLAN. IF CONTRACTOR FAILS TO NOTIFY HYDROSYSTEMSTM AND THE IRRIGATION PLAN, THE CONTRACTOR ASSUMES ALL RISKS AND LIABILITIES ASSOCIATED WITH THIS FIELD CHANGES. REFER TO SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS.
- SYSTEM PRESSURE** - HYDROSYSTEMSTM HAS CONDUCTED THE LOCAL WATER DISTRICT THAT SERVES THIS SITE AND THEY HAVE DETERMINED THAT THE STATIC WATER PRESSURE IN THIS AREA SHOULD BE 85 PSI. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY PRESSURE PRIOR TO COMMENCING ANY CONSTRUCTION AND NOTIFY HYDROSYSTEMSTM OF PRESSURE TEST AND RESULTS SHALL BE PROVIDED TO HYDROSYSTEMSTM AT CONSTRUCTION ONSET. IF CONTRACTOR FAILS TO FIELD VERIFY PRESSURE AND/OR NOTIFY HYDROSYSTEMSTM OR ANY VARIATIONS FROM THIS PRESSURE, THEN THE CONTRACTOR ASSUMES ALL RISKS AND LIABILITIES ASSOCIATED WITH THIS MODIFICATIONS REQUIRED TO ACCOMMODATE ACTUAL SITE PRESSURE. THIS SYSTEM HAS BEEN DESIGNED FOR A REQUIRED STATIC PRESSURE OF 85 PSI MINIMUM.
- IRRIGATION SYSTEM OPERATION INTENT** - THIS IRRIGATION SYSTEM HAS BEEN DESIGNED TO IRRIGATE THE ESTABLISHED LANDSCAPE WITHIN A THREE NIGHT PER WEEK, SIX HOUR PER NIGHT WATERING WINDOW. ESTABLISHED WATERING WILL REQUIRE UP TO TWICE AS MUCH IRRIGATION FOR A FOUR TO SIX WEEK PERIOD. THE DESIGN IS BASED ON AS-BUILT CONDITIONS AND A 30-YEAR AVERAGE WEATHER DATA AND WILL NEED TO BE ADJUSTED DUE TO SEASONAL CHANGES AND WEATHER CONDITIONS ABOVE AND BELOW THE AGREED VALUES UTILIZED.

ORGANISMAL PLANTINGS

 - 2.25" PER WEEK PEAK SEASON
 - 1.25" PER WEEK PEAK SEASON
- EQUIPMENT INSTALLATION** - IT IS THE INTENT OF THIS DESIGN THAT ALL IRRIGATION EQUIPMENT BE INSTALLED WITHIN THE DESIGN LIMITS. THE LOCATION FOR ANY EQUIPMENT SHOWN OUTSIDE OF THESE LIMITS IS SHOWN IN THAT LOCATION FOR GRAPHICAL CLARITY ONLY. ALL VALVE BOXES SHALL BE INSTALLED A MINIMUM OF 6'-0" FROM EDGE OF ANY PAVED SURFACES. ALL VALVE BOXES SHALL BE PLACED A MINIMUM OF 3'-0" FROM THE CENTERLINE OF ANY DRAINAGE SWALE.
- SLEEVING** - ALL MANLINE OR LATERAL LINES UNDER PAVED SURFACES SHALL BE SLEEVED. ALL SLEEVING UNDER PAVED SURFACES SHOWN ON PLANS IS BY CONTRACTOR. CONTRACTOR SHALL PROVIDE SLEEVING WITH SIZES AND QUANTITIES SHOWN ON PLANS OR BASED ON THE SCHEDULE BELOW. ALL MANLINE, CONTROL WIRES AND DRIP LINES UNDER PAVED SURFACES ARE TO BE INSTALLED IN SLEEVING. SLEEVING SHALL BE MINIMUM 2" THICKNESS. SLEEVING SHALL BE 1/2" THICKNESS.

 - 15" - 3" PIPING
 - 4" PVC (1)
 - 25" - 3" PIPING
 - 6" PVC (1)
 - 1-50 CONTROL WIRES
 - 3" PVC (1)

IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER	MODEL NO	DESCRIPTION	DETAIL NO
●	RAIN BRD	1800-SAM-PROX NOZZLE	POPUP SPRAY HEAD	9
●	RAIN BRD	1800-SAM-PROX W/ST, CORNER NOZZLE	POPUP SPRAY HEAD	9
●	RAIN BRD	1812-SAM-PROX W/ WPS SERIES NOZZ.	M-POP SPRAY HEAD	9
●	RAIN BRD	5008-PA-SAM-SS W/ # NOZZLE	GEAR DRIVEN ROTOR	10
●	RAIN BRD	8000-SS W/ # NOZZLE	GEAR DRIVEN ROTOR	10
●	RAIN BRD	8000-SS W/ # NOZZLE	GEAR DRIVEN ROTOR	10
●	RAIN BRD	F4-PR-55-4S	GEAR DRIVEN ROTOR	10
●	RAIN BRD	PER SERIES	ELECTRIC CONTROL VALVE	5 & 6
●	BUCKNER	GH44010	DUCK COUPLING VALVE	7
N/S	MUELLER	H10B3	MANUAL DRAIN VALVE	8
N/S	WATCO	10-RT	GATE VALVE	11 & 12
N/S	HARCO	WRE SPLICES	MECHANICAL JOINT RESTRAINTS	4
N/S		CLASS 200 RT - 3" & LARGER	THRUST BLOCKS	3
		600 65'	PVC MANLINE	1
		CLASS 200 BE - 2-1/2 TO 3"	PVC LATERAL	1
			PVC LATERAL	1
			NEW CONTROL WIRES	1
			PVC SLEEVING	2
			RAIN SHUT-OFF DANCE	14
			MANUAL GLOBE VALVE	15
			EXTINGUISH CONTROLLER	
			EXISTING MANLINE	
			CONTROLLER & STATION NO CONTROL VALVE SIZE	

EXISTING IRRIGATION COMPONENTS SHARED BACK FOR CLARITY

- NOTE: EACH LENGTH OF SLEEVED PIPE SHOWN SHALL BE ROUTED THROUGH SEPARATE SLEEVE.**
- POP-UP SPRAY NOZZLES** - CONTRACTOR TO INSTALL PLASTIC NOZZLES ON ALL POP-UP SPRAY HEADS. INSTALL 15 SERIES NOZZLES ON ALL HEADS SPACED AT 13' ON SERIES NOZZLES ON ALL HEADS SPACED AT 9' TO 10'. INSTALL A SERIES NOZZLES ON ALL HEADS SPACED LESS THAN 8'. INSTALL SIDE STRIP NOZZLES ON ALL HEADS WITH AN "S" DESIGNATION AND RIGHT AND LEFT CORNER NOZZLES ON ALL HEADS WITH AN "L" OR "R" DESIGNATION. VARIABLE ARC NOZZLES SHOULD BE UTILIZED ADJACENT TO CURVED ROWS OR CORNERS. OPERATING ANGLES SHALL BE MARKED WITH A MANUARD NOZZLE ANGLE (MAY REQUIRE APPROVAL BY PROJECT MANAGER SPECIFIC TO SITUATION).
- TREES SHOWN ON IRRIGATION PLANS ARE APPROXIMATE.
- ALL IRRIGATION HEAD LOCATIONS SHALL BE INSTALLED, FLAGGED AND/OR OTHERWISE CLEARLY MARKED ON THE GROUND PRIOR TO INSTALLATION. SPRINKLER HEAD STAKING SHALL BE INSPECTED AND APPROVED BY THE CONSULTANT PRIOR TO INSTALLATION. CONTRACTOR SHALL BE RESPONSIBLE FOR HEAD TO HEAD COVERAGE IN REGIONS WHERE CONTRACTOR SHALL FIELD-STAKE PROPOSED AND EXISTING ROTOR LOCATIONS WITH FLAGS OF DIFFERENT COLORS FOR REVIEW/ADJUSTMENT AND APPROVAL PRIOR TO INSTALLATION.
- CHALK PROPOSED LATERAL PIPE ROUTING WITHIN DESIGNATED TREE MASSES AND OBTAIN APPROVAL FROM DENVER DEPARTMENT OF FORESTRY AND DISTRICT REPRESENTATIVE PRIOR TO TRENCHING AND/OR PLOWING OF PIPING AND/OR EXCAVATING FOR HEAD INSTALLATION.
- CONTRACTOR SHALL INSTALL #8-UFUL YELLOW TRACER WIRE ALONG THE ENTIRE LENGTH OF THE PVC MANLINE. LOOP INTO EACH VALVE BOX.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EXISTING PLANT MATERIAL LOCATED INSIDE AND OUTSIDE WORK LIMITS IN A VISIBLE, GREEN, HEALTHY CONDITION UNTIL FINAL ACCEPTANCE OF PROJECT. THIS SHALL INCLUDE PROVIDING TEMPORARY PROTECTION FOR EXISTING PLANT MATERIAL. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING BY OWNER'S REPRESENTATIVE AS HAVING DIED DUE TO LACK OF INTERM MAINTENANCE BY CONTRACTOR SHALL BE REPLACED BY CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
- EXCESS DIRT GENERATED BY TRENCHING OPERATIONS SHALL BE DISPOSED OF BY CONTRACTOR AT OFF-SITE LOCATION AT NO ADDITIONAL COST TO OWNER.
- ADJUSTMENT - CONTRACTOR SHALL FINE TUNE/ADJUST THE IRRIGATION SYSTEM TO NOZZLE/ARC/DRAIN OVERSPRAY ONTO HARD SURFACES BY ADJUSTING NOZZLE DIRECTION AND NOZZLE RADIUS.
- MANLINE - 2" AND 2-1/2" PVC MANLINE FITTINGS TO BE INSTALLED WITH CONCRETE RESTRAINTS. 3" AND LARGER MANLINE AND FITTINGS TO BE INSTALLED WITH CONCRETE RESTRAINTS.

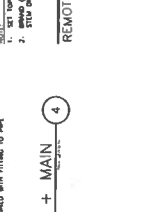
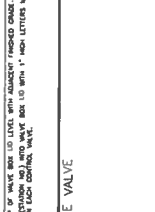
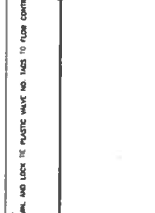
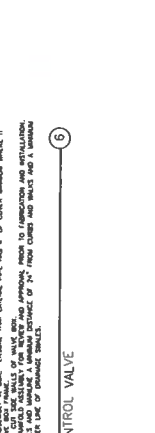
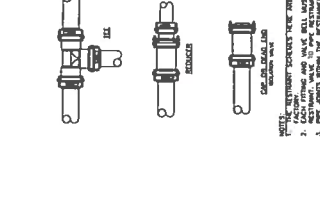
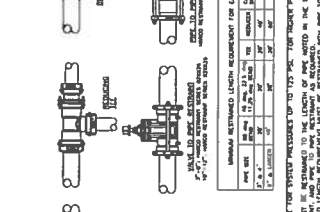
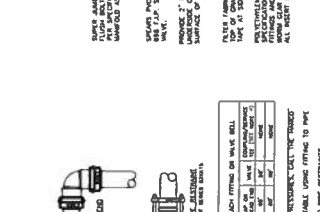
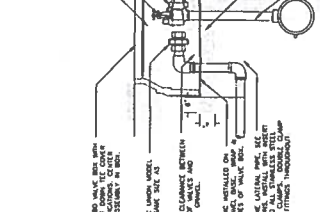
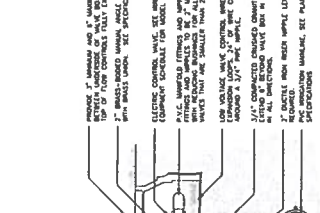
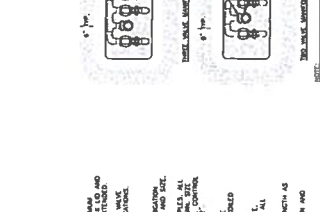
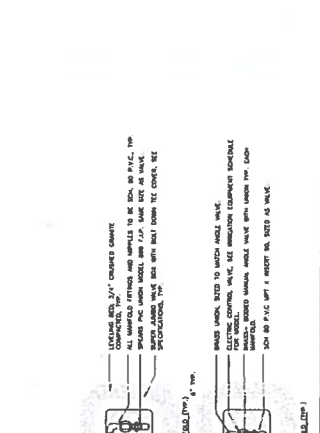
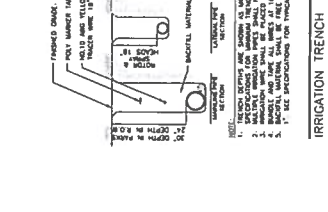
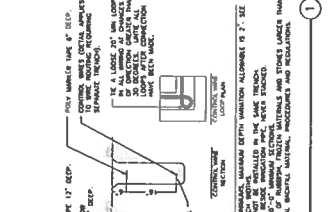
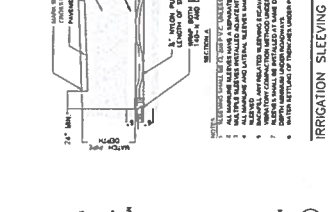
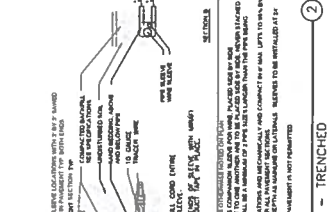
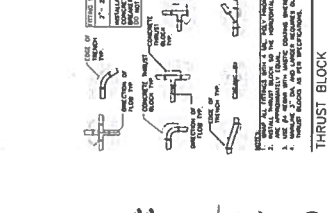
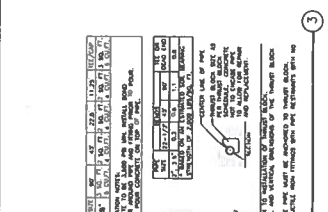
- CONTRACTOR SHALL PREVENT SEDIMENT, DEBRIS AND ALL OTHER POLLUTANTS FROM OPERATIONS THAT ARE PART OF THIS PROJECT. THE CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL REMOVE ALL SEDIMENT, MUD, AND CONSTRUCTION DEBRIS THAT MAY ACCUMULATE IN THE FLOUMES AND PUBLIC RIGHTS OF WAY OF THE PROJECT. SEDIMENT REMOVAL SHALL BE CONDUCTED IN A TIMELY MANNER.
- CONTRACTOR SHALL PREPARE AND SUBMIT A PLAN FOR STAGING. IT IS REQUIRED THAT ALL STAGING AREAS BE PROTECTED FROM POLLUTANTS. THE CONTRACTOR SHALL OBTAIN LANDOWNER AND MUST BE APPROVED BY DENVER PARKS OR ITS REPRESENTATIVE OVER 2' IN DIAMETER SHALL NOT BE CUT. PIPING SHALL BE TUNNELED UNDER THESE SUPERINTENDENT AND PROJECT MANAGER FOR DECISIONS.
- UNLABELED PIPING - ALL UNLABELED LATERAL PIPING SHALL BE 1" MINIMUM UNLESS OTHERWISE NOTED 1 1/4" AND 3/4" ARE NOT ACCEPTED.
- EXISTING IRRIGATION DAMAGE - CONTRACTOR SHALL REPAIR OR REPLACE ANY EXISTING IRRIGATION SYSTEMS DAMAGED DURING NEW INSTALLATION, REPAIR OR REPLACEMENT SHALL BE DETERMINED BY OWNER OR OWNER'S REPRESENTATIVE AND PAID FOR BY THE LANDSCAPE CONTRACTOR.
- EXISTING IRRIGATION COORDINATION - EXISTING IRRIGATION SYSTEM SHALL NOT BE TURNED OFF FOR MORE THAN 24 HOURS MAXIMUM. CONTRACTOR SHALL COORDINATE TURN OFF OF SYSTEM WITH OWNER OR MAINTENANCE STAFF 72 HOURS PRIOR TO ANY NEW CONSTRUCTION.
- EXISTING CONDITIONS - LIMITED IRRIGATION AS-BUILT AND SURVEY INFORMATION WAS AVAILABLE OR PROVIDED AT THE TIME OF THIS DESIGN. THE LOCATION OF ALL EXISTING IRRIGATION SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
- EXISTING TREES - ALL TREES WITHIN THE CANOPY OF EXISTING SHADE TREES SHALL BE PROTECTED PRIOR TO ANY TRENCHING. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER 72 HOURS PRIOR TO ANY DROPPING WITHIN TREE DROP LINES. MARK OUT PROPOSED PIPING ROUTING AND COORDINATE WITH PM AND FORESTRY FOR APPROVAL OF PROTECTION PROCEDURES.
- DISTURBED TRENCHES - MANLINE, LATERAL, AND CONTROL WIRE TRENCHES AND DISTURBED AREAS INSIDE AND OUTSIDE OF LIMIT OF WORK SHALL BE RESEDED WITH MULCH (APPLICABLE) GRADES SHALL MATCH EXISTING UNDISTURBED GRADES. CONTRACTOR SHALL BE RESPONSIBLE FOR SOIL AND SEED ESTABLISHMENT.



- REFER TO SHEET
- I-1 IRRIGATION NOTES
 - I-1 IRRIGATION SCHEDULE
 - I-2 IRRIGATION PLANS
 - I-3-I-4 IRRIGATION DETAILS
- CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

APPROVED BY	DATE
TELEPHONE DIRECTOR OF PUBLIC WORKS	
CITY MANAGER	
DIRECTOR OF PLANNING AND COMMUNITY DEVELOPMENT	
CITY TREASURER	





REFER TO SHEET

I-1 IRRIGATION NOTES

I-1 IRRIGATION SCHEDULE

I-2 IRRIGATION PLANS

I-3-I-4 IRRIGATION DETAILS

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

APPROVED BY: _____ DATE: _____

EXECUTIVE DIRECTOR OF PUBLIC WORKS

CITY TOWNSHIP: _____ DATE: _____

DIRECTOR OF TOWNSHIP/COUNTY PUBLIC WORKS

CITY TOWNSHIP COUNCIL: _____ DATE: _____

HydroSystems400, Inc.

10000 E. Hampden Ave., Suite 1000
Denver, CO 80231
303.751.8888

1. SET TOP OF VALVE BOX TO LEVEL WITH ADJACENT FINISHED GRADE.

2. SET TOP OF VALVE BOX TO WITH 1" HIGH LETTERS MIN. AND LOCK THE PLASTIC VALVE BOX LIDS TO YOUR CONTROL.

3. SET TOP OF VALVE BOX TO WITH 1" HIGH LETTERS MIN. AND LOCK THE PLASTIC VALVE BOX LIDS TO YOUR CONTROL.

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CITY AND COUNTY OF DENVER
STATE OF COLORADO



DENVER
THE MILE HIGH CITY

DEPARTMENT OF PUBLIC WORKS

Prevailing Wage Rate Schedule

Contract Number: 201844162



Rude Park Ballfield and Access Improvements

August 29, 2018



DENVER
THE MILE HIGH CITY

Office of Human Resources

201 W. Colfax, Department 412

Denver, CO 80202

p: 720.913.5751

f: 720.913.5720

www.denvergov.org/humanresources

TO: All Users of the City of Denver Prevailing Wage Schedules
FROM: Susan Keller, Human Resources Technician, Classification & Compensation
DATE: Tuesday, August 7, 2018
SUBJECT: Latest Change to Prevailing Wage Schedules

Please be advised, prevailing wage rates for some building, heavy, highway, and residential construction trades have not been updated by the United States Department of Labor (DOL) since March 1, 2002. The Career Service Board, in their meeting held on April 21, 2011, approved the use of the attached supplemental wage rates until prevailing wage rates for these classifications of work are again published by the United States Department of Labor in accordance with the Davis-Bacon Act.

The effective date for this publication will be **Friday, August 3, 2018** and applies to the City and County of Denver for **HEAVY CONSTRUCTION PROJECTS** in accordance with the Denver Revised Municipal Code, Section 20-76(c).

General Wage Decision No. CO180012
Superseded General Decision No. CO20170012
Modification No. 6
Publication Date: 08/03/2018
(6 pages)

Unless otherwise specified in this document, apprentices shall be permitted only if they are employed pursuant to, and individually registered in, a bona fide apprenticeship program registered with the U.S. Department of Labor (DOL). The employer and the individual apprentice must be registered in a program, which has received prior approval, by the DOL. Any employer, who employs an apprentice and is found to be in violation of this provision, shall be required to pay said apprentice the full journeyman scale.

Attachments as listed above.

General Decision Number: CO180012 08/03/2018 CO12

Superseded General Decision Number: CO20170012

State: Colorado

Construction Type: Heavy

Counties: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, El Paso, Jefferson, Larimer, Mesa, Pueblo and Weld Counties in Colorado.

HEAVY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	01/12/2018
2	02/02/2018
3	02/09/2018
4	03/02/2018
5	07/13/2018
6	08/03/2018

* ASBE0028-001 07/01/2018

	Rates	Fringes
Asbestos Workers/Insulator (Includes application of all insulating materials, protective coverings, coatings and finishings to all types of mechanical systems).....	\$ 31.73	14.23

BRCO0007-004 01/01/2018

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON AND WELD COUNTIES

Rates Fringes

BRICKLAYER.....\$ 27.98 10.04

BRCO0007-006 05/01/2018

EL PASO AND PUEBLO COUNTIES

Rates Fringes

BRICKLAYER.....\$ 25.88 10.34

ELEC0012-004 01/01/2018

PUEBLO COUNTY

Rates Fringes

ELECTRICIAN

Electrical contract over
\$1,000,000.....\$ 27.95 11.40+3%
Electrical contract under
\$1,000,000.....\$ 24.85 11.40+3%

ELEC0068-001 06/01/2018

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON, LARIMER, AND WELD COUNTIES

Rates Fringes

ELECTRICIAN.....\$ 35.80 15.45

ELEC0111-001 09/01/2017

Rates Fringes

Line Construction:

Groundman.....\$ 25.68 25.25%+\$5.75
Line Equipment Operator.....\$ 31.35 25.25% + \$5.75
Lineman and Welder.....\$ 44.92 25.25%+\$5.75

ELEC0113-002 06/01/2018

EL PASO COUNTY

Rates Fringes

ELECTRICIAN.....\$ 31.80 15.90

ELEC0969-002 06/01/2015

MESA COUNTY

Rates Fringes

ELECTRICIAN.....\$ 24.00 7.92

ENGI0009-001 05/01/2017

Rates Fringes

Power equipment operators:

Blade: Finish.....\$ 27.92 10.10

Blade: Rough.....	\$ 27.60	10.10
Bulldozer.....	\$ 27.60	10.10
Cranes: 50 tons and under..	\$ 27.75	10.10
Cranes: 51 to 90 tons.....	\$ 27.92	10.10
Cranes: 91 to 140 tons.....	\$ 28.55	10.10
Cranes: 141 tons and over...	\$ 29.82	10.10
Forklift.....	\$ 27.22	10.10
Mechanic.....	\$ 28.08	10.10
Oiler.....	\$ 26.84	10.10
Scraper: Single bowl under 40 cubic yards.....	\$ 27.75	10.10
Scraper: Single bowl, including pups 40 cubic yards and over and tandem bowls.....	\$ 27.92	10.10
Trackhoe.....	\$ 27.75	10.10

IRON0024-003 11/01/2017

	Rates	Fringes
Ironworkers:.....	\$ 27.45	27.76
Structural		

LABO0086-001 05/01/2009

	Rates	Fringes
Laborers:		
Pipelayer.....	\$ 18.68	6.78

PLUM0003-005 06/01/2017

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON, LARIMER AND WELD COUNTIES

	Rates	Fringes
PLUMBER.....	\$ 39.08	16.44

PLUM0058-002 07/01/2018

EL PASO COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 37.25	14.85

PLUM0058-008 07/01/2018

PUEBLO COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 37.25	14.85

PLUM0145-002 07/01/2016

MESA COUNTY

Rates	Fringes
-------	---------

Plumbers and Pipefitters.....\$ 35.17 11.70

PLUM0208-004 06/01/2016

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON, LARIMER AND WELD COUNTIES

	Rates	Fringes
PIPEFITTER.....	\$ 37.10	16.62

* SHEE0009-002 07/01/2018

	Rates	Fringes
Sheet metal worker.....	\$ 34.02	17.49

* TEAM0455-002 07/01/2018

	Rates	Fringes
Truck drivers:		
Pickup.....	\$ 21.41	4.32
Tandem/Semi and Water.....	\$ 22.04	4.32

SUCO2001-006 12/20/2001

	Rates	Fringes
BOILERMAKER.....	\$ 17.60	

Carpenters:

Form Building and Setting...	\$ 16.97	2.74
All Other Work.....	\$ 15.14	3.37

Cement Mason/Concrete Finisher...\$ 17.31 2.85

IRONWORKER, REINFORCING.....\$ 18.83 3.90

Laborers:

Common.....	\$ 11.22	2.92
Flagger.....	\$ 8.91	3.80
Landscape.....	\$ 12.56	3.21

Painters:

Brush, Roller & Spray.....	\$ 15.81	3.26
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Power equipment operators:

Backhoe.....	\$ 16.36	2.48
Front End Loader.....	\$ 17.24	3.23
Skid Loader.....	\$ 15.37	4.41

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

Office of Human Resources
Supplemental rates
(Specific to the Denver Projects)
(Supp #74, Date: 02-03-2012)

Classification		Base	Fringe
Ironworker	Ornamental	\$24.80	\$10.03
Laborer	Group 1	\$18.18	\$8.27
	Group 2	\$21.59	\$8.61
Laborer (Janitor)	Janitor/Yardmen	\$17.68	\$8.22
Laborer (Asbestos)	Removal of Asbestos	\$21.03	\$8.55
Laborer (Tunnel)	Group 1	\$18.53	\$8.30
	Group 2	\$18.63	\$8.31
	Group 3	\$19.73	\$8.42
	Group 4	\$21.59	\$8.61
	Group 5	\$19.68	\$8.42
Line Construction	Lineman, Gas Fitter/Welder	\$36.88	\$9.55
	Line Eq Operator/Line Truck Crew	\$25.74	\$8.09
Millwright		\$28.00	\$10.00
Power Equipment Operator	Group 1	\$22.97	\$10.60
	Group 2	\$23.32	\$10.63
	Group 3	\$23.67	\$10.67
	Group 4	\$23.82	\$10.68
	Group 5	\$23.97	\$10.70
	Group 6	\$24.12	\$10.71
	Group 7	\$24.88	\$10.79
Power Equipment Operator (Tunnels above and below ground, shafts and raises):	Group 1	\$25.12	\$10.81
	Group 2	\$25.47	\$10.85
	Group 3	\$25.57	\$10.86
	Group 4	\$25.82	\$10.88
	Group 5	\$25.97	\$10.90
	Group 6	\$26.12	\$10.91
	Group 7	\$26.37	\$10.94
Truck Driver	Group 1	\$18.42	\$10.00
	Group 2	\$19.14	\$10.07
	Group 3	\$19.48	\$10.11
	Group 4	\$20.01	\$10.16
	Group 5	\$20.66	\$10.23
	Group 6	\$21.46	\$10.31

Go to <http://www.denvergov.org/Auditor> to view the Prevailing Wage Clarification Document for a list of complete classifications used.



DENVER
PARKS & RECREATION

Rude Park Ballfield and Access Improvements

PROJECT # 2016-PROJMSTR - 0000179

Formal Bid

DP2017-001

Technical Specifications

April 4, 2018



TECHNICAL SPECIFICATIONS

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**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION**

SPECIAL CONTRACT CONDITIONS

TECHNICAL SPECIFICATIONS

Except as amended herein or in the attached Technical Specifications, all Work performed under the terms of this Contract shall be governed by the applicable provisions including the following latest editions:

Colorado Department of Transportation:

Standard Specifications for Road and Bridge Construction
(Sections 200 through 700 of the 2011 Edition)

Where referenced, 'CDOT specifications' refers to specific sections of the Colorado Department of Transportation "Standard Specifications for Road and Bridge Constructions, (Sections 200-700)" adopted in 2017 only and not the publication in its entirety.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this contract consists of furnishing all management, supervision, labor, materials, tools, equipment, services, testing, and incidentals for the construction of the Work indicated in the Contract Documents including lump sum items and unit price items.
- B. Reference General Conditions as listed:
 - 1. Article 301 "Consideration (Contractor's Promise of Performance)".
 - 2. Article 306 "Working Hours and Schedule".
 - 3. Title 8 "Protection of Persons and Property".
 - 4. Article 804 "Protection of Municipal, Public Service, or Public Utility Systems".

1.3 SITE CONDITIONS

- A. The Contractor acknowledges satisfaction as to the nature and location of the Work, all of the general and local conditions, particularly those bearing upon availability of transportation, access to the site, disposal, handling and storage of materials, availability of labor, water, power, roads, and uncertainties of weather, or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during work, and all other matters that can in any way affect the work or the cost thereof under this contract.
- B. The Contractor further acknowledges, by submission of a bid and on each change in work proposal, satisfaction as to the character, quality and quantity of all surface and subsurface materials and all features on top of the surface or at worksites that would be encountered from his inspection of the site and from reviewing available records of exploratory work furnished by the City. Failure by the Contractor to become acquainted with the physical conditions of the sites and all the available information will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of performing the Work.
- C. The Contractor warrants that as a result of examination and investigation of all the aforesaid data and the site, that the Contractor can perform the Work in a good and workmanlike manner and to the satisfaction of the City. The City assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this contract unless such representation is expressly stated in the contract.

1.4 DESCRIPTION OF WORK

- A. The following work items are included in these specifications: **Site Preparation; Demolition of existing building, bleacher pad and subgrade; Removals; Salvage or recycling of existing bleachers; Concrete retaining walls and stairs; Electrical system improvements;**

Earth Moving; Railings; Asphalt patching; Concrete walks, mow edges, mow bands, curbs, pans, and ramps; Fencing; Ballfield construction; Irrigation systems; Soil Preparation; Sodding; Planting; and Landscape Maintenance as listed in the Table of Contents of these specifications and as shown per the Contract Drawings. The materials and installation methods specified herein are to be considered standard for all work ordered by and performed for the Department of Parks and Recreation in the construction of new facilities in the parks.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S DUTIES

- A. Except as otherwise specified, furnish the following to the full extent required by the contract:
 - 1. Labor, superintendence, supervision and products.
 - 2. Construction equipment, tools, machinery and materials.
 - 3. Utilities required for construction and related activities.
 - 4. Other facilities and services necessary to properly execute and complete the Work, including security for worksite, testing and storage and protection of all materials awaiting incorporation into the Work, providing a safe working environment for workers, City representatives, and the public in accordance with all local, state and federal requirements.

- B. Prosecute the Work as specified and in a timely manner. Submit a schedule of Work that will be performed at times other than during the eight-hour working day of Monday through Friday, daylight hours. Submit this schedule five working days prior to the beginning of Work to the Project Manager for review and acceptance. Approval to work at night may be obtained after Contractor presents a written program outlining special precautions to be taken to control the extraordinary hazards presented by night work. That program shall include, but not limited to, supplementary lighting of work areas, availability of medical facilities, security precautions, and noise limitations.
 - 1. Noise Ordinance variances through Denver Department of Environmental Health require several weeks advance public notice and approval is not guaranteed.

3.2 COORDINATION

- A. Coordinate prosecution of the Work with those public utilities, governmental bodies, private utilities and other contractors performing work on and adjacent to the worksites. Eliminate or minimize delays in the Work and conflicts with those utilities, bodies and contractors. Schedule governmental, private utility and public utility work that relies upon survey points, lines and grades established by the Contractor to occur immediately after those points, lines and grades have been established. Confirm coordination measures for each individual case with the City in writing.

- B. In the coordination effort of work by others, the Contractor shall obtain and refer to equipment locations and other layouts, as available, to avoid interface problems.

- C. The City reserves the right to permit access to the site of the Work for the performance of work by other contractors and persons at such times that the City deems proper. The exercise of such reserved right shall in no way or to any extent relieve the Contractor from liability for loss and damage to the work due to or resulting from its operations or from responsibility for complete execution of the Contract. The Contractor shall cooperate with other contractors and persons in all matters requiring common effort.

3.3 CONTRACTOR USE OF WORKSITE

- A. Confine worksite operations to areas permitted by law, ordinances, permits and the contract.
- B. Consider the safety of the Work and that of the people and property on and adjacent to the worksite when determining amount, location, movement and use of materials and equipment on worksite.
- C. Do not load worksite with equipment and products that would interfere with the Work. Only equipment, tools or materials required for this Work may be stored at the worksite.
- D. Protect products, equipment and materials stored on worksite.
- E. Relocate stored products, equipment and materials which interfere with operations of City, government bodies, public and private utilities, and other contractors.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Mobilization will not be measured but will be a lump sum item. Fifty percent (50%) of the lump sum price for this item will be paid when ten percent (10%) of the original contract amount is earned. The balance of the lump sum bid price will be paid when fifty percent (50%) of the original contract amount is earned.

4.2 PAYMENT

- A. The lump sum price shall include all the Contractor's costs including labor, material, and any incidental work and equipment necessary for mobilization of personnel, equipment and supplies at the project site. This item shall also include the establishment of the Contractor's fenced staging area, portable toilets and other necessary temporary facilities, grading and restoration of staging area, and all other costs incurred of labor and operations which must be performed prior to beginning the other items under this contract.

The lump sum price shall also include the following: construction surveying; all necessary permits required to for the project; protection of the work; repair and restoration of any damage to pavement or landscape areas caused by construction under this contract; repairs due to vandalism; job site security; and coordination with others performing work on the site. The removal of the Contractor's equipment, supplies, excess materials, and cleanup of the site is also included in this item. Pedestrian Traffic Control within the park (signage) is included in this item

END OF SECTION 01 11 00

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 01 29 73 "Schedule of Values."

1.2 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 SCHEDULE OF UNIT PRICES**

END OF SECTION 01 22 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes submittal requirements for the approval of a different material, equipment, or process than is described in the Contract Documents.
 - 1. If the substitution changes the scope of work, contract cost or contract time, a Change Order is required.
 - 2. Contract Record Drawings and specifications must include all approved substitutions even if a Change Order is not issued.
- B. Reference General Conditions Article 406 "Substitution of Materials and Equipment".

1.3 QUALITY CONTROL

- A. The substitution must provide the same quality as what it is replacing. The level of quality is defined by:
 - 1. Maintenance and operating cost.
 - 2. Reliability.
 - 3. Durability.
 - 4. Life expectancy.
 - 5. Ease of cleaning.
 - 6. Ability to be upgraded as needed.
 - 7. Ease of interacting with other systems or components.
 - 8. Ability to be repaired.
 - 9. Availability of replacement parts.
 - 10. Established history of use in similar environments.
 - 11. Performance equal or superior to that which it is replacing.

1.4 SUBMITTAL

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Contract Drawings, Product Data, and Samples" for submittal procedures.
- B. A complete Request for Substitution using the form included in Division 01 Section "Standard Forms" must be made at least sixty (60) days prior to when an order needs to be placed or a method needs to be changed.
- C. The submittal shall contain, as appropriate, detailed product data sheets for the specified items and the substitution. Samples and shop Contract Drawings shall also be submitted of the substitution as applicable. The submittal shall contain all the data required to be submitted for acceptance of the originally specified item or process.

- D. The submittal shall contain all the applicable information required in Article 1.6, below.
- E. A signed statement as outlined in Article 1.7, below, must accompany the Request for Substitution.

1.5 INFORMATION

- A. Provide the following information as applicable with the Request for Substitution on the item or process that is being requested to be substituted:
 - 1. A complete description of the item or process.
 - 2. Utility connections including electrical, plumbing, HVAC, fire protection and controls.
 - 3. The physical dimensions and clearances.
 - 4. A parts list with prices.
 - 5. Samples of color and texture.
 - 6. Detailed cost comparisons of the substitution and the contract specified item or process.
 - 7. Manufacturer warranties.
 - 8. Energy consumption over a one-year period.
 - 9. What local organization is certified to maintain the item.
 - 10. Performance characteristics and production rates.
 - 11. A list of any license fees or royalties that must be paid.
 - 12. A list of all variations for the item or method specified.
 - 13. A list of at least three other projects of similar nature to this contract where the products or methods have been in use for at least one year including telephone number and name of the person to contact at these other projects.
 - 14. An analysis of the effect of the substitution on the schedule and contract cost and on the overall project as it relates to adjoining work.

1.6 SUBSTITUTION REQUEST

- A. The formal Request for Substitution will be evaluated by the Project Manager and the Designer of Record based on the following criteria:
 - 1. Compatibility with the rest of the project.
 - 2. Reliability, ease of use and maintenance.
 - 3. Both initial and long term cost.
 - 4. Schedule impact.
 - 5. The willingness of the Contractor to share equally in any cost savings.
 - 6. The ability of the item or process to meet all applicable governing regulations, rules and laws along with funding agency requirements.
 - 7. The cost of evaluating the substitution.
- B. Based upon the above evaluation the Project Manager will make a final determination of what is in the best interest of the City and either approve, disapprove or approve as noted the requested substitution.

1.7 CONDITIONS

- A. As a condition for submitting a Request for Substitution the Contractor waives all rights to claim for extra cost or change in contract time other than those outlined in the request and approved by the Project Manager. The Contractor, by submitting a Request for Substitution, also accepts all liability for cost and scheduling impact on other contractors or the City due to the substitution.

- B. Included with the Request for Substitution shall be the following statement:
 - 1. “The substitution being submitted is equal to or superior in all respects to the contract-required item or process. All differences between the substitution and the contract-required item or process are described in this request along with all cost and scheduling data.”
- C. The statement shall be signed and dated by the Contractor’s Superintendent.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 25 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes Pay Item descriptions for measurement and payment of Work completed.

1.3 DESCRIPTION**A. General:**

1. NOTE: The Pay Item descriptions listed herein are hypothetical and will vary with each project. Do not prepare pay estimates based on these descriptions.
2. All measurements and payments will be based on work completed in strict accordance with the Drawings and specifications for the project.
3. The method of measurement and basis of payment described are for the work itemized in the Bid Form and in the sections of the specifications. Items may include work within a single section or in more than one section.
4. See the General Conditions for additional information pertaining to measurement and payment. This section is intended to supplement the General and Special Conditions.

B. Measurement:

1. Unless otherwise specified, all longitudinal measurements will be made horizontally, and computations will be based on the dimensions shown on drawings and details. No measurement will be made by weight tickets.
2. Quantities will be rounded off to the nearest whole number.
3. The Contractor shall, in the presence of the Project Manager, verify all measurements and quantities required for payment by the unit price method.
4. Contractor shall provide necessary equipment, workers, and survey personnel as required for measurements.

C. Units:

1. Measurement by Volumes: Measurement by cubic dimension using mean length, width and height or thickness. Longitudinal measurements will be made horizontally.
2. Measurements by Area: Measured by square dimensions using mean length and width or radius, measured horizontally.
3. Linear Measurement: Measured by linear dimension at the item centerline or mean chord.
4. Measured by Lump Sum or Per Each: Item inclusion as specified by the bid item description.

D. Payment:

1. Unit bid prices, as quoted in the Bid Schedule, shall constitute full compensation for labor, materials, equipment, rentals, overhead, profit and incidentals to complete all work for each pay item and for all risk, loss, damage, or expense of whatever nature arising from the nature of the work or prosecution thereof.

2. Work or materials that are essential to the work, but for which there are no pay items, will not be measured and paid for separately, but shall be included in other items of work.
3. Payment for work listed as lump sum bid items completed under this contract shall be paid for on a lump sum fixed price basis.
4. Final payment for work governed by unit prices will be made on the basis of the measurements and quantities accepted by the Project Manager multiplied by the unit price for work which is incorporated in or made necessary by the Work.

E. Allowance Account

1. This section contains the City and County of Denver's estimate for Allowance Account Items included in the Contract. The estimated amounts will be added to the total bid to determine the amount of the performance and payment bonds. Allowance Account work shall be performed as directed by the Project Manager.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

1.1 GENERAL: Refer to each specification section for Measurement and Payment information relative to the contents of that section.

1.2 ALLOWANCE ACCOUNT

- A. Payment of allowance account work will be made in accordance with this Section. Payment will constitute full compensation for all work necessary to complete the item.
- B. Allowance Account work valued at \$5,000 or less that must be performed by a licensed journeyman in order to comply with federal, state, or local codes, may be paid for after receipt of an itemized statement endorsed by the Contractor.
- C. Item Descriptions:

<u>Item No.</u>	<u>Allowance Account Item</u>	<u>Quantity</u>	<u>Estimated</u>
A/A 01	Mobilization for Mechanical Excavation by Abatement Contractor	1	\$1,000
A/A 02	RACS management by CABI for work for mechanical excavation within Area of Environmental Concern	1	\$2,500
A/A 03	Mechanical Excavation within Area of Environmental Concern	1	\$3,840
A/A 04	Soil Export-Haul chemically impacted soils from Area of Environmental Concern to DADs	1	\$960
A/A 05	Soil Import-Backfill in Area of Environmental Concern to DADs	1	\$1664

A/A 01 Mobilization for Mechanical Excavation by Abatement Contractor. In the event RACS is encountered that can-not be handled by the CABI using hand methods, this allowance will be used for abatement contractor mobilization including labor, material, and any incidental work and equipment necessary for mobilization of personnel, equipment and supplies at the project site for mechanical excavation, as described in the Materials and Management Plan and Section 01 74 19, Construction Waste Management and Disposal.

A/A 02 RACS management by CABI for mechanical excavation work within Area of Environmental Concern. In the event RACS is encountered that can-not be handled by the CABI using hand methods, this allowance will be used for CABI management of mechanical excavation work for volumes of RACS encountered beyond those anticipated in the base bid. The account assumes 5 days of work will be required. This work is described in the Materials and Management Plan and Section 01 7419, Construction Waste Management and Disposal.

A/A 03 Mechanical Excavation within Area of Environmental Concern. In the event RACS is encountered that can-not be handled by the CABI using hand methods, this allowance will be used for mechanical excavation of chemically impacted soils within the area of environmental concern beyond the volumes anticipated in the base bid. The account assumes 64 cubic yards of excavation will be required. This work is described in the Materials and Management Plan and Section 01 7419, Construction Waste Management and Disposal.

A/A 04 Soil Export-Haul chemically impacted soils from Area of Environmental Concern to DADs. In the event RACS is encountered that can-not be handled by the CABI using hand methods, this allowance will be used for export and haul to DADs of mechanically excavated, chemically impacted soils from the area of environmental concern. The account assumes 64 cubic yards of excavation will be required. This work is described in the Materials and Management Plan and Section 01 7419, Construction Waste Management and Disposal.

A/A 05 Soil Import-Backfill in Area of Environmental Concern. In the event that RACS is encountered, this allowance will be used for import and placing of clean soils to backfill excavations in the area of environmental concern. The account assumes 64 cubic yards of import will be required. This work is described in the Materials and Management Plan and Section 01 7419, Construction Waste Management and Disposal.

END OF SECTION 01 29 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for preparing and submitting the Schedule of Values as referenced in the General Conditions. The Schedule of Values will be built upon a breakdown of the Work using specification sections and milestones. The Work also includes the preparing and submitting of updated copies of the Schedule of Values if the Schedule of Values is affected by change orders.
 - 1. A Schedule of Stored Material is a detailed cost breakdown for permanent materials that will be temporarily stored prior to their being installed and for which the Contractor seeks partial payments. The Schedule of Stored Material will be incorporated as a part of the Schedule of Values.
 - 2. Within fourteen (14) calendar days of issuance of the Notice to Proceed, the Contractor shall submit the Schedule of Values including the Schedule of Stored Material if applicable. The Schedule of Values and Schedule of Stored Material used to prepare the work/cost breakdown for the Schedule of Values will be used for the Contractor's billings.
 - 3. Any contract allowances shall be included in the Schedule of Values. Expenditure of allowances shall be done through the use of the Allowance Authorization form. Use of this form does not increase or decrease the contract value.
- A. Reference the General Contract Conditions as listed:
 - 1. Article 902 "Payment Procedure".
 - 2. Article 903 "Schedule of Values in Lump Sum Contracts".
 - 3. Article 906 "Applications for Payment".
- B. Related Sections:
 - 1. Division 01 Section "Submittals".
 - 2. Division 01 Section "Shop and Working Drawings, Product Data, and Samples".
 - 3. Division 01 Section "Standard Forms".

1.3 DEFINITIONS

- A. Allowance: A monetary amount specified and included in the construction contract for a certain item of work whose details are not yet determined at the time of contracting.

1.4 SUBMITTAL

- A. The Schedule of Values shall be submitted in a format approved by the Project Manager.

- B. The Schedule of Values shall identify each item of work. Work items in the Schedule of Values shall represent all work and shall be referenced with the Technical Specifications section numbers, specification subparagraph, specification section title and the bid item number used for the Schedule of Prices and Quantities when applicable. The Schedule of Values shall address the subcontractor, fabricator or supplier furnishing the materials and or labor for each work item.
- C. Upon request by the City, the Contractor shall support values given with the data which will substantiate the correctness of the values.
- D. The Schedule of Values will be utilized only as a basis for review of the Contractor's application for progress payment.

1.5 REVIEW AND RESUBMITTAL

- A. If review by the City indicates that changes to the Schedule of Values are required, the Contractor shall revise and resubmit the Schedule of Values.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARING SCHEDULE OF VALUES

- A. Breakdown of the items used in the Schedule of Values shall include costs as follows:
 - 1. Delivered cost of product with applicable taxes paid.
 - 2. Total installation cost with overhead and profit.
 - 3. Breakdown costs of each lump sum item with a list of products and major operations for which the Contractor seeks to receive progress payments to recover his costs for that bid Item.
 - 4. Each unit price item as listed in the bid Schedule of Prices and Quantities shall list products and major operations for which the Contractor seeks to receive progress payments for that bid item.

3.2 PREPARING SCHEDULE OF VALUES OF STORED MATERIAL

- A. The Contractor shall submit with the Schedule of Values an indication of whether products will be stored on or off the worksite. The Schedule of Stored Material shall show quantities and types of products that will be stored.
- B. Material allowances consist of only the net cost of the product, the cost of delivery and unloading at the storage site, the cost of applicable sales taxes and all discounts.
- C. In no case will the cost paid for a permanent material be greater than ninety percent (90%) of the contract price for the work in which they are included.

3.3 PAYMENT FOR STORED MATERIALS

- A. Only materials that are described in the specifications and on the drawings will be considered permanent materials. Permanent materials are materials that will be left in the work after the contract is completed.
- B. Nothing in these specifications shall be interpreted as requiring the City to pay for stored materials. The Project Manager shall decide on a case-by-case basis whether stored materials shall be paid for. No payment will be made for stored materials which have not been submitted and accepted.
- C. The Contractor must, at all times, store permanent materials in accordance with manufacturer's recommendations. Any material not properly stored will not be paid for. Amounts will be deducted from payments for any stored permanent material previously paid for and subsequently found to be improperly stored or not present, based upon a physical inventory of stored permanent material.
- D. Only the neat line quantity of material needed for the finished product may be paid for.
- E. All requests for stored permanent material payment must be accompanied by paid invoices clearly showing the quantity of permanent material, the type of permanent material and discounts or rebates and the net amount paid to the supplier along with a certificate stating that the permanent material is free of any liens or judgments preventing its use by the City.
- F. All permanent material stored off site, for which payment is being requested must be insured and stored in bonded, insured warehouses.
- G. Any permanent material on which payment is requested must be in such a form that it cannot be used on work other than this contract, or stored in a manner acceptable to the Project Manager to ensure that the permanent material cannot be used on work other than this contract.

3.4 ALLOWANCE AUTHORIZATION AND PAYMENT

- A. Contractor shall request written approval for expenditure of any contract allowances PRIOR TO performing the Work involved. List work to be performed and estimated cost in the requesting correspondence.
- B. Original copies of all invoices and receipts must be submitted with the Allowance Authorization as part of the request for payment.
- C. Using the format provided by the City, the Contractor's request for payment of all contract allowances shall be included in the Schedule of Values.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 29 73

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for project and construction coordination, supervision, and administration for the Work, including but not necessarily limited to:
 - 1. Coordination.
 - 2. Administrative and supervisory personnel.
 - 3. General installation provisions.
 - 4. Cleaning and protection.
 - 5. Utilities and site work.
- B. Reference General Conditions as listed:
 - 1. Title 3 "Contractor Performance and Services".
 - 2. Article 301 "Consideration (Contractor's Promise of Performance)".
 - 3. Article 308 "Communications".
- C. Related Sections:
 - 1. Division 01 Section "Construction Surveying".
 - 2. Division 01 Section "Administration, Procedures, Codes".
 - 3. Division 01 Section "Project Meetings".

1.3 GENERAL COORDINATION

- A. General:
 - 1. The Contractor shall ensure that each entity involved in the performance of the Work shall cooperate in the overall coordination of the Work; promptly, when requested by the Contractor, furnish information concerning the entity's portion of the Work; and respond promptly and reasonably to the decisions and requests of persons designated with coordination, supervisory, administrative, or similar authority.
 - 2. The Contractor shall, where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 - 3. Prepare similar memoranda for the Owner and separate Contractors where coordination of their work is required.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of schedules
 - 2. Installation and removal of temporary facilities
 - 3. Delivery and processing of submittals
 - 4. Progress meetings

5. Project close-out activities

- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as the City's property.
- D. Site Utilization: In addition to the site utilization limitations and requirements shown on the Contract Drawings and indicated by the Contract Documents, administer the allocation of available space equitably among entities needing access and space, so as to produce the best overall efficiency in the performance of the Work. Schedule deliveries so as to minimize the space and time requirements for storage of materials and equipment on the site; but do not unduly risk delays in the Work.
- E. Coordination Meetings: Include in scheduled meetings, coordination of various entities and activities as set forth in Division 01 Section "Project Meetings". Where necessary, schedule additional coordination meetings for this purpose on an as-needed basis.
- F. Layout: It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships of the various elements and systems and their interfacing with other elements and systems. Establishment and coordination of these relationships is the exclusive responsibility of the Contractor. Do not scale the Contract Drawings. Layout and arrange all elements to contribute to safety, efficiency and to carry the harmony of design throughout the Work. In case of conflict or un-dimensioned locations, verify required positioning with the Project Manager. The Contractor shall provide surveying for the layout of all improvements including both horizontal and vertical control, in accordance with the requirements of Division 01 Section "Construction Surveying".
- G. Substrate Examination: The Contractor shall ensure that the subcontractor of each element of the Work examines the conditions of the substrate to receive the work, dimensions and spaces adjacent, tolerances, interfacing with other elements and services, and the conditions under which the Work will be performed. The Contractor shall require each subcontractor to notify the Contractor in writing of conditions detrimental to the proper or timely completion of the Work, and ensure that they do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the subcontractor.

1.4 COMPLETE SYSTEMS

- A. It is the intent of the Contract Documents that the system be complete and functional to provide the intended or specified performance. The Contractor shall provide all incidental items and parts necessary to achieve this requirement.

1.5 COMPATIBILITY

- A. Provide products and equipment which are compatible with other work requiring mechanical interface including connections, control devices, water, drain and other piping connections. Verify requirements and other interface requirements before ordering equipment and resolve conflicts that may arise.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROCEDURES

- A. Require the subcontractor of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items. Re-check measurements and dimensions before starting each installation.
- C. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- D. Installation:
 - 1. Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.
 - 2. Install each component during weather conditions and the Work status that will ensure the best possible results. Isolate each part of the completed construction from incompatible materials as necessary to prevent deterioration.
 - 3. Coordinate work with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Project Manager for final decision.
- F. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Project Manager for final decision.

3.2 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration prior to achieving substantial completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 31 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for the Contractor, including his field superintendent and quality control representative, to attend meetings scheduled by the City for the collection and dissemination of information related to the subject contract.
 - 1. The Contractor will prepare the minutes of each meeting and distribute them to each of the participants.

1.3 OTHER MEETINGS

- A. The Contractor will be advised of times, dates, and places of contract meetings.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 PRECONSTRUCTION MEETING**

- A. A Preconstruction Meeting will be scheduled by the City after the Contract has been signed by all parties. The purpose of this meeting is to introduce the City's Representatives to their counterparts in the Contractor's organization and to establish lines of communication between the representatives and outline some of the contract requirements. The Contractor's superintendent[, and quality control representative(s)] shall attend this meeting.
 - 1. The Project Manager will distribute a notice of this meeting, along with an agenda of the subjects to be addressed.
 - 2. The Project Manager will explain and discuss the responsibilities and authorities of the City, the Designer, and the Project Manager's organization.
 - 3. The Project Manager will provide highlights of the following information at this meeting:
 - a. Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) requirements.
 - b. Insurance, laws, codes, traffic regulations, and permit requirements of public agencies and their regulations.
 - c. Procedures for processing change orders.
 - d. Procedures for submitting shop and working drawings, product data and samples.
 - e. Monthly pay estimate cutoff dates.
 - f. Payment procedures.
 - g. Request for information procedures.
 - h. Communication procedures.
 - i. Contractor-required Daily Reports.

- j. Scheduling and coordination requirements.
 - k. Quality Control/Quality Assurance procedures.
 - l. Environmental requirements and permits.
 - m. Milestones for Substantial Completion and Final Acceptance.
 - n. Record documents.
 - o. Project closeout requirements.
- B. The Contractor will introduce the Contractor's representatives and briefly describe each person's responsibilities. The Contractor shall provide the following:
- 1. A list of all subcontractors.
 - 2. Office, storage areas, and construction area layouts, along with temporary easements.
 - 3. Safety, first aid, emergency and security procedures, including the name and contact information for the Contractor's insurance company.
 - 4. 60 day preliminary schedule.
 - 5. Sequence of Work.
 - 6. Construction methods, general worksite layout, and haul plan.
 - 7. Housekeeping procedures.
 - 8. The Contractor's general erosion and sedimentation control plans, noise, hazardous material, air and water pollution control plans, and Quality Control Plan.
 - 9. Coordination and notification requirements for utility work.
 - 10. Deliveries and priorities of major equipment.
 - 11. Submittal schedule.
- C. Explanations provided by the City will not amend, supersede, or alter the terms or meaning of any contract document, and the Contractor shall not claim reliance on such explanations as a defense to any breach or failure by the Contractor to perform as specified in the contract.

3.2 CONSTRUCTION PROGRESS MEETINGS

- A. Progress meetings will be scheduled weekly or more often as necessary by the Project Manager to promote the competent and timely execution of the contract.
- B. The meetings will be held at the worksite or at a location selected by the Project Manager. Meetings will be chaired by the Contractor.
- C. The Contractor's personnel, as listed in Paragraph 3.1.A, above, shall attend unless otherwise agreed by the Project Manager.
- D. The Contractor's Project Manager will be responsible for publishing minutes of the meetings.
- E. At a minimum, the following items will be addressed at each meeting. The items addressed in the meeting do not waive notification or submittal requirements as required elsewhere in the contract.
 - 1. Safety: Contractor shall report any safety issues.
 - 2. Quality Control:
 - a. The Contractor's Quality Control Representative shall present and discuss the Independent Testing Agency weekly test report and/or testing schedule.
 - b. The Contractor's Quality Control representative shall report on inspections by other agencies and any follow-up activity required.
 - c. The Project Manager shall present and discuss issues regarding quality control.

3. Quality Assurance: The Project Manager shall present and discuss issues regarding quality assurance.
4. Design Activities: Open discussion.
5. Shop Drawings / Submittals / Material Procurement:
 - a. The Contractor shall provide and review the submittal schedule and provide any updated information and/or changes to the schedule.
 - b. The Contractor shall provide information on the status of submittals requiring re-submittal.
 - c. The Contractor shall review any accepted submittals that the Contractor plans to re-submit with changes.
 - d. Contractor shall provide the status of material procurement for long-lead items (long-lead items are materials and equipment that have a fabrication and/or delivery duration that exceeds 15 working days).
 - 1) This information shall be provided by the Contractor in a format satisfactory to the City Project Manager and shall include, at a minimum:
 - a) Submittal/shop drawing preparation duration.
 - b) Review duration.
 - c) Fabrication duration.
 - d) Delivery duration.
 - 2) All long-lead items shall be identified with a separate activity on the approved CPM project schedule.
6. Construction Activities: Open discussion to include coordination items with other Contractors and / or agencies.
7. Schedule:
 - a. The Contractor shall provide to the Project Manager the Contractor's three week look-ahead schedule and review at the meeting the items on the schedule. The schedule shall be in bar chart format based on the approved CPM, and shall include dates of testing activities, items in progress, percentage of completion of items, responsible subcontractor for the items.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 31 19

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the requirements for the preparation of a preliminary schedule, construction schedule, related narratives, and monthly progress reports, all encompassing complete performance of contract requirements.
- B. The Contractor shall schedule and coordinate the work of all of its subcontractors and suppliers including their use of the worksite. The Contractor shall keep the subcontractors and suppliers informed of the project construction schedule to enable the subcontractors and suppliers to plan and perform their work properly.
- C. The Contractor shall, in accordance with the requirements of the technical specifications, submit a construction schedule that shall provide for the expeditious and practicable execution of the Work.
- D. The construction schedule for the performance of the Work shall be a Critical Path Method (CPM) system in bar chart format, unless an alternate system is specifically identified in the technical specifications, with reasonable detail including a time scaled network and computer printout as more fully detailed in the technical specifications.
- E. Float or slack is defined as the amount of time between the early start date and the late start date or the early finish date and the late finish date of any activities in the schedule. Float or slack is not time for the exclusive use or benefit of either the Contractor or the City.
- F. The Contractor shall submit a monthly progress report and schedule update in accordance with the scheduling provisions of the technical specifications.
- G. The Contractor shall complete the Work within the contract time and in accordance with the most recent schedule submittal that has been approved in writing by the Project Manager.
- H. Reference the General Conditions as listed:
 - 1. Article 306 "Working Hours and Schedule".
 - 2. Article 603 "Delay Damages".
 - 3. Article 909 "Additional Withholding of Progress Payments".
 - 4. Article 1103 "Contractor Change Request".
 - 5. Article 1202 "Submittal of Claims".

1.3 PLANNING

- A. The schedule shall show total contract time, including project milestones, as indicated in the Special Conditions or elsewhere in the contract documents.

- B. The Contractor shall prepare a work plan to complete the work within the contract time and complete those portions of work relating to each milestone date and other contract requirements.
1. The Contractor shall generate a computerized Critical Path Method (CPM) schedule in the Precedence Diagram Method (PDM) format for the Work.
 2. The computerized format shall be compatible with the City's Primavera system, version 3.1 or Microsoft Office Project Professional 2003 or later.
 3. The Schedule shall be submitted electronically to the Project Manager in a dynamic format which will allow review and manipulation of any part of the schedule, and in reproducible hard copy.
 4. The schedule activities shall be resource loaded showing labor man hours by crafts, major construction equipment by type and value of the work.
 5. The value of the work shall summarize each pay item shown in the Schedule of Values and balance to their amount.
- C. In addition to the construction activities, the schedule shall include activities for furnishing materials and equipment and vendor shop drawing preparation.
1. The construction schedule, a supporting narrative, and the overall progress curve shall be submitted for approval within thirty (30) days after Notice to Proceed.
 2. Within thirty (30) days the City will respond with approval or direction to revise and resubmit within ten days.
 3. Failure of the Contractor to have a construction schedule approved by the City will be considered cause for withholding progress payment(s).
- D. To the extent that the construction schedule or any revisions thereof contains anything not jointly agreed upon in writing, or fails to show anything jointly agreed upon in writing, it shall not be considered to have the approval of the City.
1. Failure to include any work item required for performance of this contract shall not excuse the Contractor from completing all work within applicable completion dates, regardless of the City's approval of the schedule.
- E. Failure of the Contractor to comply with this Section will be considered cause for withholding progress payment(s) or termination for default.

1.4 SUBMITTALS

- A. Refer to Division 01 Section "Submittals" for submittal procedures. Submit the following as indicated:
1. Preliminary schedule (with narrative).
 2. Construction schedule data and work plan (with narrative).
 3. Monthly progress report.
 4. Construction schedule change request (as needed).
 5. Record construction schedule.

PART 2 - PRODUCTS

2.1 PLOT AND REPORT FORMAT

- A. All plots shall be either 24- x 36-inches or 36- x 44-inches. They shall contain a title block with a minimum eighteen (18) point font showing:
1. Contractor's name.

2. Contract number and title.
 3. Plot date.
 4. Data date.
 5. Symbol definitions.
 6. List of all approved changes to the original approved schedule.
- B. Plots shall contain a time line at the top.
- C. Reports shall be submitted on 8-1/2- x 11-inch paper with a one-inch margin in a 3-ring binder, or as directed by the Project Manager.

PART 3 - EXECUTION

3.1 PRELIMINARY SCHEDULE

- A. The Contractor shall prepare a preliminary schedule covering the first 90 calendar days of the contract. All reports shall be on 8-1/2- x 11-inch paper. This preliminary schedule shall be submitted at the Preconstruction Meeting and shall be accompanied by a narrative description of the work plan. Within fourteen (14) days, the City will respond with acceptance or direction to revise and resubmit within ten days.
- B. The preliminary schedule shall show all significant work tasks that occur in the first ninety (90) days, including planning, mobilization, shop submittals and approvals, procurement, fabrication and construction. It shall identify work items or milestones that affect or are affected by the City, other Contractor's work, utilities and other third parties, and it shall list major data submittals required by the contract.
- C. The preliminary schedule shall be accompanied by a narrative describing the Contractor's approach to mobilization, procurement and construction during the first 90 days. The narrative shall elaborate on the basis of duration, production rates, major equipment to be used, and shall identify all major assumptions used to develop the schedule.

3.2 CONSTRUCTION SCHEDULE

- A. The construction schedule shall be a computerized CPM schedule that includes:
1. Work items identified in a Work Breakdown Structure (WBS) format that corresponds with the technical specifications.
 2. The order, sequence and interdependence of all significant work items including construction, procurement, fabrication, testing, startup and inspection and delivery of critical or special materials and equipment, submittals and approvals of critical samples, shop drawings, procedures, or other documents that could have a schedule impact.
 3. Work items by the City, other Contractors, utilities and other third parties that may affect or be affected by Contractor's activities.
 4. Proper referencing of all work items to identify applicable subcontractors or other performing parties.
 5. Work item duration not to exceed twenty (20) working days. No more than twenty five percent (25%) of the work item may be on the critical path.
 6. Work items shall be resource loaded to show the direct craft man-hours estimated to perform the work including work by subcontractors.

7. A narrative that explains the basis for the Contractor's determination of construction logic. It shall include estimated quantities and production rates, hours per shift, work days per week, and types, number and capacities of major construction equipment to be used and whether the Contractor plans to work weekends or holidays.
- B. The construction schedule shall be prepared to include the data for the total contract duration, and the critical path shall be identified, including critical paths for interim completion dates. Scheduled start or completion dates imposed on the schedule by the Contractor shall be consistent with contract milestone dates. Milestone events shall be the schedule dates specified in the Special Conditions and shall be prominently identified and connected to the appropriate work item, denoting its start or completion. Work items related to any interim milestones shall be coded for that milestone.
- C. The Contractor shall submit the following documents to the City upon completion of preparation of the construction schedule:
1. A time phased plot of the CPM schedule in PDM format showing all logic ties and an electronic copy in dynamic format.
 2. Various computer generated construction schedule reports that contain the following data for each work item: Identification, description, responsibility, duration, early start and early finish, late start and late finish, total float, and resources. The work items shall be sorted by float, early start, subcontractor or other sorts mutually agreed to. The reports shall also show the logic ties of successor and predecessor work items.
 3. A physical progress curve showing either manpower or other appropriate key contract items derived from the construction schedule and against which physical progress performance will be measured for schedule and payment purposes.
 4. The narrative described in paragraph 3.2.A.7, above.

3.3 PROGRESS REPORTING

- A. The Contractor shall submit a monthly progress report at the end of each month following the Notice to Proceed. At the end of each month, the Contractor and Project Manager shall agree on the progress of the work and the Contractor shall update the construction schedule accordingly. The updated construction schedule is a prerequisite to the submittal of the Contractor's application for progress payment. The schedule shall be made in accordance with Article 3.2, above. This review does not constitute an approval of the construction schedule and shall not be used for the purposes of modifying the initially approved construction schedule.
- B. The Contractor shall submit the monthly progress report consisting of a written narrative and various construction schedule reports. This report will be reviewed in a meeting between the Contractor and Project Manager.
1. The narrative report shall describe overall progress of the work, provide a critical path analysis, discuss significant problems with proposed corrective action, and show the status of major changes and any other changes in sequence of the Work.
 2. The construction schedule reports shall include tabular reports showing the status of resources for completed and in progress work items and for work items scheduled to start in the next thirty (30) days. The report shall include all the information outlined in paragraph 3.2.C.2, above.
 3. A bar chart format schedule shall be provided showing the Contractor's completion status (progress) on each work item along with plots described in paragraph 3.2.C.1, above.
 4. The physical progress curve shall be updated to show actual progress.

- C. The latest completion time for any work item does not fall within the time allowed by the construction schedule, the sequence of work and/or duration shall be revised by the Contractor through concurrent operations, additional manpower, additional shifts or overtime, additional equipment or alternative construction methods until the schedule produced indicates that all significant contract completion dates, occupancy dates and milestones will be met. No additional costs will be allowed if such expediting measures are necessary to meet the agreed completion date or dates except as provided elsewhere in the contract documents.

3.4 SCHEDULE CHANGES

- A. The Contractor's request for construction schedule changes shall be made on the latest approved construction schedule and shall be accompanied by a narrative description and justification for the change, and shall be submitted in accordance with the General Conditions Article 1105 "Time Extensions" on changes in time. Minor revisions submitted at monthly progress review meetings are not considered as changes in this context.
- B. The construction schedule may be changed when one or more of the following occur:
 - 1. When a change order significantly affects the contract completion date or sequence of work items.
 - 2. When the Contractor elects to change the sequence or duration of work items affecting the critical path.
 - 3. When the City directs a change that affects a milestone date(s) specified in the Special Conditions or alters the length of a critical path.
- C. If, after submitting a request for change to the construction schedule, the Project Manager does not agree with the request, the Project Manager will schedule a meeting with the Contractor to discuss the differences. If a settlement cannot be reached on the change in the construction schedule or if the Contractor has failed to submit revisions to the network, the Project Manager has the option of providing suggested logic and/or duration times in all subsequent updating reports. The suggested logic and/or duration times will remain in effect until the change in the construction schedule is settled or until the logic and duration are superseded.
 - 1. If the Contractor has any objections to the data furnished by the Project Manager, he shall advise the Project Manager within ten days in writing, fully supporting the objections with a counter plan. The revisions suggested by the Project Manager shall be used for updating reports until the Project Manager approves the counter plan.
 - 2. If the Contractor does not submit a counter plan and data within ten days after the date of the Project Manager's suggested logic, the Contractor is deemed to concur with the Project Manager's suggested logic/duration time changes. The Project Manager's plan will be the basis of negotiations for any adjustment of the time and cost for performance of the Work.

3.5 CONTRACT EXTENSIONS

- A. If the Contractor is granted an extension of time for completion of any milestone or contract completion date under the provisions of the contract, the determination of the total number of extended days will be based upon the current analysis of the schedule and upon all data relevant to the extension. Such data shall be incorporated in the next monthly update of the schedule.
- B. The Contractor acknowledges and agrees that delays in work items which, according to schedule analysis do not affect any milestone dates or contract completion date shown on the CPM network at the time of the delay will not be the basis for a contract extension.

- C. Weather Delays: Impacts to the project schedule related to abnormal weather conditions will be based on General Conditions Section 1105.3.

3.6 RECORD CONSTRUCTION SCHEDULE

- A. After all contract work items are complete, the Contractor shall submit an Record Construction Schedule showing actual start and finish dates for all work items and milestones.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 32 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section summarizes the requirements for the submittal of documents to the City that are defined in these Specifications. It also describes the procedures for “supplemental” submittals.
- B. Reference the General Conditions as listed:
 - 1. Article 309 “Contractor Submittals and other Written Communications to the City”.
 - 2. Article 405 “Shop Drawings, Product Data, and Samples”.

PART 2 - PRODUCTS**2.1 SUBMITTAL SCHEDULE**

- A. The Contractor shall provide a submittal schedule within fourteen (14) days after Notice to Proceed. The Submittal Schedule shall be directly related to the CPM schedule, shall identify all the submittals, and shall include the following information for each submittal item:
 - 1. Specification section, contract article, or special condition.
 - 2. Specification Subparagraph.
 - 3. Item description.
 - 4. Date the submittal shall be submitted.
 - 5. Name of subcontractor or supplier.
- B. The submittal schedule shall be updated every two weeks by the Contractor and submitted with the progress payment request.
- C. One electronic submittal submitted on a single CD-ROM or DVD-ROM.

2.2 ELECTRONIC SUBMITTALS

- A. All submittals shall be delivered to the Project Manger in electronic format.
 - 1. Acceptable electronic formats:
 - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0. File shall have no security and bookmark every applicable submittal.
 - 2. Formats are acceptable only with written permission of the Project Manager or required by individual spec sections:
 - a. Microsoft Office 2003 (2007 preferred) or newer. All files shall be fully compatible with Microsoft Office 2003.
 - b. AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.

- 1) AutoCAD files shall include any related x-ref files, plot files and pen settings.
- c. Other files pre-approved by the Project Manager.
3. Electronic file names: Each electronic document shall have a unique file name. File name convention shall be as follows unless otherwise agreed to by Project Manager: AAA-BBBBBB-CCC-RZ:
 - a. AAA = sequential submittal number starting at 001.
 - b.BBBBBB = specification section containing submittal requirements.
 - c. CCC = sequential specification submittal number starting at 001.
 - d. RZ = sequential revision number. RZ not required on initial submittals.
 - e. Example A: 005-012973-002”, five submittals have been logged overall with two submittals made to Division 01 Section “Schedule of Values”.
 - f. Example B: 009-012973-002-R3, nine submittals made overall and three revisions to submittal 012973-002.

2.3 INITIAL SUBMITTAL

- A. Each submittal document shall include a title block showing the following information:
 1. Date of submittal and revision dates.
 2. Contract title and number.
 3. The names of Contractor, subcontractor, supplier, manufacturer and when applicable, the seal and signature of an engineer registered in the State of Colorado, for the involved discipline.
 4. Identification of product by either: description, model number, style number or lot number.
 5. Subject identification by contract drawing or specification reference.
- B. On each submitted drawing, include a blank space on each sheet, three inches by four inches, in the lower right corner, just above the title block, in which the Project Manager may indicate the action taken.
- C. Make submissions sufficiently in advance so that the Project Manager review may be completed before any material procurement or Work represented by those submittals is scheduled to be performed.
- D. Allow a minimum cycle of ten (10) working days for review of each submittal by the City.
- E. The Contractor shall at the time of submission describe variations from the contract documents in writing, separate from the submittal document. If the Project Manager approves any such variations, an appropriate contract change order shall be issued except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued. If a submission contains variations and the variation column is not marked on the transmittal form, it will not be considered for review and acceptance. Along with marking the transmittal as a variation, a description must be included which outlines all the differences including maintenance and utility services along with any cost savings from an item not containing the variation.
- F. Changes in accepted submittal documents will not be permitted unless those changes have been accepted, in writing, by the City.

- G. The form and quality of submittal documents shall comply with Article 2.2, above.

2.4 SUPPLEMENTAL SUBMITTALS

- A. Supplemental submittal documents initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals with the appropriate primary transmittal referenced.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. The Contractor shall review submittal documents, stamp and sign as reviewed and approved as complying with contract documents prior to submission to the City.

3.2 CITY REVIEW

- A. Submittal documents will be reviewed by the Project Manager for conformance to requirements of the contract drawings and specifications. Review of a separate item will not constitute review of an assembly in which the item functions. The Project Manager will withhold approval of submittals that depend on other submittals not yet submitted. Review and acceptance will not relieve the Contractor from his responsibility for accuracy of submittals, for conformity of submittal document to requirements of contract drawings and specifications, for compatibility of described product with contiguous products and the rest of the system, or for protection and completion of the contract in accordance with the contract drawings and specifications.
- B. The Project Manager will review the submittal documents for general conformance with the contract documents and mark the Action Code, sign and date the transmittal.
- C. The Action Codes have the following meanings:
 1. A - NO EXCEPTIONS TAKEN: no corrections or resubmissions required; fabrication may proceed.
 2. B - MAKE CORRECTIONS NOTED: If Contractor complies with noted corrections, fabrication may proceed and resubmission is not required. If for any reason the Contractor cannot comply with the noted corrections, fabrication shall not proceed and Contractor shall resubmit for additional review and comment.
 3. C - REVISE AND RESUBMIT means that the submittal is unacceptable and must be revised and resubmitted. Fabrication shall not proceed.
 4. E - NOT ACCEPTED Submittal is not in compliance with the Contract Documents, and is not acceptable. Resubmit Contract compliant material.

3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Coordinate each submittal document with the requirements of the Work; place particular emphasis upon ensuring that each submittal of one trade is compatible with other submittals of that trade and submittals of other trades including producing as needed drawings showing the relationship of the work of different trades.

- B. Contractor's responsibility for errors and omissions in submittal documents and associated calculations is not relieved by the City's review, correction and acceptance of submittals.
- C. Contractor's liability to the City, in case of variations in the submittal document from the requirements of the contract documents, is not relieved by the City's review and acceptance of submittals containing variations unless the City expressly approves the deviation in writing, in which the City describes the variation.
- D. The Contractor shall maintain a file of all approved submittal documents at the worksite. The complete file of approved submittal documents shall be turned over to the City with the Record Documents at the end of the job.
- E. Schedule impact due to resubmittal requirements is the responsibility of the Contractor.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 32 19

SECTION 01 33 23 SHOP AND WORKING DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for preparing and submitting shop and working drawings, product data, samples, and record documents required by other specifications sections.
 - 1. The Contractor shall submit all shop and working drawings, product data and samples, as defined in the General Conditions, to the Project Manager in accordance with the requirements in the specifications. The Project Manager will return one copy of the shop and working drawings, and product data to the Contractor with a written transmittal within the time periods noted in the specifications.
- B. Reference the General Conditions as listed:
 - 1. Article 111 "Final Completion".
 - 2. Article 117 "Shop Drawings".
 - 3. Article 405 "Shop Drawings, Product Data, and Samples".

1.3 SUBMITTALS

- A. Refer to Division 01 Section "Submittals" for submittal procedures.
- B. All submittals shall be delivered to the Project Manager in electronic format. All submittals must be of a consistent format (all Acrobat or all Word, etc). No combination of electronic file types will be allowed unless required by a specific specification section.
 - 1. Acceptable electronic formats:
 - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0.
 - b. Formats are acceptable only with written permission of the Project Manager or required by individual spec sections:
 - 1) Microsoft Office 2003 (2007 preferred) or newer. All files shall be fully compatible with Microsoft Office 2003.
 - 2) AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.
 - a) AutoCAD files shall include any related x-ref files, plot files and pen settings.
 - 3) Other files pre-approved by the Project Manager.
 - 2. Adobe Acrobat Requirements:
 - a. Drawings shall have security set to "No Security". Commenting, printing, adding photos, filling in form fields, and document signing must be allowed.
 - b. PDF submittals shall be one continuous file. No external links are allowed.
 - c. All individual components of submittals shall be bookmarked inside the PDF file.

- d. All original documents shall be directly converted from the original electronic format to PDF. Scanning of files shall only be allowed by the Project Manager when the original electronic information is not obtainable.
 - e. Failure to comply with these requirements will result in a return of file to the Contractor for immediate revision.
3. Electronic file names: Each electronic document shall have a unique file name. File name convention shall be as follows unless otherwise agreed to by Project Manager: AAA-BBBBBB-CCC-RZ.
- a. AAA = sequential submittal number starting at 001.
 - b. BBBBBB = specification section containing submittal requirements.
 - c. CCC = sequential specification submittal number starting at 001.
 - d. RZ = sequential revision number. RZ not required on initial submittals.
 - e. Example A: 005-012973-002”, five submittals have been logged overall with two submittals made to Division 01 Section “Schedule of Values”.
 - f. Example B: 009-012973-002-R3, nine submittals made overall and three revisions to submittal 012973-002.

C. Quantities:

- 1. Post electronic submittals as PDF electronic files directly to the Project Manager, Contractors FTP site, a site specifically established for the Project, or in a digital delivery method agreed to by the Project Manager.
 - a. The Contractor should send an email for each submittal posted to all parties notifying them the submittal is available for review.
 - b. The Project Manager will send an email to the Contractor when the submittal review is complete.
- 2. Contractor can submit electronic submittals via email as PDF electronic files if approved by the Project Manager.
- 3. Samples: Submit four (4) samples of each item specified in the various specification sections, unless otherwise specified.
- 4. Note: If manufacturer’s printed information is in color, all copies of submittals must be in color.
 - a. Printed information is only allowed when electronic copies are not possible.

D. Review:

- 1. Submittal review comments by the Project Manager will be in electronic form and incorporated into the electronic submittal file.
- 2. Comments from Project Manager will be formatted as described in Division 1 Section “Submittals”.
- 3. Resubmittals of electronic documents shall modify the original electronic file with new information and include the Project Manager’s comments with appropriate responses and additional information.

1.4 CHANGES

- A. Changes in products for which shop or working drawings, product data or samples have been submitted will not be permitted unless those changes have been accepted and approved in writing by the City.

PART 2 - PRODUCTS

2.1 SHOP AND WORKING DRAWINGS

- A. Include the following as they apply to the subject:
 - 1. Contract title, work order and number.
 - 2. Respective contract drawing numbers.
 - 3. Applicable specification section numbers.
 - 4. Relation to adjacent structure or materials.
 - 5. Field dimensions clearly identified as such.
 - 6. Applicable standards such as ASTM or Federal Specification number, and pertinent authority specifications or standards.
 - 7. Identification of deviations from the Contract drawings and specifications.
 - 8. Drawing name, number, and revision.
 - 9. Contractor's stamp, initialed or signed, certifying:
 - a. Verification of field measurements.
 - b. Review of submittals for compliance with contract requirements.
 - c. Compatibility of the Work shown thereon with that of affected trades.
 - 10. Blank space on each sheet per Division 01 Section "Submittals", paragraph 2.3.B.
- B. Drawings of equipment and other items that contain multiple parts shall include exploded views showing the relationship of parts and the description of the parts into the smallest units that may be purchased or serviced.

2.2 PRODUCT DATA

- A. Modify manufacturer's standard and/or schematic drawings to delete information which is not applicable to the contract. Supplement standard information with additional information applicable to this contract.
- B. Modify manufacturer's standard(s), diagrams, schedules, performance charts, illustrations, calculations and other descriptive data to delete information which is not applicable to the contract. Indicate dimensions, clearances, performance characteristics and capacities. Include with the submittal electrical, plumbing, HVAC and any other diagrams, as applicable.
- C. Modify erection, application and placing instructions to delete information that is not applicable to the contract or work order.
- D. Include the following:
 - 1. Contract title, work order and number.
 - 2. Respective contract drawing numbers.
 - 3. Applicable contract technical specification section numbers.
 - 4. Applicable standards such as ASTM or Federal Specification number, and pertinent authority specification or standards.
 - 5. Identification of deviations from the Contract drawings and specifications.
 - 6. Contractor's stamp, initialed or signed, certifying:
 - a. Dimensional compatibility of the product with the space in which it is intended to be used.
 - b. Review of submittals for compliance with contract requirements.

- c. Compatibility of the product with other products with which it is to perform or which will be next to it.
 - d. The products electrical, plumbing, control and HVAC requirements conform to contract documents and the necessary utilities are provided for in the contract documents.
- E. Certificates of compliance shall be submitted for all products. The certificates shall:
- 1. State that the product complies with the respective specification and contract drawing requirements.
 - 2. Be accompanied by a certified copy of test results pertaining to the product
 - 3. Show the submittals date, Contractor's name and address, contract title and number, product represented and its location in the contract, producer's name, product trade name and catalog number, place of product origin, test date, testing organization's name and address, quantity of the product to be furnished and related contract drawing and specification section numbers.
 - 4. Be signed by an officer or another authorized representative of the producer and notarized.
 - 5. Submit one electronic copy.
 - 6. Be received by the City not later than thirty (30) days before the acceptance is needed of the products for ordering.

2.3 SAMPLES

- A. Submit samples of sizes and quantities to clearly illustrate full color range and functional characteristics of products and materials including attachment devices.
- B. Erect field samples and mock ups at the worksite as specified in the several technical specifications sections and at locations acceptable to the Project Manager. All field samples shall be erected in a location that will be readily visible throughout the life of the contract to allow comparison of the work as it progresses to the field sample.
- C. The Contractor shall verify, through appropriate inspections and tests, that the samples submitted meet the specifications and shall provide inspection and test data with the samples. The review and comments on the sample shall not relieve the Contractor of his responsibility for completion of the contract.
- D. Show the following information:
 - 1. Contract title and number.
 - 2. Respective contract drawing numbers.
 - 3. Applicable technical specification section numbers.
 - 4. Applicable standards such as ASTM or Federal Specification number.
 - 5. Identification of deviations from the Contract drawings and specifications.
 - 6. Contractor's stamp, initialed or signed, certifying:
 - a. Dimensional compatibility of the product with the space in which it is intended to be used.
 - b. Review of submittals for compliance with contract requirements.
 - c. Compatibility of the product with other products with which it is to perform or which will be next to it.
 - 7. If multiple samples are submitted and the Project Manager is requested to make a choice, each sample shall have a unique identification number attached to it so the returned

transmittal can state the identification number of the accepted sample and the Contractor will know which one it is.

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, catalog numbers and similar data.
- B. The Contractor shall not start work for which submittals are required until a transmittal has been received by the Contractor showing acceptance or acceptance as noted by the Project Manager.
- C. Before making submittals ensure that products will be available in the quantities and at the times required by the contract.
- D. Submit final, corrected, electronic drawings of contract and shop and working drawings showing the Work as actually installed, placed, erected and applied. Refer to Division 01 Section "Contract Closeout".

3.2 REVIEW BY THE CITY

- A. One electronic copy of the marked-up shop and working drawing and one electronic copy of the product data will be returned to the Contractor by the Project Manager. Only the transmittal form, appropriately marked, and two samples will be returned on sample submittals. Contractor shall maintain one approved sample on site for the duration of the project.
- B. Contractor's responsibility for errors and omissions in submittals for compatibility will not be reduced, waived or otherwise limited by the review and acceptance of submittals by the City.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 33 23

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for construction safety precautions and programs by the Contractor and the basis for reviews by the Project Manager.
- B. Reference the General Conditions as listed:
 - 1. Article 801 "Safety of Persons".
 - 2. Article 802 "Protective Devices and Safety Precautions".
 - 3. Article 803 "Protection of Property and Work in Progress".

1.3 RESPONSIBILITY

- A. The General Conditions make it clear that all safety precautions during the construction process are the responsibility of the Contractor. The Contractor is responsible for the health and safety of his employees, agents, subcontractors and their employees, and other persons on the worksite; for the protection and preservation of the work and all materials and equipment to be incorporated therein; and for the worksite and the area surrounding the worksite. The Contractor shall take all necessary and reasonable precautions and actions to protect all such persons and property.
- B. This Section shall be interpreted in its broadest sense for the protection of persons and property by the Contractor and no action or omission by the Project Manager or his authorized representatives shall relieve the Contractor of any of its obligations and duties hereunder.

1.4 SUBMITTAL

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for the process. A safety plan shall be submitted by the General Contractor prior to commencing any work.

1.5 PROJECT MANAGER'S REVIEW

- A. The Contractor shall provide two (2) copies of its safety program to the Project Manager for review at least ten days before on-site construction begins. The Contractor's program must meet as a minimum all applicable federal, state and local government requirements.
 - 1. The Contractor must, as part of the Contractor's safety program, submit one electronic file in the form of a security-free, fully bookmarked PDF file compatible with Adobe Acrobat 8.0 or newer and one body hard copy of the following information for acceptance by the Project Manager prior to construction:
 - a. Name of the Contractor's site safety representative.

- b. If the Contractor is running multiple shifts or working more than forty (40) hours per week, the name of an assistant Contractor's safety representative who can act in the absence of the site safety representative.
 - c. Twenty four (24) hours per day emergency phone numbers of Contractor site management to be used in case of injury or accident. Provide at least four contacts.
 - d. The Contractor's method of ditching and trenching excavation to be used, including how slopes will be stabilized with calculations showing the slope stability.
 - 1) The Contractor shall also show how material will be stored beside the excavation.
 - 2) Stored material will include the excavated and backfilled material.
 - e. How injuries or accidents will be handled including samples of the forms used to report injuries or accidents.
 - f. How employees will be handled who are unable to safely perform their duties, including how the Contractor will determine whether an employee is unable to safely perform his duties.
 - g. How and when equipment will be checked to see that it is safe, that all safety guards are in place and that the equipment is being used for its designed purpose and within its rated capacity.
 - h. How and when all electric devices will be checked for proper grounding and insulation. What system will be used to lock out electric systems that should not be energized.
 - i. How trash and human organic waste will be disposed.
 - j. How snow and ice will be removed within the project area by the Contractor.
 - k. How concrete forms will be anchored to ensure their stability, including calculations showing that the forms will safely hold the maximum construction loads.
 - l. How flammable materials will be stored and handled, and how any spills will be cleaned up and removed for disposal.
 - m. What system will be used to prevent fires, and if fires do occur who will be trained to fight them. Also what firefighting equipment the Contractor will have available and how this equipment's condition will be monitored.
 - n. How materials will be received, unloaded, stored, moved, and disposed of.
 - o. How personnel working above ground level will be protected from falling.
 - p. How people working underneath work will be protected.
 - q. What will be done to protect personnel in case of severe weather.
 - r. How adequate lighting will be provided and monitored.
 - s. How the safety of work platforms, man lifts, material lifts, ladders, shoring, scaffolding, etc. will be ensured relating to load capacity and the protection of personnel using or working around them.
- B. Prior to the start of any work by a contractor or subcontractor employee, the Contractor shall provide the Project Manager with a list of its employees, subcontractor's employees, and other personnel the Contractor has requested to work on site, who have signified in writing that they have been briefed on, or have read and understand, the Contractor's Safety Plan.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S SAFETY PLAN

- A. Provide a Contractor's Safety Program as described in Division 01 Section "Summary of Work".

PART 3 - EXECUTION

3.1 IMPLEMENT CONTRACTOR'S SAFETY PLAN

- A. Implement the approved Contractor's Operational Safety Plan as described in Part 1 of this section.

PART 4 - AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 35 23

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section identifies primary compliance with the State, and City and County of Denver's regulatory requirements including:
 - 1. Where referenced, 'CDOT specifications' refers to specific sections of the Colorado Department of Transportation "Standard Specifications for Road and Bridge Constructions, (Sections 200-700)" adopted in 2017 only and not the publication in its entirety.
 - 2. Denver Department of Public Works
 - a. The Division of Wastewater Services
 - b. Right of Way Services
 - c. Construction Engineering
 - d. Traffic Engineering
- B. Construction shall be based on the latest edition of the referenced codes including additions and revisions thereto that are in effect at the time of project bidding.

1.3 BUILDING CODE

- A. All design and construction work shall be governed by the Building Code for the City and County of Denver, latest edition. This is based upon the International Building Code of the International Code Council with Denver Amendments to this code.

1.4 DENVER BUILDING DEPARTMENT

- A. For review and approval of all construction documents for compliance to the Denver Building Code:

City and County of Denver
Community Planning and Development
Building Inspection Division
201 West Colfax Avenue, Dept 205
Denver, Colorado 80202
Telephone 720-865-2720
Fax 720-865-2880

1.5 DENVER FIRE DEPARTMENT

- A. For review and approval of plans for compliance with the Denver Fire Department's requirements as they apply to projects for the Department of Public Works:

Denver Fire Department
745 W. Colfax Ave.
Denver, Colorado 80204
Telephone 720-865-2833

- B. The Contractor is advised that the Denver Fire Department – Fire Prevention Bureau requires permitting for the following activities as they apply to the scope of work. The Contractor is responsible for obtaining the appropriate permits necessary to complete the work. All costs associated with this permitting and policy compliance shall be the responsibility of the Contractor. The policies all reference the International Fire Code (IFC).
1. Hot Work: “Hot work” shall be defined as the operation of any equipment or tool that creates sparks, hot slag, or radiant or convective heat as a result of the work. This includes, but is not limited to, welding, cutting, brazing, or soldering.
 2. Use and storage of compressed gas for both temporary storage and permanent facility installation. This includes, but is not limited to, flammable gas (excluding propane-LPG), oxidizer (including oxygen), and inert and/or simple asphyxiates.
 3. Tank installation, which includes above-ground storage tanks (AST) and underground storage tanks (UST) for both temporary tanks and permanent facility installations.
- C. In addition to the above permits, the Denver Fire Department may require other permits that are associated with the specific work in the Contract Documents. Policies provided by the Denver Fire Department are meant to provide basic information for the most common conditions and situations. In any given occupancy, many other International Fire Code (IFC) requirements may be enforced. These should be addressed with the Denver Fire Department before construction begins and during construction with premise inspection(s). Any questions can be addressed to the Fire Prevention Bureau between 6:30 A.M. and 9:00 A.M. Monday-Friday at 720-913-8242 or 720-913-8237.

1.6 THE DENVER OFFICE OF DISABILITY (ADA) COMPLIANCE

- A. For review and approval of all construction documents for compliance with the Denver ADA standards*:

City and County of Denver
Human Rights and Community Partnerships
Office of Disability Rights
201 West Colfax Avenue, Dept 1102
Denver, CO. 80202

*Note: Currently the 2010 ADA standards for accessible design and the Transportation Standards and Details for the Engineering Division, Denver Public Works Department, 7.0-7.8 are being used as reference documents to review all plan approval requests.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PERMITS AND CERTIFICATIONS

- A. The Contractor shall maintain records on site of all permits acquired by federal, state, and local agencies. Posting of permits shall conform to requirements of the respective agencies.
- B. At the completion of any inspection by other agencies, the Contractor shall forward copies of the status of the inspection and copies of any approved or "signed-off" inspections by the respective agencies to the Project Manager.
- C. At the time of request for Substantial Completion, the Contractor shall forward to the Project Manager all permits approved by the respective agencies.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 42 10

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section contains a list of definitions of words or phrases and grammatical or contextual conventions commonly used in these contract documents.

1.3 DEFINITIONS

A. Alphabetical Listing of Definitions

1. As Indicated: Shown on the drawings by graphic indication, notes or schedules, or written in the specifications or elsewhere in the contract documents.
2. As directed, as approved, or as requested: Unless otherwise indicated, these terms imply “by the Project Manager” and require that an instruction be obtained by the Contractor from the Project Manager.
3. Concealed: Embedded in masonry, concrete or other construction; installed in furred spaces; within double partitions or hung ceilings; in trenches; in crawl spaces or in enclosures.
4. Ensure: To make certain in a way that eliminates the possibility of error.
5. Exposed: Not installed underground or “concealed” as defined above.
6. Furnish or Provide: To supply, install and connect complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
7. As Indicated, As Shown, or As Noted: As depicted on drawings or specifications.
8. Install: To erect, mount and connect complete with related accessories.
9. Or equal, or Approved Equal: Refers to products which, in the opinion of the Project Manager, are similar in all respects to products specified by proprietary brand name.
 - a. Refer to Division 01 Section “Substitutions” for procedures for submittal of proposed substitutions.
10. Rework: To repair existing items or work required to be removed and replaced in order to accomplish the Work in accordance with the contract documents.
11. Related Work: Includes, but not necessarily limited to, mentioned work associated with, or affected by, the work specified.
12. Reviewed, Satisfactory, Accepted, or Directed: Assumes by or to the Project Manager.
13. Similar, or Equal: Same in materials, weight, size, design, construction, capacity, performance and efficiency of specified product.
14. Supply: To purchase, procure, acquire and deliver complete with related accessories.
15. Unless Otherwise Indicated and Unless Otherwise Noted: General note to perform work as indicated or shown on drawings or in specifications unless specifically directed otherwise elsewhere in the contract documents; may be abbreviated “U.O.N.”, “U.O.I.”, or “U.N.O.”

1.4 CONVENTIONS

- A. Specifications Format: In order to standardize the location of information in the Contract Documents, the specifications generally are organized in the following format:
 - 1. The 2014 edition of “MASTERFORMAT” published by the Construction Specifications Institute.
- B. Organization of Drawings and Specifications: Organization of the specifications into divisions and sections, and arrangement or numbering of drawings is intended solely for the convenience of the Contractor in his responsibilities to divide the Work among subcontractors or to establish the extent of work to be performed by any trade.
 - 1. Neither the City nor the Project Manager assume any liability arising out of jurisdictional issues or claims advanced by trade organizations or other interested parties based on the arrangement or organization of drawings or specifications.
- C. Gender and Number: For convenience and uniformity, parties to the Contract, including the City, Contractor, and Project Manager, and their subcontractors, suppliers, installers, consultants or other interested parties are referred to throughout the contract documents as if masculine in gender and singular in number. Such reference is not intended to limit the meaning of the contract documents to the masculine gender or singular number.
- D. Singular vs. Plural: Materials, products, equipment or other items of work referred to in the singular shall be construed as plural where applicable by the intent of the contract documents and shall not limit quantities to be provided by the Contractor.
- E. Imperative Mood: Specifications and notes on the Drawings or elsewhere in the contract documents are generally written in the imperative mood as instructions to the Contractor, whether the Contractor is specifically addressed or not.
- F. References to Subcontractors or Trades: References to subcontractors, trades, or other entities which are not parties to the contract shall be construed as meaning the Contractor whose responsibility it shall be to divide the Work among subcontractors or trades. Such references are used as a matter of convention, and are not intended to preclude or direct the Contractor’s responsibility to divide the Work.
- G. Abbreviations: Abbreviations are believed to be those in general use in the construction industry. Contact the Project Manager for clarification of abbreviations for which the meaning is not clear.
 - 1. Review the contract drawings for additional abbreviations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

A. No separate payment will be made for work under this Section.

END OF SECTION 01 42 16

DEFINITIONS AND CONVENTIONS

01 42 16 - 3

January 2016

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general administrative requirements and procedures, and related applicable codes.

1.3 CODES

- A. Obtain all permits and licenses in accordance with General Conditions Article 317 – “Permits and Licenses”.
- B. Publication Dates: Comply with General Conditions Article 401 – “Contract Documents-Review and Interpretation”.

1.4 EXISTING UTILITIES

- A. Locate and protect existing utilities in accordance with General Conditions Article 804 – “Protection of Municipal, Public Service, or Public Utility Systems”.
- B. Although existing utilities may be shown on the drawings, their location is not guaranteed. Contractor is required to call Utility Notification Center of Colorado (UNCC) at 811 three days (72 hours) prior to starting any work.

1.5 CONTRACTOR’S CONSTRUCTION SCHEDULE

- A. Furnish construction schedule, as required by General Conditions Article 306 – “Working Hours and Schedule”.
- B. **IMPORTANT:** Prior to beginning work on project site, the Contractor shall give minimum 48 hour notification to both the Project Manager and the District Superintendent.
- C. The schedule may be used as a tool in analyzing any requests for the extension of the contract completion date due to changes in the Work or abnormal weather conditions. Normal weather conditions are based on the ten-year historical weather information provided by the National Climatic Data Center for the Denver Metropolitan area. Normal weather conditions shall be incorporated into the bar chart schedule. Additional time will be added to the Contract time only if the activities involved will affect the project’s Completion Date because of the criticality of the activities changed or altered.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Properly carton, crate, cover, and protect materials, products and equipment for shipping, handling and storing. Use appropriate means for hoisting and loading which will prevent damage or overstress to items being handled or shipped. Store them under roof in controlled environment whenever feasible; otherwise store off the ground under suitable coverings properly secured against wind and weather. Protect all items from rain, snow, moisture, wind, cold, heat, frost, sun, staining, discoloration, deterioration and physical damage from any cause. Refer to individual sections for specific requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT (Not Used)

END OF SECTION 01 42 23

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Quality Assurance is defined as measures, tests, and/or audits that may be performed by the City or City Representatives to ensure the Contractors work is installed per the construction documents and the contractors Quality Control plan.
- B. This Section identifies inspection activities to be performed by inspectors and testing agencies employed by the City and working under the direction of the Project Manager.
 - 1. Inspection and tests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards.
 - 2. The inspection and approval of work by other agencies above does not constitute inspection or acceptance of work required by the City. Technical specifications may contain requirements more stringent than Building Inspection Division or other code agency requirements.
- C. Reference General Conditions as listed:
 - 1. Article 1701 "Construction Inspection by the City".
 - 2. Article 1702 "Authority of Inspectors".
 - 3. Article 1703 "Observable Defects".
 - 4. Article 1704 "Defects – Uncovering Work".
 - 5. Article 1705 "Latent Defects".
 - 6. Article 1706 "Removal of Defective Materials and Work".
- D. Related Sections:
 - 1. Division 01 Section "Contractor Quality Control".
 - 2. Division 01 Section "Submittals".
 - 3. Division 01 Section "Shop and Working Drawings, Product Data, and Samples".

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 CITY'S QUALITY ASSURANCE MEASURES**

- A. According to the judgment of the Project Manager, any portion of the work in this contract may be tested at any time for any reason.
- B. Contractor shall not rely upon these tests to assure compliance with the Contract Documents.

3.2 TESTING – GENERAL

- A. Tests: Made by testing laboratory approved by the Project Manager. Except as otherwise provided, sampling and testing of materials and laboratory methods and testing equipment shall be in accordance with latest standards and tentative methods of ASTM.
 - 1. Specific information concerning testing methods, sample sizes, etc., is included under applicable sections of Specifications.
 - 2. Any modification of, or elaboration on, these test procedures included for specific materials under their respective sections in Specifications shall take precedence over these procedures.

3.3 COST OF TESTING

- A. Unless indicated otherwise, additional testing required by the City's Agents shall be performed by the City's authorized agents, at the City's expense.
- B. Costs for testing shall be borne by the Contractor only if such tests indicate that work does not meet Contract Document requirements.
- C. Costs for re-testing of non-complying work shall be borne by the Contractor.

3.4 TEST REPORTS

- A. Test reports, whether performed for the City or the Contractor, shall be submitted to the Project Manager and Contractor as soon as results are available. Reports shall be clear, concise, comprehensive written forms containing required test results.
- B. Reports of tests made by testing laboratories shall be distributed by testing laboratory as follows:
 - 1. Two (2) Copies – Project Manager.
 - 2. One (1) Copy – Contractor.
 - 3. One (1) Copy – Applicable Supplier or Subcontractor.

3.5 MANUFACTURING AND FABRICATION INSPECTIONS

- A. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacturer, the shipping point, or at the destination to verify conformance to applicable specifications. Inspections and tests performed by the City shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered to be a guarantee for acceptance of materials that will be delivered at a later time.
- B. The Project Manager or his authorized representative may inspect at its source any material or assembly to be used in the Work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the Work and to obtain samples for testing and further inspection.
- C. Should the Project Manager conduct plant inspections the following conditions shall exist:
 - 1. The Project Manager shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.

2. The Project Manager shall have full access during scheduled production or warehousing working hours to parts of the plant that are concerned with the manufacture, production, storage or shipping of materials being furnished.
 3. The Contractor shall arrange for adequate office or working space that can reasonably be needed for conducting a plant inspection. Office or working space shall be conveniently located with respect to the plant and/or warehouse as required by the Project Manager.
- D. It is understood and agreed that the City shall have the right to re-test, at the City's expense, any materials that have been tested and accepted at the source of supply after it has been delivered to the site.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 43 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section identifies the Quality Control activities to be performed during all phases of the contract by the Contractor. Quality Control is defined as the process by which the Contractor ensures the project is constructed per the construction documents.
- B. The Contractor shall have in place his Quality Control Program as necessary to ensure that all materials and work are completed in compliance with contract documents. The Contractor is solely responsible for Quality Control. The City reserves the right to conduct additional tests or audits to verify compliance per Division 1 section "Quality Assurance".
- C. Test schedules and/or testing requirements for materials used on this project are included in the technical specifications. Laboratory and field testing identified in the technical specifications shall be conducted by an Independent Testing Agency (ITA) retained by the Contractor.

1.3 LEVEL OF CONTROL

- A. The intent of this section is to enable the Contractor to establish a necessary level of control that will:
 - 1. Adequately provide for the production of acceptable quality materials.
 - 2. Provide sufficient information to ensure both the Contractor and the Project Manager that the specification requirements are being met.
 - 3. Allow the Contractor as much latitude as possible to develop his or her own standards of control.

1.4 SUBMITTALS

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples", for submittal requirements.
- B. Quality Control Plan: Within ten (10) days after Notice to Proceed, the Contractor shall submit a Quality Control Plan for review and acceptance. Acceptance by the Project Manager does not relieve the Contractor of compliance with the contract requirements. The Contractor Quality Control Plan shall address the following as a minimum:
 - 1. Provide a general description of Quality Control monitoring to be performed until final acceptance by the City. Include monitoring activities of Work and the worksite during times no construction activity is scheduled to take place.
 - 2. The Contractor shall designate an employee as the Quality Control Representative qualified to perform quality control monitoring of the Work. The designated individual shall have the authority to direct work changes required to bring the Work into

- conformance with contract requirements including stopping non-conforming work in progress.
3. The Quality Control Plan shall address each technical specification division's requirements for quality control. The Contractor shall identify each item requiring submittal and approval/acceptance prior to installation of work. Also, the Contractor shall identify each item of work requiring testing by the independent testing agency.
 4. The Quality Control Plan shall address and establish controls and documentation format to ensure that items or materials that have been accepted through receiving inspection are used or installed. Identification and traceability shall be provided throughout all inspections, test activities and records. For stored items, provisions shall be made for the control of item/material identification, consistent with the expected duration and type of storage.
 5. Provide methodology of monitoring, testing and exercising of all equipment, valves and/or assemblies to ensure the Work installed is in proper working order.
- C. List of Suppliers and Subcontractors: Submit a list of suppliers and subcontractors, including items to be supplied by each supplier and/or subcontractor. Identify work to be performed by each subcontractor. The list shall be updated and resubmitted as required.
- D. Emergency Contact List: Submit a list of emergency contact information including name, company, title, work phone number, home phone number, and other means of contact for at least four individuals.
1. Review the Emergency Contact list on a daily basis. In the event there is any change in any of the information, the Contractor shall forward the updated list to the Project Manager.
 2. The Emergency Contact list shall include the project number, project title, and date of issue.
- E. Quality Control Report:
1. The Quality Control Report shall be submitted weekly or per the discretion of the Project Manager in the format detailed in Division 01 Section "Standard Forms". The report shall address as a minimum the following: identify notifications and discussions with/by other agency inspectors, identify work placed that day and any deviations and/or corrections required to bring the Work into conformance with the contract. Reporting must be digital format and signed by the Contractors Quality Control Representative. Legible, hand written reports on the approved form shall be accepted. Scanned copies of daily reports are acceptable.
 2. Submit one electronic copy of the Quality Control Report to the Project Manager the week following the work or per the discretion of the Project Manager. The report shall be signed by the Contractor's Quality Control Representative and the Contractor's Superintendent.
- F. Corrective Action Report (CAR): Conditions adverse to quality will be reviewed by the Contractor and the City Representative to determine the cause and to recommend a corrective action that will preclude recurrence.
1. The condition, its cause, and the corrective action planned shall be reported to the Project Manager prior to implementation.
 2. Follow-up action shall be taken to verify implementation of the corrective action.
 3. The Contractor will document the corrective action and a copy of the Corrective Action Report (CAR) will be transmitted to the Project Manager.

1.5 DOCUMENTATION

- A. The Contractor shall not change or alter approved submittals, procedures, specifications, drawings, or other pertinent documentation without the Project Manager's written authorization.
- B. All records and documents that are quality related shall be prepared, identified, and maintained by the Contractor and shall be made available to the City upon request. Records shall be protected from damage, deterioration or loss. A copy of the records and documents shall be maintained at the Work site at all times unless the Project Manager has approved other locations in writing. .
- C. The Contractor shall maintain records at the actual worksite and at Contractor's office to show the inspection status of materials and items installed in order to ensure that the required inspections and tests have been performed in a timely and correct manner.

1.6 INSPECTIONS AND TESTS

- A. Inspections, tests, and system shut down requests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards. The Contractor's designated Quality Control Representative shall inspect the work and shall ensure the work complies with the contract requirements prior to any requests for inspection or testing.
- B. When the specifications, laws, ordinances, rules, regulations or orders of any public agency having jurisdiction require the Project Manager's surveillance of inspections or tests, the Contractor shall notify the Project Manager of the place, date and time forty eight (48)-hours prior to the inspection and/or test. The Contractor shall be responsible for notifying and requesting inspection by other agencies including but not limited to the Denver Building Inspection Division, Denver Fire Department, Denver Wastewater Management Division and Denver Water. Prior to request for other agency inspections, the Contractor shall meet and plan inspection times with the Project Manager and or his designated representative.
- C. Special inspections or tests may be required by the technical specifications, City, State and/or Federal Agencies in addition to those tests already performed. The Contractor shall notify the Project Manager at least forty eight (48)- hours in advance of the additional inspections or tests.

1.7 INSPECTION PLAN

- A. The Contractor shall utilize the following six-point inspection plan to ensure the conformance of the Work performed by the Contractor meets the requirements of the contract drawings and specifications, the referenced codes and standards and the approved submittals:
 - 1. Pre-work Coordination: Prior to the start of construction work, work under each separate specification section, where a change in a construction operation is contemplated by the Contractor, and a new subcontractor starting work, a coordination meeting will be held with the Contractor's superintendent, Quality Control, and Safety representative(s), and the ITA representative. Supervisory, Safety, and Quality Control representatives of all applicable subcontractors shall also attend. The Contractor's Quality Control Representative shall chair the meeting, and prepare and distribute minutes of Quality Control meetings. Meeting minutes shall be electronically distributed within twenty four (24) - hours of the meeting.

2. The purpose of the meeting is to ensure that the Contractor's personnel have no misunderstandings regarding their safety and quality procedures as well as the technical requirements of the contract. The following items shall be presented and reviewed by the Contractor:
 - a. Contract requirements and specifications.
 - b. Shop drawings, certifications, submittals and Record Drawings.
 - c. Testing and inspection program and procedures.
 - d. Contractor's Quality Control program.
 - e. Familiarity and proficiency of the Contractor's and subcontractor's workforce to perform the operation to required workmanship standards including certifications of installers.
 - f. Safety, security, and environmental precautions to be observed.
 - g. Any other preparatory steps dependent upon the particular operation.
 - h. The Contractor's means and methods for performing the Work.
3. Initial Inspection: Upon completion of a representative sample of a given feature of the Work and no later than two weeks after the start of a new or changed operation, the Project Manager and/or his designated representative will meet with the Contractor's Quality Control representative and applicable subcontractor's supervisor and their Quality Control representatives to check the following items, as a minimum:
 - a. Workmanship to established quality standards.
 - b. Conformance to contract drawings, specifications and the accepted shop drawings.
 - c. Adequacy of materials and articles utilized.
 - d. Results of inspection and testing methods.
 - e. Adequacy of Record Drawings maintained daily.
4. Once accepted, the representative sample will become the physical baseline by which ongoing work is compared for quality and acceptability. To the maximum practical extent, approved representative samples of work elements shall remain visible until all work in the appropriate category is complete. Acceptance of a sample does not waive or alter any contract requirements or show acceptance of any deviation from the contract not approved in writing by the Project Manager.
5. Follow-up Inspection: The Contractor's Quality Control representative will monitor the work to review the continuing conformance of the work to the workmanship standards established during the preparatory and initial inspections.
6. Completion Inspection: This is not an acceptance inspection. Forty eight (48) - hours prior to the completion of an item or segment of work and prior to covering up any work, the Contractor will notify the Project Manager who will verify that the segment of work is substantially complete, all inspections and tests have been completed and the results are acceptable.
 - a. The purpose of this inspection is to allow further corrective work upon, or integral to, the completed segment of work.
 - b. If any items are determined to be deficient, need correction or are non-conforming, a Deficiency List will be prepared and issued to the respective Contractor for correction, repair or replacement of any deficient or non-conforming items.
 - c. The Project Manager and Contractor's Quality Control representative will verify the correction of the deficient and/or non-conforming items prior to the start of the next operation.

7. Substantial Completion Inspection: Prior to requesting a Substantial Completion Inspection by the City, all work and operational systems to be inspected shall be satisfactorily completed and tested by the Contractor.
 - a. The Contractor's written request for this inspection shall be made seventy two (72) - hours in advance.
 - b. With the request shall come a list of any known deficiencies and when they will be corrected.
 - c. If the list is too large or contains too many significant items, in the opinion of the Project Manager, no inspection will be held because of the incompleteness of the work.
8. The Contractor will schedule the Substantial Completion Inspection and will prepare a list of deficient items (punch list) discovered during the inspection.
 - a. If during the inspection the list becomes too large or too many significant items are on the list, the inspection will be canceled.
 - b. After the inspection is completed, the Deficiency List will be transmitted to the Project Manager identifying all deficient items.
9. Final Acceptance Inspection: After the Contractor has completed all items on the Deficiency List (generated from the Substantial Completion Inspection) he shall request a Final Acceptance Inspection. The request shall be made in writing at least seventy two (72) hours in advance of the inspection.
 - a. All areas must be cleaned and ready for turnover prior to this inspection. The Project Manager, the design consultant, a representative of the funding agency (if applicable) and other interested parties will inspect the subject Work to ensure that all deficiencies have been satisfactorily attended to and that no new deficiencies have appeared and that all systems are completely functional.
 - b. Any outstanding or additional deficient items will be noted and handled per the requirements of the Substantial Completion Inspection noted above until the Work is acceptable to the Project Manager.

1.8 SAMPLES

- A. The Contractor shall maintain at the worksite a copy of all samples submitted and accepted by the City. Samples shall be made available to the designer or the Project Manager's designated representatives for review and comparison in the field. The Project Manager prior to use on the project must accept all items and materials.
- B. The installed work will be compared to the samples and if any of the work is not of the same quality, material, finish, color, texture or appearance as the sample, that portion that is not the same will be considered defective and in nonconformance.
- C. Contractor selection of samples will only be considered if taken at random. The Contractor shall permit representatives of the City to witness the selection of samples. Inspection or tests of items or materials that fail shall be sufficient cause to terminate further inspections/tests of the same brand, make or source of that product.
- D. The Contractor is obligated to correct any item deemed deficient.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. The Contractor is responsible for Quality Control of the Construction. All acquisition of materials, sequence of construction (except as otherwise indicated), and means and methods of construction shall be the responsibility of the Contractor. Establish system to perform sufficient inspection and tests of all items of work, including that of subcontractors, to ensure conformance to Contract Documents for materials, workmanship, construction, finish, functional performance and identification.
1. Control System: Establish for all construction except where Contract Documents provide for specific compliance tests by testing laboratories and engineers employed by the City.
 2. Control System: Specifically include all testing required by various sections of Specifications.
 3. Quality Control System: Means by which Contractor assures himself that construction complies with requirements of Contract Documents.
 - a. Controls: Adequate to cover all construction operations and keyed to proposed construction schedule.
- B. All materials required for the contract shall be new except where specified otherwise. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by the City shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered a guarantee for acceptance of materials that will be delivered at a later time.
- C. The Contractor is obligated to correct or remove non-conforming materials, whether in place or not. If necessary, the Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the Project Manager may order correction, removal and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.
- D. Materials accepted on the basis of a Certificate of Compliance may be sampled and inspected/tested by the Project Manager or it's Designer at any time. The fact that the materials were accepted on the basis of such certification shall not relieve the Contractor of his responsibility to use materials that conform to the specifications.
- E. The Contractor shall impose upon his suppliers the same quality control requirements, including inspection and test procedures, as imposed upon him by the specifications and referenced standards. The Contractor shall apply appropriate controls, designed to ensure that all materials supplied meet the requirements and specifications.

3.2 CONTRACTOR'S QUALITY CONTROL SYSTEM

- A. The Contractor is responsible for Quality Control of the Construction. All acquisition of materials, sequence of construction (except as otherwise indicated), and means and methods of construction shall be the responsibility of the Contractor. Establish system to perform sufficient inspection and tests of all items of work, including that of subcontractors, to ensure

conformance to Contract Documents for materials, workmanship, construction, finish, functional performance and identification.

1. Control System: Establish for all construction except where Contract Documents provide for specific compliance tests by testing laboratories and engineers employed by the City.
2. Control System: Specifically include all testing required by various sections of Specifications.
3. Quality Control System: Means by which Contractor assures himself that construction complies with requirements of Contract Documents.
 - a. Controls: Adequate to cover all construction operations and keyed to proposed construction schedule.

- B. The Contractor shall be responsible for assuring compliance with the quality standards as indicated in the Contract Documents. In addition, the Contractor shall be responsible for:
1. Review of submittals prior to their being forwarded to the Project Manager for review. The Contractor shall mark submittals with comments and shall indicate the date and party conducting the Contractor's review of each submittal.
 2. Final inspection of the project prior to calling for the Project Manager to conduct a final inspection. The Contractor shall provide his inspection comments to the Project Manager prior to the scheduled final inspection.
 3. Verification of completion of punch-list items prior to calling for verification inspection by the Project Manager.

- C. Records: Maintain correct records on appropriate forms for all inspections and tests performed, instructions received from the Project Manager and actions taken as result of those instructions.
1. Records: Include evidence that required inspections or tests have been performed (including type and number of inspections or tests, nature of defects, causes for rejection, etc.) proposed or directed remedial action, and corrective action taken.
 2. Document inspections and tests as required by each section of Specifications.

3.3 MATERIAL AND WORKMANSHIP

- A. Unless otherwise specified, or indicated on the Drawings, material shall be new, of best quality, and without flaws, and delivered upon completion in an undamaged condition.
- B. Workmanship shall be the best of its respective kind. Labor shall be performed in a thorough workmanlike manner by qualified, efficient, and skilled mechanics, acceptable to the Project Manager, and other trades involved on the job requiring acceptable substrate for the performance of their work.

3.4 TESTING – GENERAL

- A. Testing Laboratory and/or Engineering services are required for quality control in portions of the work identified in other sections of these specifications.
- B. Tests required by these Specifications shall be performed in strict accordance with referenced testing methods, procedures, and conditions. Pertinent data shall be included in clear, comprehensive written forms according to the requirements of these Contract Documents.

- C. Contractor: Provide equipment and facilities as required for testing at no additional cost, subject to Project Manager's review, for conducting field tests and for collecting and forwarding samples.
 - 1. Do not use materials or equipment represented by samples until tests, if required, have been made and materials or equipment found to be acceptable.
 - 2. Do not incorporate any product into work which becomes unfit for use after acceptance thereof.
- D. Testing: Materials or equipment proposed to be used may be tested at any time during their preparation or use. Furnish required samples without charge and give sufficient notice of placing of orders to permit testing. Products may be sampled either prior to shipment or after being received at site of work.
- E. Tests: Made by testing laboratory approved by the Project Manager. Except as otherwise provided, sampling and testing of materials and laboratory methods and testing equipment shall be in accordance with latest standards and tentative methods of ASTM.
 - 1. Specific information concerning testing methods, sample sizes, etc., is included under applicable sections of Specifications.
 - 2. Any modification of, or elaboration on, these test procedures included for specific materials under their respective sections in Specifications shall take precedence over these procedures.

3.5 OTHER TESTING

- A. Following Testing: Performed at expense of Contractor:
 - 1. Any additional tests required because of any tests that fail subject to following conditions:
 - a. Quantity and Nature of Tests: Determined by the Project Manager.
 - b. Tests: Taken in presence of the City and/or the Project Manager.
 - c. Proof of Noncompliance: Contractor liable for corrective action which the Project Manager feels is required including complete removal and replacement of defective material.
 - 2. Material Substitution: Any tests of material or equipment offered as substitute for specified item on which test may be required in order to prove its compliance with the Contract Documents.
- B. Contractor: May have tests performed on material and equipment for his own information and job control so long as the City does not assume responsibility for costs or for giving them consideration when appraising quality of materials.

3.6 EQUIPMENT TESTING

- A. Equipment testing shall be as determined appropriate by the Project Manager to assure proper performance according to the manufacturer's specifications for each equipment item.
- B. After all utility connections to equipment have been completed, the Contractor shall conduct final tests of equipment in presence of the City and Project Manager.
- C. Unless waived in writing by the Project Manager, the requirements of this section shall apply to all installed equipment items having utility connections.

3.7 NOTIFICATION

- A. The Contractor shall be responsible for notifying the Project Manager at least 3 working days prior to commencing work which is identified as requiring testing.
- B. The Contractor shall be responsible for scheduling and coordinating all required testing with the Project Manager and, when required by the City's Agents, the City's Independent Testing Agency.

3.8 TEST REPORTS

- A. Test reports, whether performed for the City or the Contractor, shall be submitted to the Project Manager and Contractor as soon as results are available. Reports shall be clear, concise, comprehensive written forms containing required test results.
- B. Reports of tests made by testing laboratories shall be distributed by testing laboratory as follows:
 - 1. Two (2) Copies – Project Manager.
 - 2. One (1) Copy – Contractor.
 - 3. One (1) Copy – Applicable Supplier or Subcontractor.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price. If the City is required to re-inspect work or conduct a special test because a previous inspection, requested by the Contractor, showed that the work was defective or not in conformance, the Manager or authorized representative may deduct from the contract value the cost of re-inspection at the rate of seventy-five dollars (\$75.00) per man-hour.

END OF SECTION 01 45 16

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing, installing, operating, maintaining, and removing temporary construction barriers, enclosures and field facilities including the Contractor's construction offices, staging areas, yards, storage areas, electrical power, telephone, water, fire protection, and sanitary service.
- B. Construction Office, Yards, and Storage Areas:
 - 1. Temporary facilities which the Contractor desires to locate in staging areas adjacent to the Work or within the project limits are subject to approval by the Project Manager.

1.3 SUBMITTALS

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for submittal procedures.
- B. Submit a shop drawing within five days of the Notice to Proceed that shows the following:
 - 1. Temporary facilities equipment and materials (include manufacturer's literature).
 - 2. Details and layout of temporary installations including fences, roads, utilities, parking, buildings, storage areas and drainage plans.
 - 3. Lighting plan showing temporary lighting facilities, electrical service panel location, electrical circuit diagram and anticipated light level on the working roadway, pathway or construction surface.

PART 2 - PRODUCTS**2.1 ELECTRICAL SERVICE**

- A. Provide temporary power and lighting equipment consisting of fixtures, transformers, panel boards, groundings, lamps, switches, poles, conduits and wiring sized and capable of continuous service and having adequate capacity to ensure a complete operating system. Comply with NEMA.
- B. Provide temporary extension cords to supply tools not longer than two hundred feet (200'), except that additional length may be used if equipment will be grounded within two hundred feet (200') of tool or power.
- C. Portable power generators shall be grounded.

2.2 DRINKING WATER SERVICE

- A. Provide sanitary materials and equipment that satisfies the requirements of codes and regulations pertaining to temporary water systems. Bottled products may be used if those products comply with codes. Clearly label portable containers having a dispensing tap and used only for drinking water. Provide single service disposable cups and a sanitary container for dispensing cups. A trash receptacle shall be provided and maintained beside each portable water supply.

2.3 FIRE PROTECTION

- A. Fire extinguishers shall be UL rated and shall comply with the current City fire code.

2.4 SANITARY SERVICE

- A. Provide materials and equipment adequate for the intended purposes, which will neither create unsanitary conditions nor violate the codes applicable to temporary sanitary facilities. Enclosures for toilet and washing facilities shall be weatherproof, sight proof, ventilated and sturdy.
- B. Provide portable type toilet facilities that satisfy the requirements of OSHA.
- C. Provide washing facilities as needed. Furnish soap, single-service paper towels, towel dispenser and towel receptacle. If paints, coatings and other volatile or hazardous materials injurious to humans will be applied as part of the contract, provide washing facilities with warm water of approximately one hundred twenty degrees (120°) F.

PART 3 - EXECUTION

3.1 ELECTRICAL SERVICE

- A. The approximate location of primary power lines is shown on the Construction Drawings. The Contractor shall locate electrical service where it will not interfere with equipment, storage spaces, traffic, and prosecution of the Work or the work of others. Installation shall present a neat and orderly appearance and shall be structurally sound. Maintain service in a manner that will ensure continuous electrical service and safe working conditions.

3.2 WATER SERVICE

- A. Install the systems in a neat and orderly manner. Make them structurally and mechanically sound. Provide continuous service. Modify, relocate and extend the systems as the work progresses.
- B. Locate systems where they will be convenient to work stations, sanitary facilities and first aid station but will not interfere with traffic, work areas, materials handling equipment, storage areas or the work of other contractors.
- C. Install vacuum breakers, backflow preventers and similar devices in a manner and location which will prevent temporary water from returning to the water mains.

- D. Do not incorporate any part of temporary water distribution system into the permanent water distribution system.

3.3 FIRE PROTECTION

- A. Install products in conformance with the requirements of the applicable Denver Fire Department and OSHA regulations.
 - 1. Provide functional fire extinguishers that are clearly identified for fire and an accessible supply of water during the period of construction. These fire extinguishers shall remain in place until permanent fire protection systems are functional.
 - 2. Furnish not less than one twenty (20) pound fire extinguisher, type 2A-20ABC within ten feet of cutting and welding operations.
 - 3. Provide twenty (20) pound fire extinguishers, type 2A-20ABC no further than one hundred feet (100') apart in buildings.
 - 4. Provide not less than one twenty (20) pound fire extinguisher, type 2A-20ABC on any equipment of seventy five (75) horsepower or more.
- B. Instruct construction personnel as to location and use of temporary fire protection equipment.
- C. Fire extinguishers shall be located for easy access. Their location shall be clearly marked so that they can be seen at least seventy five feet (75') away.

3.4 SANITARY SERVICE

- A. Place temporary sanitary (and washing) facilities within the limits of the work and convenient to the work stations. Make these facilities structurally and mechanically sound. Modify, relocate and extend the facilities as required by progress of the work.
- B. Service toilets at those time intervals which will minimize the accumulation of wastes and prevent creation of unsanitary conditions, but not less frequent than once per week.
- C. The waste from the sanitary and wash facilities shall be disposed of in accordance with all applicable rules, regulations and laws and with the least environmental impact.

3.5 FENCING

- A. Contact all utility service companies prior to planning fence location and post locations for certification of current utilities. Locate pothole posts planned within 5-feet of known utilities. Submit fencing plan and typical details to Project Manager at least seven days before planned execution for review and acceptance.

3.6 SIGNAGE

- A. Contractor shall not provide any signage for temporary facilities without prior approval from the Project Manager.

3.7 QUALITY CONTROL

- A. Provide products for, and the execution of, the Work of this Section that will satisfy the requirements of the NEC, OSHA, and local codes. Provide products that satisfy requirements of NEMA and are UL listed.

3.8 REMOVAL

- A. The Contractor shall locate all temporary facilities including the underground utilities so they can be completely removed without damaging permanent work or the worksite of other contractors.
- B. The Contractor shall remove all temporary facilities, including all underground utilities, and restore the site to the condition in which the City initially provided it to the Contractor or per the construction documents.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 50 00

PART 1 GENERAL

1.01 DESCRIPTION

Provide traffic control to complete the work shown and specified.

1.02 RELATED REQUIREMENTS

- A. Comply with Standards set by the Manual Uniform Traffic Control Devices (M.U.T.C.D.) and the Colorado Supplement.
- B. Comply with the City of Denver Traffic Engineering Requirements.

1.03 SUBMITALS

Submittals shall be made in accordance with the Special Conditions of the Contract. The following shall be submitted for the Work in this section:

- A. The Contractor shall submit, in writing, the proposed Method of Handling Traffic (MHT) for review and approval of the Project Manager. The MHT shall be developed according to this section and the construction plans.
 - 1. The plan shall detail the proposed methods of traffic control and signing in the work zone, for all phases of construction.
 - 2. All traffic control shall conform to the “Manual of Uniform Traffic Control Devices for Street and Highways”, the Colorado Supplement to the “Manual of Uniform Traffic Control Devices for Street and Highways,” or as directed by the Project manager.
 - 3. Approval of the proposed MHT does not relieve the Contractor of liability specifically assigned to him under the contract. The Contractor shall erect and maintain warning lights, signs, barricades, and sufficient safeguards around all excavations, embankments, and obstructions.
 - 4. Traffic Control shall be provided as required by, in descending order of precedence, MUTCD, the plans and special provisions for this project, Colorado Department of Transportation Standard Specifications, and Colorado Department of Transportation M and/or S Standards.
 - 5. When a different MHT is required for a subsequent construction phase, it must be submitted at least two weeks prior to starting that phase. All proposed methods of handling traffic shall be approved, in writing, by the Project Manager following approval of the Traffic Engineering Services Department.

6. The contractor shall notify the Project Manager by Thursday at 3:00 P.M. which streets they intend to work on the following week. This notification will be made for all phases of construction.

1.04 GENERAL WORK RESTRICTIONS

- A. The Contractor shall perform all work that interferes in any way with roadway usage between the hours of 8:30 A.M. and 3:30 P.M. or as approved by the Project Manager. Weekend and nighttime work will be allowed with the prior written approval of the Project Manager.
- B. Work will not be permitted that directly or indirectly interferes with the flow of traffic between the hours of 5:30 AM and 8:30 AM Monday through Friday; between the hours of 3:00 PM to 6:30 PM Monday through Thursday; and after 2:00 PM on Fridays unless otherwise authorized by the Project Manager.
- C. Work that interferes with traffic 1] on any day of a 3 or 4 day holiday weekend; or 2] after 12:00 noon on the day preceding such holiday weekend, will only be permitted following review of a Contractor submitted request and approval by the Project Manager and the City of Denver Traffic Engineering Services Department:
- D. The Contractor shall coordinate all of the work on the roadway during any special event with the City and County of Denver.

1.05 ACCESS

- A. Two-way traffic shall be maintained on West Holden Place from Federal Boulevard to Decatur Street at all times, and on all surrounding streets at all times, via flagging if necessary for closures of less than one day unless authorized by the Project Manager and the Traffic Engineering Services Department.
- B. Contractor shall obtain all required access and construction permits from the City & County of Denver prior to initiating work along City right of way.
- C. Apart from the designated construction access route, the Contractor shall maintain access to all roadways, side streets, walkways, alleyways, driveways, and hike/bike paths at all times unless otherwise approved by the Project Manager. The sole exception to this requirement is that the City will permit full closures of access to all alleyways, walkways, driveways, and hike/ bike paths DIRECTLY ADJACENT to an active work phase for a maximum period of one (1) week. Should the Contractor wish to exercise this exception, a request for same shall be submitted to the Project Manager for review and approval including proposed method for Public notice per Section 632. If access restrictions are approved by the Project Manager, the Contractor shall coordinate with all tenants affected by alley and/or access closures two weeks prior to closure.
- D. All proposed lane closures shall be subject to the approval of the Project Manager and Traffic Engineering Services Department. Requests for such lane closures shall be submitted with a Method of Handling Traffic at least 24 hours in advance of the time the lane closure is to be implemented. Lane closures will not be allowed to remain unless

utilized in continuum for the duration of each working period. Contractor shall make all efforts to fashion his lane closure proposal to close no more than one lane at a given time.

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL

- A. Provide barricades and temporary signage for bicycle and automobile detours and traffic control to maintain smooth flow of traffic, and public safety.
- B. The Contractor shall install construction traffic control devices in locations where they do not block or impede other existing traffic control devices, or sidewalks for pedestrians, disabled persons, or bicyclists.
- C. Steel drum channelizing devices shall not be used for traffic control.
- D. Access to driveways shall be maintained at all times during construction. The Contractor shall coordinate driveway work with the property owner. Appropriate signage shall be provided alerting all motorists leaving driveways that enter a work zone as to which direction the through lane is traveling and what access restrictions exist, if any.

2.02 EQUIPMENT

- A. The Contractor shall not have construction equipment or materials in the lanes open to traffic any time, unless approved by the Project Manager.
- B. The Contractor and subcontractors shall equip their construction vehicles with flashing amber lights. Flashing amber lights on vehicles and equipment shall be visible from all directions.
- C. All personal / employee vehicle and construction equipment parking is prohibited when it conflicts with safety, access, or the flow of traffic.

PART 3 EXECUTION

3.01 TRAFFIC CONTROL

- A. Provide signage and barricades as defined under Part 2 Products.
- B. Maintain signage and barricades in working order.
- C. Provide additional traffic control as directed by project manager.
- D. The Contractor shall contact City, Police, Fire and Traffic Engineering two weeks prior to any street closings or restrictions.

PART 4- MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- B. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 55 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section consists of retention and protection of trees during the construction of the project.

1.3 REFERENCE STANDARDS AND GUIDELINES

- A. Contractor shall comply with applicable requirements and recommendations of the most current versions of the following standards and guidelines. Where these conflict with other specified requirements, the more restrictive requirements shall govern.
 1. ANSI Z133.1-2006: American National Standard for Tree Care Operations.
 2. ANSI A300: Tree, Shrub, and Other Woody Plant Management – Standard Practices.
 3. Guide for Plant Appraisal – Current Edition: Authored by the Council of Tree and Landscape Appraisers; published by the International Society of Arboriculture.

1.4 GENERAL REQUIREMENTS

- A. Appropriate tree pruning and/or removal permits must be secured prior to beginning work.
- B. City Forestry Staff or Appointee will conduct daily observation of Contractor's field crews the during the critical phases of the project, for example: demolition of existing concrete, root pruning, construction of retaining walls, and construction of new curb or sidewalk in tree protection areas. City Forester may require a consulting arborist be hired to oversee the project. Contractor to notify Project Manager and City Forester at least two (2) weeks prior to when such observations will be needed.
- C. If it appears that the completion of the construction may cause damage to the branches of any tree, the Contractor shall contact the Project Manager and the City Forester's Office. The Project Manager and City Forester will make a determination as to whether such damage is imminent.
- D. To prevent or minimize soil compaction, designated routes for equipment and foot traffic by work crews shall be determined prior to commencing construction activities, and shall be indicated in the tree protection plan to be submitted by Contractor to the Project Manager. These routes shall be marked at the site, prior to commencement of construction, with tree protection fencing and signage as specified in Articles 3.6 and 3.7 of this section. A Tree Protection Plan shall be submitted to the Project Manager for approval by the City Forester.
- E. Motorized equipment and trailers, including tractors, bobcats, bulldozers, rubber tired excavators, tracked excavators, trucks, cars, and carts shall not be allowed access within tree protection areas. Should access be necessary within designated tree protection areas, the existing grade shall be covered with twelve inches (12") of wood mulch with overlapping three

quarter inch (3/4") thick plywood on top to help distribute the weight of equipment and to minimize soil compaction and rutting. Plywood and/or mulch are not acceptable bridging materials for driving over exposed tree roots. Exposed tree roots shall not be driven over. The City Forester or Project Consulting Arborist shall be notified and shall approve of the access and driving surface prior to its use.

- F. Materials and supplies shall not be stockpiled or stored within the tree protection area. Should temporary storage be necessary within designated tree protection areas, the existing grade shall be covered with twelve inches (12") of wood mulch with overlapping three quarter inch (3/4") thick plywood on top to help distribute the weight of equipment and to minimize soil compaction and rutting. Plywood and/or mulch are not acceptable bridging materials for driving over exposed tree roots.
- G. Under no circumstances shall any objects or materials be leaned against or supported by a tree's trunk, branches, or exposed roots. The attachment or installation to trees of any sign, cable, wire, nail, swing, or any other material that is not needed to help support the natural structure of the tree is prohibited. Standard arboricultural techniques such as bracing or cabling that are performed by professional arborists are acceptable upon approval by the City Forester or Project Consulting Arborist.

1.5 DEFINITIONS

- A. Critical Root Zone: Shall be defined as the tree protection area encompassing one and one half (1.5) minimum to two (2) times the distance between the trunk and drip line.

B.

Trunk Size	Where Measured
< 4"	6" above grade
4" – 8"	12" above grade
> 8"	54" above grade

Note: All measurements should be rounded up to the nearest inch.

- C. Drip Line: The outermost edge of the tree's canopy or branch spread. The area within a tree's drip line is all the ground under the total branch spread.
- D. High Value Shrub: Any specimen shrub with an appraised value of one-hundred dollars (\$100.00) or more.
- E. Project Consulting Arborist: An independent consultant with a degree in a horticulture, arboriculture, and/or ISA Certified Arborist, and at least five years field experience in tree preservation or on-site monitoring of public works or construction projects involving tree retention and protection. The Consultant should be an active member in the American Society of Consulting Arborists and/or International Society of Arboriculture.
- F. Tree Protection Area: The tree protection area should consist of the ground encompassing from one and one half (1.5) minimum to two (2) times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater (see definition of drip line, below). Areas of ground covered by pavement, buildings, or other permanent structures where the presence of roots is minimal or negligible are excluded.

The area under or within the tree's drip line is also referred to as the "Critical Root Zone" (see definition of critical root zone, below).

1. With groups of trees or where an array effect is present, there may be discontinuous (non-overlapping) perimeters of tree protection areas, which result in difficult to maintain or ineffective tree protection fencing. In these cases, even though tree protection areas do not overlap, they should be treated as though they do if the distance between the perimeters of such areas is less than thirty (30)-feet. In effect, this will artificially enlarge the area of tree protection, but will result in a more clearly defined, manageable area.

1.6 SUBMITTALS

- A. Tree Protection Plan: Submit tree protection plan for approval by the City Forester.
- B. Proposed methods and schedule for effectuating tree and other plant protection shall be submitted for approval. Contractor shall submit construction schedule which includes a time frame for work near existing plants. Approval of such shall be obtained from the City Forester prior to commencement of construction near tree protection areas.
- C. Proposed methods, materials, and schedule for root pruning, branch pruning, and other tree maintenance shall be submitted for approval.
 1. The City Forester or Forestry Appointee shall mark the location of root pruning lines in the field prior to the operation.
 2. If possible, root pruning should occur between autumnal leaf fall and spring foliation.
 3. Root pruning during the growing season shall require approval of the City Forester or Forestry Appointee.
- D. Maintenance Schedule: Submit maintenance schedule to City Forester for approval.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. This section provides standards and guidelines for the retention and protection of trees and high-value shrubs for any proposed construction project.

3.2 DEMOLITION OF EXISTING CONCRETE

- A. Caution should be used during removal of existing street, curb, gutter, sidewalk, drain inlets, and other concrete and asphalt demolition, to minimize injury to tree root systems. The following procedures should be used when removing existing concrete.
- B. Breaking of the existing concrete and asphalt for removal should be done in a manner that will minimize ground disturbance and vibration.
- C. Curbs and sidewalks within designated tree protection areas and critical root zones shall be removed by hand. When removing existing sidewalks and curbs, care should be taken to avoid injury to roots located under, over, or adjacent to paved surfaces.

- D. Roots and root-trunk flares growing over curbs should not be injured during breaking of curbs and removal of debris. Wood and bark tissues shall not be injured by striking tissues with equipment.
- E. During the removal of concrete, all root systems and soil areas exposed shall not be disturbed.
- F. Motorized equipment and trailers, including but not limited to tractors, skid steers, bulldozers, rubber tired excavators, tracked excavators, trucks, cars, and carts are to be limited to access on the existing paved street only. Access is not allowed behind the curb within tree protection areas.
- G. Should access be necessary within designated tree protection areas, the existing grade shall be covered with double, overlapping sheets of 3/4-inch thick plywood and twelve inches (12") of wood mulch to help distribute the weight of equipment and to minimize soil compaction and rutting.
 - 1. Plywood and/or mulch are not acceptable bridging materials for driving over exposed tree roots. Exposed tree roots shall not be driven over.
 - 2. The City Forester or Project Consulting Arborist shall be notified and shall approve of the access and driving surface prior to its use.

3.3 CONSTRUCTION OF SIDEWALKS, CURBS, CONCRETE, ASPHALT PAVING, AND DRAINAGE INLETS

- A. The following procedures shall be used when constructing sidewalks, curbs, concrete, asphalt paving, and drainage inlets.
 - 1. Keep all materials and equipment within the street bounded by existing curbs.
 - 2. Protect exposed roots from contamination by stabilization materials and concrete.
 - 3. Locate concrete washout areas away from roots and tree protection areas.
 - 4. When excavating for the construction of inlets, excavated soil shall be deposited in trucks and hauled off or deposited temporarily on three quarter inch (3/4") thick plywood outside the critical root zone. Excavated and fill soil shall not be deposited, even temporarily, on unprotected natural grade.
 - 5. After proper pruning, as needed, cover exposed roots within thirty (30) minutes to minimize desiccation. Roots may be covered with soil, mulch, or moistened burlap (7 ounce or equivalent), and shall be kept moist during the period until the final grade is established.
 - 6. Where possible, construction should be relocated to prevent damage to existing roots. Where relocation of walks is not possible, walks should be constructed in a manner with the least amount of impact/damage to roots including but not limited to raised, narrowed, curbed, ramped, bridged, cantilevered, use of pylons, root break out zones, root channeling, structural cells to prevent cutting and removing major roots (e.g. roots greater than two inches in diameter).
 - 7. Place a sheet of 6-mil or thicker plastic over the grade within affected portions of tree protection areas prior to placing concrete sidewalks, curbs, inlets, ramps, and driveway approaches. The plastic will assist in providing a non-leaching barrier between the concrete, soil and roots.
 - 8. Construct new sidewalks on, or above, the existing grade instead of excavating into root zones. The new grade shall not interfere with sheet-flow drainage.
 - 9. Grading within the critical root zone shall consist of the ground encompassing from one and one half (1.5) minimum to two (2) times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk,

whichever is greater. Grading within the critical root zone shall be performed by hand. Any fill material that needs to be placed in the critical root zone shall be limited to a maximum of one inch (1”) of fill material over the critical root zone area. Fill should consist of sandy loam topsoil. Clay soils shall not be used as fill. When using fill soil, the existing surface to receive fill should be scarified by hand to a maximum depth of one inch (1”) from the finished grade prior to placing fill material, to ensure proper incorporation of fill material. Any filling operation should not occur during water saturated soil conditions.

10. Existing soil may be used as a form for back of curb and gutter, with or without the use of a thin masonite-type form, although a Masonite form is preferred. This will minimize excavation in the critical root zone and prevent undue injury to the roots. This method is unnecessary in areas outside the critical root zone. Place a layer of “Typar BioBarrier” between the curb and tree roots to help inhibit root growth that may exploit small cracks in the curb. Where appropriate, use curbs with discontinuous footings to maintain natural grade near the base of trees adjacent to the curbing, and to minimize injury to roots and root flares.
11. Provide for easy concrete removal and replacement where an obvious raised root may cause sidewalk cracking in the future. This can be accomplished by installing an expansion joint on either side of the root or by scoring (as shown on the documents) the concrete on either side of the root to allow that particular section to be broken out and replaced. Compaction rating for the replacement walkway should not exceed eighty percent (80%) Proctor density. Tree roots will continue to slowly add girth every year; therefore, the base material needs to be malleable (e.g. suitable subgrade aggregates, crushed granite, or compacted sand) to prevent a fulcrum or pressure point which can crack or heave the walkway.
12. Where appropriate, and under the direction of the City Forester or Appointee, root restricting barriers can be installed with a minimal amount of disturbance away from sidewalks, curbs and streets. Materials include:
 - a. Eight (8) Mesh Copper (0.028-inch or greater) wire screen.
 - b. “Typar BioBarrier” as manufactured by Fiberweb, Inc. www.biobarrier.com. Contact Dave Zill, (651)330-2920.
 - c. Or acceptable substitution.
13. In areas where roots have to be removed for construction of drain inlets, roots shall be severed prior to excavation to eliminate unnecessary tearing of roots by equipment, refer to Article 3.5 - Root Pruning.
 - a. Excavate soil by hand at the construction cut limit to a depth of thirty (30) inches or to the depth of the required root cut, whichever is less.
 - b. Prune roots as specified.
 - c. Protect exposed roots as specified.
14. Concrete or chemicals spilled within tree protection areas should be completely removed. Contamination soil shall be completely removed at the time of the spill and removed by hand and/or air spade tool without disturbance to root systems. Appropriate soil should be added as necessary to restore the grade. Contact the City Forester immediately in the event of a spill within a tree protection area.

3.4 IRRIGATION OR UTILITY INSTALLATION

- A. Protection of Trees and High Value Shrubs: Contractor shall protect all trees and high-value shrubs from injury due to irrigation related work. All injuries to trees and high-value shrubs

shall be mitigated to the satisfaction of the Project Manager, and, if appropriate in accordance with guidelines established in the “Guide for Plant Appraisal”. All costs of such mitigating shall be charged to and paid by the Contractor. See Article 3.9 – Injuries to Existing Plants – Damage Penalties of this section for definition of high value trees and shrubs.

1. All irrigation lines shall be indicated on construction plans and pre-approved by the City Forester or Project Manager. No irrigation lines shall be located within ten feet (10’) of any existing tree trunk, without prior approval of City Forester or Project Manager.
- B. Existing Trees: The City Forester or Project Consulting Arborist shall be notified prior to any trenching or excavation known or suspected to disturb more than ten percent (10%) of the critical root zone.
- C. Where it is necessary to excavate within the critical root zone of existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots. Where more than ten percent (10%) of the critical root zone area is to be disturbed the Contractor shall notify the City Forester or Project Consulting Arborist to review the conditions. Final approval must be provided by City Forester or Project Consulting Arborist prior to excavation work. In areas where tunneling or boring are to occur all exposed roots shall be covered with moistened burlap to prevent drying of roots.
- D. When trenching or excavation within the critical root zone is to occur care shall be taken not to disturb roots contained within the structural root plate of the tree. The structural root plate shall be determined based on the following guidelines:

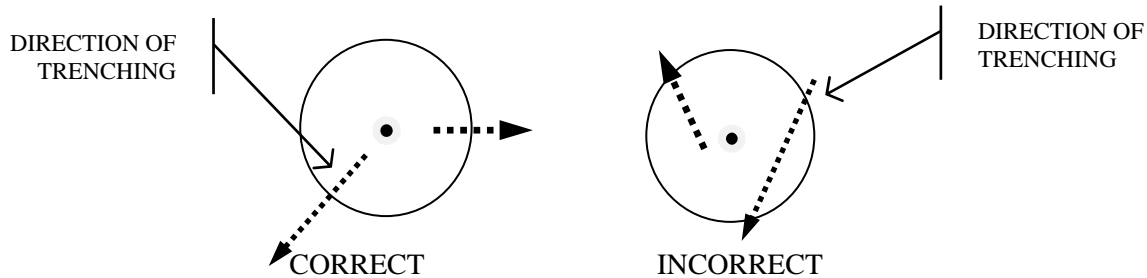
Tree Diameter (in inches)	Structural Root Plate (in feet)
< 5	3
5	3.75
10	6
15	7.5
20	9
25	10
> 30	12

If trenching or excavation is to occur the following procedures shall apply:

1. If excavation, trenching or utility installation only occurs on one side of the tree or within a six inch (6”) linear distance from the trunk base for every one inch (1”) of trunk diameter, horizontal directional boring (auger tunneling), shall be used for irrigation or utility line installations.
 2. If excavation, trenching or utility installation will occur on two or more sides of a tree (e.g. N,S,E, or W) or is within one foot (1’) linear distance from the trunk base for every one inch (1”) of trunk diameter, then horizontal directional boring (auger tunneling) shall be used.
- E. All trenching or other work within the drip line of any tree shall be done by hand or other methods approved by the City Forester or Project Manager, which will prevent breakage or other injury to branches and roots.
- F. Wherever a trenching machine exposes roots extending through the trench wall, those roots shall be hand pruned immediately, refer to Article 3.5 - Root Pruning. All trenches within

critical root zones shall be closed within twelve (12)-hours; if this is not possible, the trench walls shall be covered with burlap and kept moistened. Prior to backfilling, the Contractor shall contact the City Forester, Project Consulting Arborist, or Project Manager to inspect the condition and treatment of roots injured by trenching.

- G. Trenching within critical Root Zone shall be done perpendicular to the radial center of the tree and not through the critical root zone.



3.5 ROOT PRUNING

- A. Tree roots shall not be pruned or cut unless their removal is unavoidable or absolutely necessary. The City Forester or Project Manager shall be notified prior to any operation known or suspected to involve cutting of more than:
 - 1. The City Forester or Project Consulting Arborist shall be notified immediately in the event that roots in excess of one-half the diameter of the tree, as measured per Paragraph 1.4.D, are cut, torn, ripped, or otherwise injured.
- B. Upon approval by the City Forester, prior to any excavation, removal of sidewalk, or other activity that will result in removal of soil and tree roots, all tree roots within a designated area will be pruned to a depth of fourteen inches (14"). Pruning shall occur with a Dosko Root Pruner, or equivalent, in accessible areas, and by hand in areas inaccessible to the root pruning machine. All other root pruning shall be done by hand with approved tools.
- C. Removal of roots greater than one-half the diameter of the tree, as measured per Paragraph 1.5.D, or parts of roots that are injured or diseased should be performed as follows:
 - 1. Preserve the root bark ridge (similar in structure and function to a branch bark ridge). Directional root pruning technique shall be used during hand excavation around tree roots. Roots are similar to branches in their response to pruning practices. With directional root pruning, objectionable and severely injured roots are properly cut to a lateral root one third (1/3) the size of the root being cut, if possible, that is growing downward or in a favorable direction.
 - 2. All roots needing to be pruned or removed shall be cut cleanly with sharp hand tools, with oversight by the City Forester or Project Consulting Arborist. No wound dressings shall be used.
 - 3. Recommended root pruning tools:
 - a. Scissor-type lopper.
 - b. Scissor-type pruner.
 - c. Large and small hand saws.
 - d. Wound scriber.
- D. Root Pruning Near Sidewalks:

1. Root pruning should be done carefully, by hand, to achieve the objective of reducing future sidewalk problems as well as preserving the trees. Removing anchoring roots or causing injuries in anchoring roots and root flares can cause future decay and potential hazards. Indiscriminate cutting of vigorous roots results in their regeneration so that several more new roots may grow from the cut end, back under the sidewalk, thereby reducing the time between sidewalk repairs. Roots can be managed in the ground without significant harm to trees, if care is taken to avoid injuries that lead to root and trunk decay.
 2. Directional root pruning is recommended because it considers the tree's response to root pruning and decay. With directional root pruning, roots are cut to a lateral one third (1/3) the size of the root being cut, if possible, that is growing downward or in a more favorable direction. The pruned root ends will be less likely to regenerate, since a large lateral can assume the new terminal role of the root.
 3. Proper removal of selected roots or parts of roots can direct roots away from sidewalks in the future. Procedures for root pruning directly next to sidewalks are as follows:
 - a. Hand-dig a trench six (6)- to eight (8)-inches in depth at the edge of the planting strip and sidewalk.
 - b. Remove all roots less than 2-inches in diameter in this trench back to a desirable lateral root, preserving the root bark ridge. If careful excavation does not reveal a desirable lateral root within twelve inches (12") of the exposed root in question, then the exposed root shall be pruned properly so that a minimal amount of root is removed.
 - c. Small root bundles, the source of future sidewalk problems, should also be removed at this time.
- E. All roots one-half the diameter of the tree caliper as measured per Paragraph 1.5.D shall be examined by the City Forester or Project Consulting Arborist in terms of their role in anchoring the tree.
1. All roots that contribute significantly to anchorage should be preserved. Remove all other roots in this size range to sound, downward growing lateral roots that are at least one third (1/3) the size of the root being removed.
 2. All roots larger than one-half the diameter of the tree caliper as measured per Paragraph 1.5.D diameter are to be preserved unless their removal is absolutely necessary and approved by the City Forester. Preservation of large roots may require:
 - a. Reducing the sidewalk width near the root flare and/or
 - b. Curving or relocating walk around root/root flare.
 - c. Ramping or bridging the sidewalk over the roots to allow for root growth.
 - d. Use of cantilever/pylon technology.
 - e. Establish root break out zones.
 - f. Root channeling.
 - g. Structural cells.
- F. Tree Guying Subsequent to Root Pruning: Upon review of on-site root pruning and constructing grading limits, the City Forester shall determine if existing trees subject to root pruning should be guyed or otherwise stabilized. Contractor shall retain a qualified tree service company to complete tree guying and stabilization in accordance with Tree Care Industry Association standards. Tree service company shall be licensed by the City and County of Denver, through the City Forester's Office.

3.6 TREE PROTECTION FENCING

- A. Tree protection fencing should be installed 1-foot behind the existing curb in areas where the street surface will be removed and replaced. Tree protection areas shall be designated on construction documents, and fencing locations should be staked for approval by the Project Manager and City Forester or Project Consulting Arborist.
- B. Tree protection fences should be constructed of one of the following:
 - 1. Galvanized Chain-link – Six feet (6') in height. Posts should be installed no less than ten feet (10') on center, at a depth of thirty six inches (36") minimum. Installation of post shall not result in injury to tree surface roots; root flares or branches.
 - 2. Colored (orange), molded plastic construction fencing-four forty eight inches (48") in height.
- C. Fencing should be installed to completely surround the limits of tree protection areas, and should extend at least ten feet (10') beyond the designated construction limits.
- D. Tree protection fencing shall be installed prior to any site activity and shall remain until its removal is authorized by the City Forester or the Project Manager.

3.7 TREE PROTECTION SIGNAGE

- A. A standard Forestry Tree Protection sign shall be mounted on tree protection fencing at fifty foot (50') intervals warning construction personnel and the public to keep out of the tree protection areas.
 - 1. Signs may be picked up at the City Forestry office in the Webb Building at 201 W. Colfax Avenue.

3.8 PROJECT SITE MONITORING

- A. As determined by the City Forester for projects of sufficient size to warrant such, a Project Consulting Arborist shall be retained to enforce and monitor the Tree Retention and Protection objectives.
 - 1. The project site should be monitored a minimum of two (2) times weekly (more frequently at the start of the project) until all procedures and specifications are understood and properly executed by all parties.
 - 2. Specific monitoring schedules should be developed at preconstruction meetings and modified as deemed necessary by the appropriate parties.
 - 3. Schedules shall be relayed to the City Forester and the Project Manager along with reports of site visits.

3.9 INJURIES TO EXISTING PLANTS - DAMAGE PENALTIES

- A. Tree and High-Value Shrub Appraisal: All trees and high-value shrubs will be evaluated and appraised by the City Forester or Forestry Appointee, and a list of all tree values for the project will be on file in the Contractor's office.
 - 1. Any tree or other plant requiring retention or protection that is not on the list shall be appraised by the City Forester or Project Consulting Arborist as necessary to comply with this damage penalty.
- B. Documentation for appraisals will consist of:

1. Measurement of plant size.
 2. Identification by common and botanical names.
 3. Current condition (overall health, injuries, overt hazard status, etc.).
 4. Location factors as described in the most current addition of "Guide for Plant Appraisal". Photographs may be taken of certain trees and shrubs to document debilitating condition factors.
- C. The threshold level for plants to be appraised shall be one-hundred dollars (\$100.00); only those trees and shrubs estimated to have a monetary value greater than one-hundred dollars (\$100.00) shall be appraised.
- D. Trees and other plants designated as requiring retention or protection shall be identified and located on construction plans. Loss of, or partial injury to, any of these plants due to Contractor neglect or improper construction activities will result in a penalty of up to three times the appraised value of the tree as determined by the City Forester or Forestry Appointee as described in Chapter 57 of the Denver Revised Municipal Code.
- E. Trees determined as requiring "general protection" or "special protection" in the construction areas and in other key locations should be clearly identified by the City Forester or Forestry Appointee. Loss or partial injury to any of these trees due to Contractor neglect or improper construction activities will result in a penalty of up to three times the appraised value of the trees as determined by the City Forester or Project Consulting Arborist as described in Chapter 57 of Denver Revised Municipal Code. Injury to a portion of these trees will be assessed by the City Forester or Project Consulting Arborist and a corresponding portion of the damages will be assessed to the Contractor.
- F. A fine of one-thousand dollars (\$1,000.00) will be levied against the Contractor for each incident of construction damage (including construction traffic) within designated tree protection areas. Any fine shall be independent of any applicable damages for the appraised value of the tree or tree part.
- G. Trees or roots visibly and unnecessarily injured, in the opinion of the Project Manager, City Forester and/or Project Consulting Arborist will cause the City to withhold from the Contractor an assessed amount conforming to the requirements stipulated above, for a period of one full year. After that period the impact of the injury to any tree will be assessed by the City Forester or the Forestry Appointee.
- 3.10 TREE AND OTHER PLANT MAINTENANCE DURING AND AFTER COMPLETION OF CONSTRUCTION
- A. Tree Maintenance: Proper maintenance shall include, but be limited to: structural and remedial pruning, watering, mulching, remediating soil compaction, fertilization, insect and disease control, soil and tissue analysis, aeration, and wound treatment.
- B. The timing duration and frequency of necessary maintenance practices should be determined and approved by the City Forester or Forestry Appointee, based on factors associated with the site and affected plants.
- C. Submit maintenance schedule to the City Forester for approval prior to work beginning.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Tree Retention and Protection. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the **contract unit** price, and shall include required materials, transportation, equipment, and labor required to establish tree protection, and remove the tree protection at the end of the project as required in accordance with the Contract Drawings and Specifications. Payment will also include the maintenance of the tree protection throughout the duration of the project as well as the labor, materials and equipment required to restore the site to its original condition at the completion of the project.

END OF SECTION 01 56 39

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Work shall consist of constructing, installing, maintaining, and removing when required, BMPs during the life of the Contract until Final Stabilization to prevent or minimize erosion, sedimentation, and pollution of any waters including storm, drainageways, MS4, State Waters, and/ or wetlands. Work under this Section includes the Contractor obtaining required Permits, utilizing SWMP elements provided in the Contract, and/ or SWMP elements specifically prepared by the Contractor as defined herein. The work shall also consist of providing on-going maintenance and monitoring of the SWMP as may be necessary due to the specific and/or dynamic needs of the Project as well as meet all requirements set forth within the CASM.

- B. The Contractor shall coordinate the construction of temporary BMPs with the construction of permanent BMPs to assure economical, effective, and continuous erosion and sediment control and water pollution prevention throughout the construction period until Final Stabilization is achieved

- C. When a provision of this Section or an order by the Permit Enforcement Authority requires that an action be immediate or taken immediately, it shall be understood that the Contractor shall at once begin effecting completion of the action and pursue it to completion in a manner acceptable to the Permit Enforcement Authority, and in accordance with applicable Permitting requirements.

Refer to "City and County of Denver Construction Activities Stormwater Manual" by City and County of Denver Wastewater Management Division, Department of Public Works, revised June 2010, or latest edition.

- D. Refer to applicable sections within the **Wastewater Capital Projects Management Standard Construction Specifications**, Wastewater Management Division, Department of Public Works, specifications updated September 2014, or latest edition.

1.3 DEFINITIONS

- A. Definitions used for this Section shall consist of those listed in Title 1 of the City and County of Denver "Standard Specifications for Construction, General Contract Conditions", 2011 edition.

- B. Definitions used for this Section hereby incorporate those identified within the City and County of Denver Construction Activities Stormwater Manual (CASM).

- C. Additional Definitions applicable to this Section are listed heretofore:

- D. Basis of Payment: The terms under which “Work” is paid, as a designated “Pay Item” in accordance with the quantity measured and the “Pay Unit.”
- E. Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, installation of devices, maintenance procedures, and other management practices deployed to stabilize the construction site to prevent or reduce the pollution of State Waters (see definition below). Stormwater BMPs can be classified as "structural" (i.e., devices installed or constructed on a site) or "non-structural" (procedures, such as modified landscaping practices).
- F. Colorado Department of Health and Environment (CDPHE): State of Colorado, Water Quality Control Division responsible for issuance of State Construction Stormwater Permit.
- G. Construction Activities Stormwater Discharge Permit (CASDP): Permit issued by the City for compliance with City & County of Denver Revised Municipal Code and Department of Public Works Rules & Regulations concerning the discharge of pollutants in storm generated runoff from construction sites to Municipal Separate Storm Sewer System (MS4, see definition below) or State Waters, via the Municipal Separate Storm Sewer System (MS4).
- H. Construction Activities Stormwater Manual (CASM): City and County of Denver Construction Activities Stormwater Manual (CASM), 2010 edition.
- I. Colorado Department of Transportation (CDOT): State agency that has published standards for Erosion Control with accompanying Erosion Control Supervisor certification courses.
- J. Erosion Control Supervisor (ECS): The Erosion Control Supervisor is assigned by the Contractor to perform duties as described in this Section. The ECS shall be properly trained in BMPs per requirements of Part V below, and shall be under the direction of a Professional Engineer licensed in the State of Colorado when performing any modifications to the Project Stormwater Management Plan (SWMP), as required by CDPHE.
- K. Final Stabilization: Point of construction when all ground surface disturbing activities at the site have been completed and uniform vegetative cover has reached 70% of pre-disturbance vegetative cover (as judged by comparison to nearest fallow vegetation), or equivalent permanent features have been employed. At this point, all temporary BMPs can be removed, all construction and equipment maintenance wastes have been disposed of properly; and all elements of the Stormwater Management Plan have been completed.
- L. Major SWMP Modification: Changes to the original SWMP that removes or adds additional area to the Project, or modifies the hydrology or drainage of the Project. A Major SWMP Modification requires the submission of revised Stormwater Management Plan (SWMP) elements to the Permit Authority for review and approval. Any adjustments to a SWMP must be performed either by or under the direction of a Professional Engineer licensed in the State of Colorado.
- M. Minor SWMP Modification: Modification to the SWMP that does NOT increase the scope or change hydrology of the Project but: modifies/improves specific BMPs in use at site, indicates progression in phasing of the Project, or specifies relocation of previously approved BMPs

within the Project. Any adjustments to a SWMP must be performed either by or under the direction of a Professional Engineer licensed in the State of Colorado.

- N. **Municipal Separate Storm Sewer System (MS4):** A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):
- a) owned or operated by a State, city, town, county, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of stormwater or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or a designated and approved management agency under Section 208 of the Federal Clean Water Act that discharges to State Waters;
 - b) designed or used for collecting or conveying stormwater;
 - c) which is not a combined sewer; and
 - d) which is not part of a Publicly Owned Treatment Works (POTW).
- O. **Permit Authority:** The Department authorized by the City to review and process CASDP Applications for Capital and/ or governmental sponsored Projects. The responsible City department serving as the Permit Authority is the Engineering, Regulatory and Analytics Office. As a clarification, the Development Services Department of the City serves as the point of intake and permit processing center.
- P. **Permit Enforcement Authority:** The Department authorized by the City to inspect and enforce CASDP Rules and Conditions for all construction Projects within the City's MS4 Boundary. The responsible City department serving as the Permit Enforcement Authority is the Wastewater Management Division of the Department of Public Works.
- Q. **State Construction Stormwater Permit:** Colorado Revised Statutes require that all construction sites/development Projects, which, by definition, disturb one or more acres in area, shall be covered by a State issued general permit for construction activities. Information on the application requirements for the State permit can be obtained by phone at 303-692-3500; or by visiting their offices located at 4300 Cherry Creek Drive South, Denver, CO 80246 – 1530. or on the Web at: <https://www.colorado.gov/pacific/cdphe/news/water-quality-permits>
- R. **State Waters:** Any and all surface waters which are contained in or flow in or through this State, not to include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.
- S. **Examples of State Waters** include, but are not limited to, perennial streams, intermittent or ephemeral gulches and arroyos, ponds, lakes, reservoirs, irrigation canals or ditches, wetlands, stormwater conveyances (when they discharge to a surface water), and groundwater.
- T. **Stormwater Management Plan (SWMP):** The Stormwater Management Plan contains the requirements necessary to accomplish all the following:
- U. **The SWMP** establishes a minimum standard to construct, install, maintain, and remove required BMPs during the life of the Contract to prevent or minimize pollution of stormwater due to

erosion, sediment transport, and construction related pollutant generated during all phases of the Project. A SWMP consists of the following elements:

- (i) CASDP Narrative Worksheet with Narrative Report. The Narrative Report and supporting documents should fully address the methods to be used to prevent sediment, debris, and other pollutants from entering the MS4 and/ or State Waters in and around the Project area. Proposed structural and non-structural BMPs should be described with sufficient implementation detail to insure that the logical phases of the proposed construction Project meet the performance standards listed in the CASM.
 - (ii) Proposed site drawings and Best Management Practice (BMP) installation details as they apply to the site conforming to the Urban Storm Drainage Criteria Manual, Vol. 3, "Best Management Practices", most current version as issued by the Urban Drainage and Flood Control District (UDFCD), or those established by the City's Department of Public Works. If erosion control drawings were included within the bid documents for the Project, they shall be used for bid purposes and initial planning/ deployment of BMPs on the Project. If provided drawings are signed/ sealed by a Professional Engineer, they have been pre-approved by the Permit Authority and may be used without revision for purposes of submitting for CASDP. If provided drawings do not have signature/ seal of Professional Engineer licensed by the State of Colorado, they will require revision by the Contractor with Professional Engineer signature/ seal prior to submission to the City and County of Denver for CASDP.
 - (iii) Supporting documentation related to proposed BMPs that are not currently identified in UDFCD Vol. 3 or as otherwise published by the City.
- V. Any preparation of or adjustments to a SWMP must be performed either by or under the supervision of a Professional Engineer licensed in the State of Colorado. SWMP elements submitted to the City shall also meet currently established criteria of the CDPHE as the SWMP must meet all local, State and Federal requirements.
- W. **Substantial Completion of Erosion Control:** Point of construction when permanent BMPs have been installed, initial growth is in place, and the site is waiting for vegetative cover to reach 70% of pre-disturbance vegetative cover.

PART 2 - PRODUCTS

- A. The materials to be used for BMPs shall conform to each specific detail as set forth within the Project SWMP or as noted on the Contract Drawings.
- B. The Contractor shall submit a complete SWMP and application to the Permit Authority to obtain the required CASDP. The Contractor shall use the provided "For reference only" erosion control drawings provided in the Contract as a starting point for preparation of required SWMP elements (as required for CASDP) and for general information as to the origin of pay items included in the Bid Documents. The included erosion control drawings have been previously reviewed by the Permit Authority, and the BMPs shown therein have been found to be generally acceptable by the Permit Authority.

- C. It shall be the responsibility of the Contractor to prepare and acquire approval of a complete SWMP and obtain a CASDP from the Permit Authority prior to beginning construction. The Contractor is hereby made aware that the Permit Authority allots up to 3 weeks per review cycle for CASDP applications (2 or more review cycles are not uncommon).
- D. Per CASDP requirements, the Contractor shall obtain the endorsement of a Professional Engineer licensed in the State of Colorado for preparation of the initial SWMP and/ or any proposed Major or Minor SWMP Amendments. This will require the Contractor to provide or retain a Professional Engineer or subcontract with the original Professional Engineer of the “For reference only” erosion control drawings.
- E. Per definition, a Major SWMP Modification requires the submission of revised SWMP elements to the Permit Authority for review and approval.
- F. Prior to construction, the Contractor shall obtain the required State Construction Stormwater Permit(s) as applicable.

PART 3 - EXECUTION

- 3.1 **SCHEDULES:** At least 10 working days prior to the beginning of any construction work, the Contractor shall submit for approval a schedule for accomplishment of temporary and permanent BMPs shown in the SWMP. This schedule shall specifically indicate the sequence of clearing and grubbing, earthwork operations, and construction of temporary and permanent BMPs. The schedule shall include BMPs for all areas within the Project boundaries, including but not limited to, haul roads, borrow pits, and storage and other staging sites. Work shall not be started until the BMP schedule has been approved in writing by the Project Manager, and on site pre-construction inspection is performed and approved by CCD’s NPDES inspector. Once the work has started, and during the active construction period, the Contractor shall update the schedule for all BMPs on a regular basis, and as required to keep the SWMP in compliance.
- 3.2 **CONSTRUCTION IMPLEMENTATION:** The Contractor shall incorporate into the Project all BMPs that are appropriate for the current phase of work, as outlined in the accepted schedule.
- 3.3 **UNFORSEEN CONDITIONS:** The Contractor shall direct the ECS (under the supervision of a Professional Engineer licensed in the State of Colorado) to design and implement BMPs for correcting conditions unforeseen during design of the Project, or as possible for emergency situations, which arise during construction. The Project’s SWMP, UDFCD Vol 3 standards and details, and CDOTs “Erosion Control and Storm-Water Quality Guide,” and any approved modification to these documents as proposed by the Contractor, shall be used as reference documents for the purpose of designing appropriate BMPs. Measures and methods proposed by the Contractor to deal with unforeseen conditions shall be reviewed and approved in writing by the Permit Enforcement Authority and the Project Manager prior to implementation and construction.
- 3.4 In an emergency situation, the Contractor shall use best judgment for immediately responding to the emergency situation as it arises, and shall notify the Permit Enforcement Authority and ECS

of the emergency situation and BMPs employed in response as soon as practical after installation.

- 3.5 PERMITS: The Contractor shall obtain all required permits for the Project including those required by federal, state, and local agencies. The Contractor shall obtain (or transfer from the City when specified) required erosion control and water quality permits and shall be responsible for compliance with all requirements under any such permits.
- 3.6 EROSION CONTROL SUPERVISOR: Contractor shall assign to the Project an employee or subcontractor to serve as Erosion Control Supervisor (ECS). The ECS shall be a person other than the Contractor's superintendent, foreman, or equivalent supervisory position. The ECS shall be experienced in aspects of BMP construction and have satisfactorily completed a Colorado DOT or equivalent ECS training program authorized by the City. Proof that this requirement has been met shall be submitted to the Project Manager at least ten working days prior to the beginning of any soil disturbance work. A list of authorized ECS training programs is available from the City upon request. Additionally, per definition, the ECS shall be under the direction of a Professional Engineer licensed in the State of Colorado when performing any modifications to the Project Stormwater Management Plan (SWMP).

The ECS shall be responsible for oversight of the implementation, maintenance, and revision of the SWMP for the duration of the Project. CCD requires the ECS to fulfill responsibilities as outlined by CDPS such as having financial control and authority to implement BMPs. The ECS's responsibilities shall be as follows:

- 1) Ensure compliance with all water quality permits or certifications in effect during the construction work.
- 2) Supervise the installation, construction, and maintenance of all BMPs specified in the Contract and coordinate the construction of BMPs with all other construction operations.
- 3) Direct the implementation of suitable BMPs as necessary to correct unforeseen conditions or emergency situations. Direct the dismantling of those features when their purpose has been fulfilled due to completion of each Project phase unless the Permit Enforcement Authority agrees that the features be left in place.
- 4) Attend the preconstruction conference, erosion control preconstruction inspection, Project scheduling meetings, weekly construction/ field meetings, substantial completion and final stabilization inspections, and other meetings regarding construction that could impact water quality.
- 5) Evaluate all non-stormwater coming onto the site, such as springs, seeps, and landscape irrigation return flow. If such flow is identified, the ECS shall propose appropriate SWMP

modifications to the Contractor to protect off-site water from becoming contaminated with sediment or other pollutants.

6) Coordinate with the Contractor to implement necessary actions to reduce anticipated or presently existing water quality or erosion problems resulting from construction activities.

7) Coordinate with the Contractor to ensure all labor, material, and equipment deployed to meet SWMP requirements is judged appropriately.

8) During construction, update and record the following items in the SWMP as changes occur:

- a) Construction boundaries (may require Major SWMP Modification)
- b) Areas of disturbance (may require Major SWMP Modification)
- c) Areas used for storage of construction materials, equipment, soils, or wastes.
- d) Location of any dedicated asphalt or concrete batch plants.
- e) Location of construction offices and staging areas.
- f) Location of work access routes during construction.
- g) Location of borrow and waste.
- h) Location of temporary and permanent stabilization
- i) The ECS shall start a new site map before the current one becomes illegible. All site maps shall remain with the SWMP paperwork.

9) Amend the SWMP whenever there are: additions, deletions, or changes in locations of BMPs. SWMP revisions shall be recorded immediately. Items shall be dated and signed at time of occurrence. Specifically, amendments shall include the following:

- a) A change in design, construction, operation, or maintenance of the site which would require the implementation of new or revised BMPs; or
- b) Changes when the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity.
- c) Changes when temporary BMPs are no longer necessary from changes in Project phase and are removed. All inspection and maintenance activities or other repairs shall be documented.
- d) All inspection and maintenance activities or other repairs shall be documented. The SWMP and documentation shall be kept on the Project site at all times.

10) Modify the site map with arrows to indicate direction of surface and storm water flowing across the Project site.

11) When adding or revising BMPs in the SWMP, amend the narrative to explain what, when, where, why, and how the BMP is being used, and add a detail to the SWMP.

12) If using existing topography, vegetation, etc. as a BMP, label it as such in the SWMP site map; amend the Narrative to explain when, why, and how the BMP is being used in the SWMP.

13) Record on the SWMP, and implement the approved plan for concrete and asphalt saw cutting, grinding, and milling containment and removal.

14) Update the potential pollutants list in the SWMP throughout construction meeting CASDP requirements.

15) Spills, leaks, or overflows that result in the discharge of pollutants shall be documented on the inspection form. The ECS shall record the time and date, weather conditions, reasons for spill, and how it was remediated. The ECS shall immediately report to the Contractor and Project Manager the following instances of noncompliance:

Noncompliance which may endanger health or environment.

Spills or discharge of hazardous substance or oil which may cause pollution of the City MS4 or State Waters.

Discharge of stormwater which may cause an exceedance of a water quality standard.

16) Perform a thorough inspection of the stormwater management system at least every seven (7) days and within 24 hours after any precipitation or snowmelt event with the potential to cause surface erosion. If no land disturbing construction activities are present during a storm event, post-storm event inspections shall be conducted prior to commencing any new land disturbing construction activities, but no later than seventy-two (72) hours following the storm event. The inspection records shall be kept on-site in a written or previously approved format. Inspections shall be conducted during the progress of the work, during work suspensions, or until Final Stabilization of all disturbed areas is approved by Permit Enforcement Authority and shall include the following services at a minimum:

- a) The construction site perimeter, disturbed areas, and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. BMPs identified in the SWMP shall be observed to ensure that they are operating correctly.
- b) The description of potential pollutant sources, and the BMPs identified in the SWMP, shall be revised and modified as appropriate based on the results of the inspection as soon as practicable after such inspection. Modification to the SWMP shall be implemented in a timely manner and in accordance with applicable Permit requirements.
- c) The operator shall keep a record of inspections. Uncontrolled releases of sediment or polluted storm water or measurable quantities of sediment found off the site shall be recorded with a brief explanation as to the measures taken to prevent future releases as well as any measures taken to clean up the sediment that has left the site. Inspection records shall be made available to the City upon request. Note: documentation of uncontrolled releases at site DOES NOT alleviate any State or Federal requirements for reporting of discharges or upset conditions. Care shall be taken to ensure compliance with all regulatory requirements at site.
- d) Seven (7) day inspections are required during construction and at all times until Final Stabilization has been achieved. Seeding and mulching of disturbed areas does NOT

count as final stabilization until such time as 70% pre disturbed vegetative cover has been achieved. Sites with growth in place sufficient to deter erosion that have not yet achieved final stabilization may petition the City to grant an alternative inspection schedule while awaiting additional growth for final stabilization. These inspections must be conducted in accordance with the above paragraphs.

- 3.7 **APPLYING BMPs TO STABILIZE SITE:** The duration of the exposure of incomplete construction to the effects of weather shall be as short as practicable. BMPs such as: seeding, surface roughening, mulching, applying tackifier, use of geotextiles and matting, permanent landscaping, or other selected BMPs shall be applied within fourteen (14) calendar days of completion of grading/soil disturbance activities to stabilize the construction site unless disturbed area is within 100 feet of an MS4 or State Waters or has slopes of 3 to 1 or greater in which case BMPs shall be implemented within seven (7) calendar days of completion of grading activities. Disturbed areas where work is temporarily halted shall be temporarily stabilized within seven (7) days after the activity ceased unless work is to be resumed within thirty (30) calendar days after the activity ceased.
- 3.8 Clearing and grubbing operations shall be scheduled and performed to minimize both the area of the Project disturbed at a given time and the amount of time that disturbed areas remain open. BMPs such as temporary seeding are required between successive construction stages when disturbed areas will not be stable or active for thirty (30) calendar days or more. No payment will be made for additional work required because the Contractor has failed to properly coordinate the BMP schedule, thus causing previously stabilized areas to be disturbed by operations that could have been performed prior to the stabilization. Upon failure of the Contractor to coordinate the permanent BMPs with the grading operations in a manner to effectively control erosion and prevent water pollution, the Permit Enforcement Authority can suspend the Contractor's grading operations and the Project Manager can withhold monies due to the Contractor on current estimates until such time that all aspects of the work are coordinated in an acceptable manner.
- 3.9 **WORK OUTSIDE LIMITS OF CONSTRUCTION:** Non-contiguous areas outside the limits of construction that are used by the Contractor that include, but are not limited to, borrow pits, haul routes, storage and disposal areas, field offices, maintenance, batching areas, etc., shall have appropriate BMPs implemented by the Contractor at the Contractor's expense. Should said areas meet applicable CASDP Permit criteria, the Contractor shall obtain a separate CASDP or amend existing CASDP for each area as applicable at no additional expense to the City.
- 3.10 **MAINTENANCE:** The Contractor shall continuously maintain erosion and sediment control BMPs on a daily basis or as directed by the ECS so that they function properly during and after construction (including work suspensions) until Final Stabilization has been approved by the Permit Enforcement Authority. Maintenance includes, but is not limited to, the following items:
- a) From the time seeding and mulching work begins until the date the Project has reached Substantial Completion of Erosion Control, the Contractor shall keep all seeded areas stabilized at all times. Any damage to seeded areas or to mulch materials shall be promptly repaired.

- b) All inspection sediment removal, and BMP maintenance activities to comply with all Federal, State & Local erosion control permit requirements until Final Stabilization is reached.
 - c) All removal and replacement of existing BMPs due to damage to same suffered either by the contractor, outside agencies, the public, or acts of God.
 - d) All required mechanical and/ or manual street sweeping.
 - e) Discretionary changes required of any regulatory enforcement officer.
- 3.11 If the Contractor fails to maintain the BMPs in accordance with the Contract, or as directed, the City may at the expiration of a period of 48 hours, after having given the Contractor written notice, proceed to maintain BMPs as deemed necessary. The cost thereof will be deducted from any compensation due, or which may become due to the Contractor under this Contract.
- 3.12 **MINOR SWMP MODIFICATIONS:** Shall be made in the field by the Contractor and thoroughly documented in the Contractor's SWMP narrative and drawings. Should the Permit Enforcement Authority deem minor field modifications inadequate, the Contractor may be required to a) make specific modifications as requested by the Permit Enforcement Authority or b) return to the original approved design specifications. Minor SWMP Modifications are allowed, covered under the original CASDP, and required as part of standard maintenance and operation.
- 3.13 **MAJOR SWMP MODIFICATION:** The City reserves the right to require changes in the Work or Project Limits that may require a Major Modification to the SWMP and/ or CASDP due to unforeseen circumstances. Should this occur, the Contractor will be responsible for the following (as applicable) and applying for CASDP amendment:
- a) Make required revisions to comply with changing Federal or State rulemaking if it occurs within timeframe of the Project
 - b) Make required revisions due to unforeseen or unplanned conditions leading to deficient Drawings/ SWMP (hazardous materials encountered, landfills, expansion of work limits, etc.)
 - c) Prepare revised SWMP elements endorsed by a Professional Engineer licensed in the State of Colorado.
- 3.14 **SUBSTANTIAL COMPLETION OF EROSION CONTROL:** When a CASDP is required for the Project, Substantial Completion of the Project as defined by the City and County of Denver General Contract Conditions cannot be reached until Substantial Completion of Erosion Control has been granted. Granting of Substantial Completion of Erosion Control must be requested by the Contractor and be approved by the Permit Enforcement Authority in the form of a "Certificate of Substantial Completion of Erosion Control".
- 3.15 **FINAL STABILIZATION:** Granting of Final Stabilization must be requested by the Contractor and be approved by the Permit Enforcement Authority. Other permanent soil stabilization techniques may be proposed, in writing, by the Contractor and used upon approval, in writing, by the Project Manager and Permit Enforcement Authority. The Contractor shall follow the following procedures for approval of Final Stabilization:

- a) The Contractor shall file Inactivation Request for Construction Activities Stormwater Discharge Permit (available within CASDP guidance documents) with the Permit Enforcement Authority.
 - b) The Contractor shall coordinate with the Permit Enforcement Authority to hold a Final Inactivation Inspection.
 - c) If passing, the Permit Enforcement Authority transmits a letter of approval for Final Stabilization.
 - d) If not passing, the Permit Enforcement Authority transmits a letter of denial for Final Stabilization with associated inspection report to Contractor.
 - e) Stabilization, inspection and maintenance requirements shall continue until confirmation of having met final closure requirements have been granted in writing by the Permit Enforcement Authority.
 - f) When Final Stabilization has been reached, the Permit Enforcement Authority shall issue a "Certificate of Final Stabilization".
 - g) Once the Inactivation request is approved by the City and County of Denver, the contractor can apply to close the State Stormwater Permit.
- 3.16 FINAL ACCEPTANCE: CASDP obligations (including reaching Final Stabilization) may hinder the ability to reach Final Acceptance for the overall Project as defined in the City General Contract Conditions.
- 3.17 CONSTRUCTION OF BMPs: BMPs shall be constructed so that they conform to all requirements as set forth within the Project SWMP. They shall meet all requirements set forth within each BMP detail and shall be installed and maintained so that they function in an effective and operable manner.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Silt fence, silt berms, erosion logs, gravel bags, silt dikes, temporary berms, temporary diversions, temporary drains, and brush barriers will be measured by the actual number of linear feet that are installed and accepted. Stakes, anchors, connections and tie downs used for temporary slope drains will not be measured and paid for separately, but shall be included in the work.
- B. Concrete washout structure will be measured by the actual number of structures that are installed and accepted, and if specified on the SWMP as in-ground will include excavation, embankment, concrete, liner, erosion bales, fencing, and containment and disposal of concrete washout and all other associated waste material.
- C. Storm drain inlet protection will be measured by the unit as specified in the Contract. Sediment trap and sediment basin quantities will be measured by the unit which shall include all excavation and embankment required to construct the item.
- D. Removal and disposal of sediment, concrete & trash that is or is not generated by construction activities will not be measured separately but shall be included in the work.

- E. Any excavation required for the removal of sediment from traps, basins, areas adjacent to silt fences and erosion bales, and any other cleanout excavation of accumulated sediment, and removal of check dams or storm drain inlet protection will not be measured separately but shall be included in the work.

4.2 PAYMENT

- A. Work to furnish, install, maintain, replace (if not due to contractor negligence), remove, and dispose of BMPs specified in the Contract will be paid for at the contract unit price.

- B. Payment will be made under:

Pay Item	Pay Unit
i) Erosion Control Plan, Implementation and Permitting	Lump Sum
ii) Construction Fence	Linear Foot
iii) Silt Fence	Linear Foot
iv) Stabilized Construction Staging Area	Square Yard
v) Vehicle Tracking Control	Each
vi) Concrete Washout Area	Each
vii) Storm Drain Inlet Protection	Each
viii) Temporary BMPs will be measured and paid for by the BMPs used, except that surface roughening, removal and disposal of sediment, and removal of trash will not be measured and paid for separately.	

- C. Payment for each BMP item will be full compensation for all work, materials and equipment required to furnish, install, maintain, remove, and dispose of it. BMPs as deployed per the SWMP requiring replacement due to Contractor negligence and or carelessness shall be provided at the Contractor's expense.
- D. Temporary BMPs required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or for the Contractor's convenience, shall be performed at the Contractor's expense.
- E. If the Contractor fails to complete construction within the approved contract time, payment will not be made for Section 208 pay items for the period of time after expiration of the approved contract time. These items shall be provided at the Contractor's expense.
- F. The cost for any corrective actions required by the State or City due to contractor's failure to obtain or comply with applicable Permits will be borne by the Contractor, including fines and penalties. In the case of failures on the part of the Contractor in controlling erosion, sedimentation, and/or water pollution, the City may provide the necessary corrective actions. All corrective action costs, including Project engineering costs, will be charged to the Contractor, and appropriate deduction will be made from the Contractor's monthly pay estimate.
- G. The sole remedy for additional costs associated with installation of BMPs as required by regulatory agencies to ensure compliance with local and State requirements shall be per unit BMP as provided in the Bid Schedule of this Contract. The Contractor however may submit a separate itemized Change Order for any required Major SWMP Modification proposed by the City during the course of the Project.

- H. Pay Units for ECS will be full compensation for the Erosion Control Supervisor including all materials, labor and equipment necessary for the ECS to perform the work. Commute time will not be measured and paid for separately, but shall be included in the work. The ECS pay item shall include all labor, Professional Engineering (includes supervisory Professional Engineer licensed in the State of Colorado), and/ or design fees to prepare modifications to Stormwater Management Plan(s), revise or amend Permits, coordinate with State and Local agencies, design special erosion control plans for emergency situations that develop during construction or unexpected weather conditions.
- I. Additional stabilized construction/ staging area proposed by the Contractor beyond the area included in the Bid shall be installed per requirements of the Permit Authority and Permit Enforcement Authority without any additional compensation.
- J. Payment for concrete washout structure, whether constructed or prefabricated, will be full compensation for all work and materials required to install, maintain, and remove the item. This includes, but is not limited to: excavation, embankment, liner, erosion bales, fencing, signing, and containment and disposal of concrete washout and all other associated waste material.
- K. Silt berm spikes and dike staples will not be measured and paid for separately, but shall be included in the work.
- L. Payment for storm drain inlet protection will be full compensation for all work, materials, and equipment required to complete the item, including surface preparation, maintenance throughout the Project, and removal upon completion of the work. Aggregate will not be measured and paid for separately, but shall be included in the work.
- M. Sweeping, when used as a BMP as shown in the Contract, will be measured by the number of hours that a pickup broom or motorized equipment capable of collecting sediment, authorized by the Project Manager, is used to remove sediment from the roadway or other paved surfaces. Operator will not be measured and paid for separately, but shall be included in the work.
- N. Stakes, anchors, connections, geotextile, riprap and tie downs used for temporary slope drains will not be measured and paid for separately, but shall be included in the work.
- O. Payment for vehicle tracking pad will be full compensation for all work, materials and equipment required to construct, maintain, and remove the entrance upon completion of the work. Aggregate and geotextile will not be measured and paid for separately, but shall be included in the work.
- P. Surveying of permanent BMPs will not be measured and paid for separately, but shall be included in the work.

END OF SECTION 01 57 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the project.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties", "systems", "structure", "finishes", "accessories", and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - 1. Products: Are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "Product" includes the terms "material", "equipment", "system" and terms of similar intent.
 - 2. Named Products: Are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature that is current as of the date of the Contract Documents.
 - 3. Materials: Are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 4. Equipment: Is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.4 SUBMITTALS

- A. Product List: A list of products is included in each appropriate specification division. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.
 - 1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.
 - 2. Form: Prepare product list with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.

3. Initial Submittal: Within thirty (30) days after date of commencement of the Work, submit three (3) copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
4. Completed List: Within sixty (60) days after date of commencement of the Work, submit three (3) copies of the completed product list. Provide a written explanation for omissions of data and for known variation from Contract requirements.
5. Action: The Project Manager will respond in writing to Contractor within two (2) weeks or receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Project Manager's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

1.6 GENERAL PRODUCT REQUIREMENTS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. It is the responsibility of the Contractor and his installers, as experts, to notify the Project Manager of any specified product that to his knowledge will not meet the requirements or is unsuited to the application indicated or specified.
- C. The use of manufacturer's and trade names is intended only to establish standards of quality and performance and not to limit competition.
- D. Substitution of Materials and Equipment: All bids are to be based on those materials and equipment specified in the Contract Documents. Substitutions after the bid will be made in

accordance with the provisions of General Contract Conditions Article 406 “Substitution of Materials and Equipment”, and Division 01 Section “Substitutions”.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. The Contract Documents and governing regulations govern product selection. Procedure governing product selection include the following:
1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
 2. Semi-proprietary Specification Requirements:
 - a. Where Specifications name two or more products or manufacturers, provide one (1) of the products indicated. No substitutions will be permitted.
 - b. Where Specifications specify products or manufacturers by name, accompanied by the term “or equal” or “or approved equal,” comply with the Contract Document provisions concerning “substitutions” to obtain approval for use of an unnamed product.
 3. Non-proprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning “substitutions” to obtain approval for use of an unnamed product.
 4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated. Manufacturer’s recommendations may be contained in published product literature or by the manufacturer’s certification of performance.
 6. Compliance with Standards, Codes and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
 7. Visual Matching:
 - a. Where Specifications require matching an established Sample, the Project Manager’s decision will be final on whether a proposed product matches satisfactorily.
 - b. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning “substitutions” for selection of a matching product in another product category.
 8. Visual Selection: Where specified product requirements include the phrase “...as selected from manufacturer’s standard colors, patterns, textures...” or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Project Manager will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

3.2 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. To the fullest extent possible, provide products of the same kind from a single source.
 - 2. Substitutions to the specified products will only be allowed in accordance with General Contract Conditions Article 406 "Substitution of Materials and Equipment", and Division 01 Section "Substitutions".
- B. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. The cost of the Work described in this Section shall be included in the Contract price.

END OF SECTION 01 60 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section consists of providing storage and protection of the materials, products and supplies which are to be incorporated into the construction and indicating such storage areas on the Contract Drawings with the location and dates when such areas will be available for each purpose.
- B. Reference General Contract Conditions Article 803 "Protection of Property and Work in Progress".

1.3 SUBMITTALS

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for submittal procedures. Submit concurrently with submittals required in Division 01 Section "Layout of Work and Surveys".
- B. Storage Site Plan: Submit working drawings showing locations of storage areas not indicated on the Contract Drawings.
- C. Storage and Protection Methods: Submit descriptions of proposed methods and locations for storing and protecting products.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Materials required for the storage and protection of the items specified shall be durable, weatherproof and either factory finished or painted to present an appearance acceptable to the Project Manager. Storage facilities shall be uniform in appearance with similar materials used to the maximum extent possible.

PART 3 - EXECUTION**3.1 GENERAL REQUIREMENTS OF EXECUTION**

- A. Palletize materials, products and supplies which are to be incorporated into the construction and stored off the ground. Store these items in a manner which will prevent damage and which will facilitate inspection. Leave seals, tags and labels intact and legible. Maintain access to products to allow inspection. Protect products that would be affected by adverse environmental conditions.

- B. Periodically inspect stored products to ensure that products are being stored as stipulated and that they are free from damage and deterioration.
- C. Do not remove items from storage until they are to be incorporated into the Work.
- D. The Contractor shall ensure that all protective wrappings and coverings are secure and ballasted to prevent any items from deterioration and/or subsequent dislodgment. All items on the worksite that are subject to becoming windborne shall be ballasted or anchored.

3.2 HANDLING AND TRANSPORTATION

- A. Handling:
 1. Avoid bending, scraping or overstressing products. Protect projecting parts by blocking with wood, by providing bracing or by other approved methods.
 2. Protect products from soiling and moisture by wrapping or by other approved means.
 3. Package small parts in containers such as boxes, crates, or barrels to avoid dispersal and loss. Firmly secure an itemized list and description of contents to each container.
 4. Refer to Division 32 Sections related to landscape materials for proper handling and storage of plant material.
- B. Transportation: Conduct the loading, transporting, unloading, and storage of products so that they are kept clean and free from damage.
 1. Refer to Division 32 Sections related to landscape materials for proper transportation of plant material.

3.3 STORAGE

- A. Store items in a manner that shall prevent damage to the City's property. Do not store hydraulic fluids, gasoline, liquid petroleum, gases, explosives, diesel fuel, and other flammables in excavations, except one day's supply of diesel fuel may be stored in open excavations.
- B. Provide sheltered weather-tight or heated weather-tight storage as required for products subject to weather damage.
- C. Provide blocking, platforms or skids for products subject to damage by contact with the ground.
- D. All material shall be stored according to the manufacturer's recommendations. Any material that has to be stored within specified temperature or humidity ranges shall have a twenty four (24) hour continuously written recording made of the applicable condition. Should the recording show that the material was not stored within the recommended ranges the material shall be considered defective and in nonconformance. If a certification from the manufacturer's engineering design representative is provided stating that the actual variations are acceptable and will in no way harm the material or affect warranties, then the deficiency will be considered corrected.
- E. Store hazardous material separately, with all material marked with a label showing the hazard and how to treat exposure to the material.

3.4 LABELS

- A. Storage cabinets and sheds that will contain flammable substances and explosive substances shall be labeled **FLAMMABLE--KEEP FIRE AWAY** and **NO SMOKING** with conspicuous lettering and conforming to OSHA requirements.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. The cost of the Work described in this Section shall be included in the Contract price. See Division 01 Section "Schedule of Values" for additional requirements for the possible payment of stored material.

END OF SECTION 01 66 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the procedures and accuracy requirements for survey services for layout of work and field measurement of work quantities to be determined by surveys.
 - 1. The Work is to be verified and coordinated with Contract Drawings. Variations between Contract Drawings and actual field conditions are to be immediately brought to the attention of the Project Manager.
 - 2. Reference Construction General Contract Conditions Article 318 "Construction Surveys" and Article 319 "Preservation of Permanent Land Survey Control Markers".

1.3 SUBMITTALS

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for the submittal process.
- B. Field Notes: Submit Copies of original pages of field notes.
- C. Closeout Submittals:
 - 1. Original field notebooks when filled and at end of contract.
 - 2. Measurements for Record Documents.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 CONSTRUCTION LINES AND GRADES**

- A. The Contractor shall make surveys and layouts as necessary to delineate the work. The Contractor shall make the surveys for the proper performance of the Work. As a part of such surveys, the Contractor shall furnish, establish, and maintain in good order survey control points that may be required for the completion of the Work subject to the approval of the Project Manager as to their location, sufficiency, and adequacy. However, such approval by the Project Manager shall not relieve the Contractor of his responsibility for the accuracy of his survey work.
- B. The Contractor shall furnish skilled labor, instrument platforms, ladders, and such other temporary structures as may be necessary for making and maintaining points and lines in connection with the surveys required.

- C. The City may draw the Contractor's attention to errors or omissions in lines or grades, but the failure to point out such errors or omissions shall not give the Contractor any right or claim nor shall in any way relieve the Contractor of his obligations according to the terms of this contract.
- D. The Contractor's instruments and other survey equipment shall be accurate, suitable for the surveys required in accordance with recognized professional standards and in proper condition and adjustment at all times. Surveys shall be performed under the direct supervision of a Colorado licensed surveyor.

3.2 DIGITAL FILES

- A. If approved by the Project Manager, Contractor may elect to utilize design consultant's digital CADD files as guidance for layout and location of site elements.
- B. Layout and location of site elements, grades and features from digital CADD files does not relieve the Contractor of requirements, locations and grades shown on the Contract Drawings.
- C. Contractor is responsible to verify locations of elements staked with digital data to assure conformance with the Contract Drawings at a level of accuracy as stated in Section 3.3 below.

3.3 SURVEYING ACCURACY AND TOLERANCES IN SETTING SURVEY, LAYOUT, AND QUANTITY CALCULATION STAKES

- A. The tolerances generally applicable in setting survey stakes shall be as set forth in the CDOT Survey Manual, latest edition. Such tolerances shall not supersede stricter tolerances required by the drawings or specifications, and shall not otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

3.4 RECORD MEASUREMENTS

- A. Provide record measurement for items that will be hidden or visible including all civil, mechanical and electrical, control work, and all utilities that are placed in concrete, earth, or behind walls shall be made.
- B. Items located within or five feet beyond a building shall be referenced to building column lines and finish floor elevations.
- C. Special attention shall be paid to items requiring service, sensors, items with moving parts, access points and locations of junctions, elevation changes, and directional changes.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 71 23

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Technical Specification Sections, apply to this Section.
- B. All work shall be completed in accordance with the approved Materials Management Plan (MMP).

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements, if applicable:
 - 1. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
 - 2. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.03 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 15 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
 - 1. Demolition Waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Terra cotta/plaster walls.
 - e. Structural and miscellaneous steel.
 - f. Rough hardware.
 - g. Doors and frames.
 - h. Door hardware.
 - i. Windows.
 - j. Glazing.
 - k. Equipment.
 - l. Cabinets.
 - m. Piping.
 - n. Supports and hangers.
 - o. Valves.
 - p. Mechanical equipment.
 - q. Electrical conduit.
 - r. Copper wiring.
 - s. Electrical devices.
 - 2. Construction Waste:
 - a. Lumber.
 - b. Wood sheet materials.
 - c. Metals.
 - d. Piping.
 - e. Electrical conduit.
 - f. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.05 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.06 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Qualification Data: For refrigerant recovery technician.
- H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.07 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: General Contractor with a record of successful waste management coordination of projects with similar requirements.

- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
 - 1. Disposal Procedures:
 - a. Location: Denver Arapahoe Disposal Site – DADS. All debris must be disposed of at this location.
 - b. Removal and Hauling: All Debris removal and hauling cost shall be part of base bid.
 - c. The Owner will set up an account with DADS that will cover the dump volumes cost only. All other fees to be included in base bid by General Contractor.
- D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Technical Specification Section 012000 "Project Meetings." Meeting shall include contractors affected by the Waste Management Plan. Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.08 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification. Include separate sections in plan to distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. General Contractor's Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on appropriate separation, handling, and recycling to be used by all parties and proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Technical Specification Section 01500 "Temporary Facilities" for controlling dust and dirt, environmental protection, and noise control.

3.02 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: : (Not applicable)
- C. Salvaged Items for Owner's Use: (Not applicable)

- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Lighting Fixtures: Separate lamps by type and protect from breakage.
- F. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

C. RECYCLING RECEIVERS AND PROCESSORS			
CO Resource Management	400 Marriel Avenue Carbondale, CO 81623	(970) 963-8900	George MacDonald
Oxford Recycling	2400 W. Oxford Avenue Englewood, CO 80110	(303) 762-1160	John Kent
Allied Waste	10303 E. Dry Creek Rd #250 Englewood, CO 80112	(720) 895-1500	Bill Kich
Waste-Not	1065 Poplar Street Loveland, CO 80534	(970) 669-9912	Gary Gettman
Bunting Disposal	3315 State Street Evans, CO 80620	(970) 339-3023	Bryan Bunting
Phoenix Recycling	2501 Delwood Avenue Durango, CO 81301	(970) 375-1300	Mark Thompson
Waste Chasers	19 Oak Avenue Eaton, CO 80615	(970) 454-2497	Jason Hawk
Colorado All Waste	7247 E. County Line Rd Longmont, CO 80504	(303) 702-9955	Majori McDonald
Patch Construction	12655 State Hwy 67	(719) 784-6236	David Patch Jr.

	Florence, CO 81226		
Pueblo Disposal	28900 E. Hwy 96 Pueblo, CO 81001	(719) 948-0047	
Construction Endeavors	2255 E. Las Vegas Rd Colorado Springs, CO	(303) 375-0785	

- D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.04 RECYCLING DEMOLITION WASTE

- A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
1. Pulverize concrete to maximum 4-inch size.
- C. Masonry (Terra Cotta): Remove anchors and ties from masonry and sort with other metals.
1. Pulverize masonry to maximum 4-inch size.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, panel products, and treated wood materials.
- E. Metals: Separate metals by type.
1. Remove and dispose of bolts, nuts, washers, and other rough hardware.

- F. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- G. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- H. Conduit: Reduce conduit to straight lengths and store by type and size.

3.05 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
 - 1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.
- C. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.
- D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.06 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.

- C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.
- D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for Construction Waste Management and Disposal

4.02 PAYMENT

- A. Payment: The lump sum price shall include all the Contractor's costs including labor, material, and any incidental work and equipment necessary to customize, finalize, and implement the Draft MMP; follow all appropriate regulations; obtain the proper permits, and have adequately trained field personnel to identify and manage potential contamination. Commute time will not be measured and paid for separately but shall be included in the work. The pay item shall include all labor, Professional Engineering, and/ or design fees, and coordination with State and Local agencies.

END OF SECTION 01 74 19

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the requirements for maintaining a clean, orderly, hazard free worksite during construction, and final cleaning for the City's Final Acceptance. Failure to maintain the worksite will be grounds for withholding monthly payments until corrected to the satisfaction of the Project Manager.
- B. Reference General Contract Conditions as listed:
 - 1. Article 325 "Cleanup During Construction".
 - 2. Article 803 "Protection of Property and Work in Progress".
 - 3. Article 2001 "Cleanup Upon Completion".

1.3 JOB CONDITIONS

- A. Safety Requirements: Maintain the worksite in a neat, orderly and hazard-free manner in conformance with all federal, state and local rules, codes, regulations and orders, including all OSHA requirements, until Final Acceptance of the Work. Keep catwalks, underground structures, worksite walks, sidewalks, roadways and streets, along with public and private walkways adjacent to the worksite, free from hazards caused by construction activities.
 - 1. Inspect those facilities regularly for hazardous conditions caused by construction activities.
- B. Hazards Control:
 - 1. Store volatile wastes in covered metal containers and remove those wastes from worksite daily.
 - 2. Do not accumulate wastes which create hazardous conditions.
 - 3. If volatile and noxious substances are being used in spaces that are not naturally ventilated, provide artificial ventilation.
 - 4. Hazard controls shall conform to the applicable federal, state, and local rules and regulations.
 - 5. Provide appropriate waste receptacles in all areas in which employees are working. Waste receptacles shall be kept covered at all times. All materials on site shall be anchored and covered to prevent any objects from becoming wind-borne.
- C. Access: Maintain the worksite to permit access by other City contractors as required and to allow access by emergency personnel.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

- A. Utilize the type of cleaning materials recommended by the manufacturer for the surfaces to be cleaned.
- B. Maintain current Safety Data Sheets (SDS) on site for all chemicals. Refer to following link for associated OSHA requirements.
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10103
- C. Ensure proper disposal of all wastes generated from the use of these materials. Must ensure compliance with all environmental regulations.

PART 3 - EXECUTION

3.1 INTERIM CLEANING

- A. Clean the worksite every shift/workday for the duration of the construction contract. Maintain structures, grounds, storage areas, and other areas of worksite, including public and private properties immediately adjacent to worksite, free from accumulations of waste materials caused by construction operations. Place waste materials in covered metal containers. All hard concrete, steel, wood, and finished walking surfaces shall be swept clean daily.
- B. Remove or secure loose material on open decks and on other exposed surfaces at the end of each workday or more often in a manner that will maintain the worksite hazard free. Secure material in a manner that will prevent dislodgment by wind and other forces.
- C. Sprinkle waste materials with water or acceptable chemical palliative to prevent blowing of dust.
- D. Promptly empty waste containers when they become full and legally dispose of the contents at dumping areas off the City's property.
- E. Control the handling of waste materials. Do not permit materials to be dropped or thrown from structures.
- F. Immediately remove spillage of construction related materials from haul routes, work site, private property, or public rights of way.
- G. Clean only when dust and other contaminants will not precipitate upon newly painted surfaces.
- H. Cleaning shall be done in accordance with manufacturer's recommendation.
- I. Cleaning shall be done in a manner and using such materials as to not damage the Work.
- J. Clean areas prior to painting or applying adhesive.

- K. Clean all heating and cooling systems prior to operations. If the Contractor was allowed to use the heating and cooling system it shall be cleaned prior to testing.
- L. Clean all areas that will be concealed prior to concealment.

3.2 FINAL CLEANING

- A. Inspect interior and exterior surfaces, including concealed spaces, in preparation for completion and acceptance.
- B. Remove dirt, dust, litter, corrosion, solvents, paint, stains, and extraneous markings.
- C. Remove surplus materials, except those materials intended for maintenance.
- D. Remove all tools, appliances, equipment, and temporary facilities used in the construction.
- E. Remove detachable labels and tags. File them with the manufacturer's specifications for that specific material for the City's records.
- F. Repair damaged materials to the specified finish or remove and replace.
- G. Clean all catch basins, manholes, drains, strainers, and filters after all trades have completed their work and just before Final Acceptance
- H. Sweep roadway, driveways, floors, steps, and walks.
- I. Interior areas of buildings shall be vacuumed clean and mopped.
- J. Final cleanup applies to all areas within and adjacent to the site.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 74 23

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedures required for Substantial Completion under Title 19 and Final Completion and Acceptance of the Work under Title 20 of the General Contract Conditions and Division 01 Section "Contract Record Documents".
- B. Reference General Contract Conditions as listed:
 - 1. Article 906 "Applications for Payment".
 - 2. Article 909 "Additional Withholding of Progress Payments".
 - 3. Article 2003 "Final Settlement".

1.3 PREPARATION FOR FINAL INSPECTION

- A. Before requesting inspection for Final Acceptance of the Work by the City, inspect, clean, and repair the Work as required.

1.4 FINAL INSPECTION

- A. When the Contractor considers that the Work is complete, he shall submit written certification that:
 - 1. All punch list items have been completed.
 - 2. All clean up at the project site has been accomplished.
 - 3. Work has been inspected by the Contractor for compliance with contract documents.
 - 4. Work has been completed in accordance with contract documents.
 - 5. Work is ready for final inspection by the City.
 - 6. All required Record Documents have been submitted and accepted.
 - 7. All damaged or destroyed real, personal, public or private property has been repaired or replaced.
 - 8. All operation and maintenance manuals have been submitted and accepted and all training has been completed.
- B. The Project Manager will inspect to verify the status of completion with reasonable promptness after receipt of such certifications. The inspection of the work will be done in accordance with the General Conditions.
- C. If the Project Manager finds incomplete or defective work:
 - 1. The Project Manager may, at his sole discretion, either terminate the inspection or prepare a punch list and notify the Contractor in writing, listing incomplete or defective work.
 - 2. The Contractor shall take immediate steps to remedy stated deficiencies and send a second written certification to the Project Manager that Work is complete.

3. The Project Manager will then re-inspect the Work.

1.5 REINSPECTION FEES

- A. Should the Project Manager perform re-inspection due to failure of the Work to comply with the claims of status of completion made by the Contractor:
 1. The Contractor shall compensate the City for such additional services at the rate of seventy-five dollars (\$75.00) per man-hour.
 2. The City shall deduct the amount of such compensation from the final payment to the Contractor.

1.6 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a Final Statement of Accounting to the Project Manager.
- B. The Final Statement of Accounting shall reflect all adjustments to the contract amount and shall include the following:
 1. The original contract amount.
 2. Additions and deductions resulting from:
 - a. Previous change orders.
 - b. Allowances.
 - c. Final quantities for unit price items. Along with this statement shall be detailed backup for the quantities.
 - d. Deductions or corrected work.
 - e. Penalties.
 - f. Deductions for liquidated damages.
 - g. Deductions for re-inspection payments.
 - h. City resurveys required due to the Contractor.
 - i. Other adjustments.
 3. Total contract amount, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. If required, the Project Manager will prepare a final change order, reflecting approved adjustments to the Contract sum which were not previously made by change orders.

1.7 FINAL APPLICATION FOR PAYMENT

- A. The Contractor shall submit the final application for payment in accordance with the procedures and requirements stated in the General Conditions Title 20 "Final Completion and Acceptance of the Work".

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 77 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section consists of requirements for preparing and submitting operation and maintenance data for mechanical, electrical, and other specified equipment.

1.3 SUBMITTALS

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for submittal procedures.
- B. Submit one (1) electronic copy and two (2) bound hard copy of the proposed Operation and Maintenance Data Manual format including a table of contents not less than ninety (90) days prior to acceptance tests and final inspection.
- C. Submit one (1) electronic copy and two (2) bound hard copy of Operation and Maintenance Data Manual within ten days after system startup is complete. These copies shall incorporate any comments made on the previous submittals, along with final readings on all settings and gauges taken while the system is in fully satisfactory operation.

1.4 CONTINUOUS UPDATING PROGRAM

- A. Furnish one electronic copy of the Contractor's letter indicating that suppliers have been notified to provide updated operation and maintenance data, service bulletins, and other information pertinent to the equipment, as it becomes available.

PART 2 - PRODUCTS

- A. The following are the requirements of hard copies:
 - 1. Paper Size: 8-1/2-inches x 11-inches.
 - 2. Paper: White bond, at least twenty (20) pound weight.
 - 3. Text: Typewritten.
 - 4. Printed Data: Manufacturer's catalog cuts, brochures, operation and maintenance data. Clear reproductions thereof will be acceptable. If this data is in color, all final manuals must contain color data.
 - 5. Drawings: 8-1/2-inches x 11-inches, bound with the text. Larger drawings are acceptable provided they are folded to fit into a pocket inside the rear cover of the manual. Reinforce edges of large drawings.
 - 6. Prints of Drawings: Black ink on white paper, sharp in detail, and suitable for making reproductions.

7. Flysheets: Separate each portion of the manual with colored, neatly prepared flysheets briefly describing the contents of the ensuing portion.
8. Covers: Provide forty (40) to fifty (50)-mil, clear plastic, front and plain back covers for each manual. The front covers shall contain the information required in Article 3.2 below.
9. Bindings: Conceal the binding mechanism inside the manual; lockable 3 ring binders shall be provided.

PART 3 - EXECUTION

3.1 GENERAL

- A. Assemble each operation and maintenance manual using the manufacturer's latest standard commercial data.

3.2 COVER

- A. Include the following information on the front cover and on the inside cover sheet:
 1. Title: "Operation and Maintenance Instructions".
 2. Title of structure or facility.
 3. Title and number of contract.
 4. Contractor's name and address.
 5. General subject of the manual.
 6. Leave spaces for signatures of the City representatives and acceptance date.

3.3 CONTENTS OF THE MANUAL

- A. An index of all volumes in each volume of multiple volume systems.
- B. An index in front of each volume. List and combine the literature for each system in the sequence of operation.
- C. Names, addresses, and telephone numbers of Contractor, suppliers, and installers along with the manufacturer's order number and description of the order.
- D. Name, address, and telephone numbers of manufacturer's nearest service representatives.
- E. Name, address, and telephone number of nearest parts vendor and service agency.
- F. Copy of guaranties and warranties issued to, and executed in the name of, the City.
- G. Anticipated date City assumes responsibility for maintenance.
- H. Description of system and component parts including theory of operation.
- I. Pre-operation check or inspection list.
- J. Procedures for starting, operating and stopping equipment.
- K. Post operation check or shutdown list.

- L. Inspection and adjustment procedures.
- M. Troubleshooting and fault isolation procedures for on-site level of repair.
- N. Emergency operating instructions.
- O. Accepted test data.
- P. Maintenance schedules and procedures.
- Q. Test procedures to verify the adequacy of repairs.
- R. One copy of each wiring diagram.
- S. One (1) copy of each piping diagram.
- T. Location where all measurements are to be made.
- U. One (1) copy of each duct diagram.
- V. One (1) copy of control diagram.
- W. One (1) copy of each accepted shop drawing.
- X. One (1) copy of software programs imputable or changeable on site.
- Y. Manufacturer's parts list with catalog names, numbers and illustrations.
- Z. A list of components which are replaceable by the City.
- AA. An exploded view of each piece of the equipment with part designations.
- BB. List of manufacturer's recommended spare parts, current prices and recommended quantities for two (2) years of operation.
- CC. List of special tools and test equipment required for the operation, maintenance, adjustment, testing and repair of the equipment, instruments and components.
- DD. Scale and corrosion control procedures.
- EE. Disassembly and re-assembly instructions.
- FF. Troubleshooting and repair instructions.
- GG. Calibration procedures.
- HH. Ordering information.
- II. Training course material used to train City staff, including slides and other presentation material.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 78 23

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the requirements for preparing and submitting warranties and bonds required by these specifications.
- B. Reference the General Contract Conditions as listed:
 - 1. Article 111 "Final Completion".
 - 2. Article 1501 "Surety Bonds".
 - 3. Article 1502 "Performance Bond".
 - 4. Article 1503 "Payment Bond".
 - 5. Article 1801 "Contractor's Warranties, Guarantees, and Correction of Work".
 - 6. Article 1802 "Performance During Warranty Period".

1.3 SUBMITTALS

- A. Refer to Division 01 Section "Submittals" for submittal procedures.
- B. Submit executed warranties and bonds.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 WARRANTIES AND BONDS**

- A. Execute the warranties and bonds required by the Contract Documents. Prepare and submit a list of all warranties and bonds on the form provided by the City. Reference Division 01 Section "Standard Forms".
- B. Provide warranties or bonds for the materials, labor, and time period set forth in the sections of these specifications requiring such documents. All warranties shall be in accordance with the General Contract Conditions. Refer to the individual specifications sections for all specific items requiring longer warranty periods.
- C. Provide all warranties and bonds that the manufacturer or supplier furnishes at no additional cost in regular commercial trade. All warranties shall be in accordance with the General Contract Conditions. Refer to the individual specifications sections for all specific items requiring longer warranty periods.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 78 35

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the requirements for maintaining, marking, recording, and submitting contract record documents, including shop drawings, warranties, contract documents, and Contractor records.
- B. Reference General Contract Conditions Article 324 “Documents and Samples at the Site” and Division 32 Sections “Irrigation Systems” and “Automatic Irrigation Controllers”.

1.3 SUBMITTALS

- A. Each submittal of record documents shall contain the following information:
 - 1. Date.
 - 2. Project title and numbers.
 - 3. Contractor’s name and address.
 - 4. Title and number of each record document.
 - 5. Certification that each document as submitted is complete and accurate.
 - 6. Signature of the Contractor or his authorized representative.
- B. At the completion of this contract, deliver all record documents including the following:
 - 1. Shop drawings, diagrams, illustrations, schedules, charts, brochures and other similar data, updated to record status.
 - 2. Warranties, guarantees, and bonds.
 - 3. Contract documents.
 - 4. Contractor records.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 MAINTENANCE OF DOCUMENTS**

- A. The Contractor shall maintain at the worksite on a current basis one record copy of all drawings, specifications, addenda, change orders, approved shop drawings, working drawings, product data, and samples in good order and marked currently to record all changes made during construction.
- B. Maintain at the field office one copy of the following record documents:
 - 1. Contract Documents:

- a. Contract drawings with all clarifications, requests for information, directives, changes and field-modified conditions clearly posted.
 - b. Contract specifications with all clarifications, requests for information, changes, directives and record of manufacturer actually used along with product trade name.
 - c. Reference Standards in accordance with Division 01 Section "Definitions and Conventions".
 - d. One set of drawings to record the following:
 - 1) Horizontal and vertical location of underground utilities affected by the Work.
 - 2) Location of internal utilities; include valves, controls, conduit, duct work, switches, pressure reducers, size reducers, transitions, crosses, tees, filters, motors, heaters, dampers, regulators, safety devices, sensors, access doors, and appurtenances that are concealed in the construction shall be shown with dimensions given from a visible and recognizable reference to the item being located in all three dimensions. The drawing shall also reference the applicable submittal for the item being located.
 - 3) Field changes of dimensions and details including as-installed elevations and location (station and offset).
 - 4) Details not on original contract drawings but obtained through requests for information or by other communications with the City.
2. Contractor Records:
- a. Daily QC Reports.
 - b. Certificates of compliance for materials used in construction.
 - c. Nonconformance Reports (NCRs).
 - d. Remedial Action Requests (RARs).
 - e. Completed inspection list.
 - f. Inspection and test reports.
 - g. Test procedures.
 - h. Qualification of personnel.
 - i. Approved submittals.
 - j. Material and equipment storage records.
 - k. Safety Plan.
 - l. Erosion, sediment, hazardous and quality plans.
 - m. Hazardous material records.
 - n. First report of injuries.

3.2 RECORDING

- A. Keep record documents current daily.
- B. Legibly mark copies of the contract drawings to record actual construction.
- C. Legibly mark up each Section of the technical specifications and contract drawings to record:
 - 1. Changes made by change orders, requests for information, substitutions, and variations approved by submittals.

3.3 DOCUMENT MAINTENANCE

- A. Maintain Documents in a clean, dry and legible condition, which shall be turned over to the City prior to final acceptance.

- B. Do not use record documents for construction purposes.
- C. Make documents available for inspection by the Project Manager and any others having jurisdiction.

3.4 REVIEW

- A. Project Manager or their designated representative will inspect the Record Drawings at each weekly progress meeting to ensure that they are being maintained and contain the most current data.
- B. Prior to any application for payment, the Project Manager or his designated representative will inspect the record documents to ensure that they are being maintained and contain the most current correct data with particular attention to Record Drawings.
- C. If, during the inspection, the Project Manager determines that the documents are not being maintained and kept current as to as-installed conditions, an amount may be withheld from the payment request and deducted from the contract value to cover the City's cost of collecting and recording the Record Contract data. This cost will be determined on the basis of seventy-five dollars (\$75.00) per man-hour of effort.

3.5 QUALITY CONTROL

- A. Record documents shall be prepared by Contractor to a high standard of quality, such as that set forth in MIL STD 100, American National Standard Drafting Manual (ANSI Y14), or other relevant lower tier specification defining equal drafting quality for microfilming, except for daily reports.

3.6 IRRIGATION RECORD DRAWINGS

- A. Refer to Division 32 Section "Irrigation Systems", Article 1.5.G

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 78 39

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The forms listed below and appended to this Section will be used for performance of the Work as indicated.
 - 1. This is not a complete listing of all required forms.
 - 2. The Contractor may be permitted to recreate some of the forms so that they are compatible with the Contractor's Project Management system. However, Contractor must receive prior approval from the Project Manager before using modified forms.
 - 3. The Contractor shall properly complete all forms required by the contract or the Project Manager.
 - 4. The Project Manager shall review and approve all submitted forms. If submitted forms are not acceptable the Contractor shall resubmit forms in an acceptable format.

1.3 APPENDICES

- A. Attached to this Section are the following (Sample) forms:
 - 1. Daily Quality Control Report.
 - 2. Request for Information.
 - 3. Submittal Transmittal Form.
 - 4. Document Transmittal Form.
 - 5. Contractor Warranty (reference the General Contract Conditions).
 - 6. Contractor/Subcontractor Warranty (reference the General Contract Conditions).
 - 7. Contractors Certification of Payment (included within the Bid Documents).
 - 8. Pay Application Form (reference the General Contract Conditions).
 - 9. Subcontractor Partial Lien Release Form (included within the Bid Documents).
 - 10. Subcontractor Final Lien Release Form (included within the Bid Documents).
 - 11. Request for Substitution.
 - 12. Non-Conformance Report.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 COMPLETING FORMS**

- A. All documents are to be filled in digitally by the Contractor using the format provided by the Project Manager or using Adobe Acrobat 8 or newer. It is at the discretion of the Project Manager if other forms or formats will be accepted.

3.2 SIGNING FORMS

- A. Original hand written signatures are acceptable for all documents. The Contractor is to fill out the document digitally as indicated above prior to signing the hard copy.
 - 1. If the form is to be submitted digitally to the Project Manager the document shall be scanned and saved as an Adobe Acrobat file.
- B. Digital signatures are acceptable for all documents. The Contractor is to fill out the document digitally in the format provided by the Project Manager or Adobe Acrobat 8 or newer. The file must be signed and submitted digitally to the Project Manager.
 - 1. All digital signatures must contain the name of signer in plain text and the time and date the signature is executed.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 01 99 90

City and County of Denver
Certified Asbestos Building Inspector Work Day Documentation
 Project Name _____

DDPNE V1.0

Inspector Name: _____	Date: _____
Inspector Certification Number: _____	Weather: _____
Inspector's Company/Affiliation: _____	
Location Description: _____	
Description of Site Activities: _____	
Equipment Used (Model Number): _____	

CABI Documentation

Identify environmental hazards discussed at the safety meeting:

<input type="checkbox"/> Delineation of Work Area	<input type="checkbox"/> Equipment Mobilization
<input type="checkbox"/> Work Zones	<input type="checkbox"/> Emissions Controls
<input type="checkbox"/> Utility Identification	<input type="checkbox"/> Fencing and Wind Barriers
<input type="checkbox"/> Haul Routes / Access	<input type="checkbox"/> Other: _____

Description of Encountered Debris Materials and Practices

1A	Types of Debris Identified (List all materials, clarify depths of piles): _____ _____ _____
1B	Description of Suspect Debris Material (RACS/ Non-RACS): _____ _____
1C	Description of Hand Removals (Assumed RACS or Analyzed To Be RACS): _____ _____
1D	Friability of Suspect Debris Materials: _____ _____
1E	Observation of Non-Earthen Material or the Appearance of Fill: _____ _____
1F	Observation of Any Other Impacted Soils (Non-Asbestos impacts): _____ _____

Bulk Sample Log

Sample ID#	Time Sampled	Depth	Sample Location/Description	Asbestos Content From Analytical

RACS Management Detail

Decontamination																																																																																			
No.	Items	YES	NO																																																																																
2A	Have all equipment surfaces in contact with RACS been decontaminated?	<input type="radio"/>	<input type="radio"/>																																																																																
	Details:																																																																																		
2B	Have workers conducted personal and equipment decontamination in accordance with applicable procedures?	<input type="radio"/>	<input type="radio"/>																																																																																
	Details:																																																																																		
Engineering and Administrative Controls																																																																																			
No.	Items	YES	NO																																																																																
3	Onsite Staging, Stockpiling, & Storage of RACS	<input type="radio"/>	<input type="radio"/>																																																																																
	Annual Awareness Training for Regulated Work Area Personnel	<input type="radio"/>	<input type="radio"/>																																																																																
	Annual Awareness Training for Non-Regulated Work Area Personnel	<input type="radio"/>	<input type="radio"/>																																																																																
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Spill Response																																																																																			
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	Details (provide information on corrective actions):																																																																																		
Air Monitoring information As Applicable																																																																																			
General Conditions																																																																																			
No.	Items	YES	NO																																																																																
5A	Were work conditions maintained below stoppage requirements?	<input type="radio"/>	<input type="radio"/>																																																																																
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Details of Wind Shut Down Event (If Applicable):																																																																																			
5B	Visible emissions observed?	<input type="radio"/>	<input type="radio"/>																																																																																
	If visible emissions were observed, was worked stopped?	<input type="radio"/>	<input type="radio"/>																																																																																
	Details (provide information on corrective actions):																																																																																		

Perimeter Monitoring			
6A	Adequate perimeter sampling points based on test area?	<input type="radio"/>	<input type="radio"/>
	No disturbance to sampling equipment or power source?	<input type="radio"/>	<input type="radio"/>
	Were samples compromised in any way?	<input type="radio"/>	<input type="radio"/>
	Details:		
6B	Has the pump been calibrated?	<input type="radio"/>	<input type="radio"/>
	Details (Pump Calibration Method):		
6C	Is there an adjacent public receptor zone within 150 ft. of a Regulated Work Area?	<input type="radio"/>	<input type="radio"/>
	Details (Location):		

Air Sample Log								
Sample ID#	Start Time	Stop Time	Total Minutes:	Flow Rate Start:	Flow Rate Stop:	Sample Location	Volume	f/cc

Contractor Monitoring			
No.	Items	YES	NO
7	Is contractor working in the regulated work area conducting personal monitoring?	<input type="radio"/>	<input type="radio"/>
	Details:		

Work Practices and Completion			
No.	Items	YES	NO
8A	Are work practices conducted in accordance with the project MMP and State regulations?	<input type="radio"/>	<input type="radio"/>
	Have excavation and loading activities been conducted in accordance with applicable procedures?	<input type="radio"/>	<input type="radio"/>
	Details:		
8B	Have loading and transportation requirements been met?	<input type="radio"/>	<input type="radio"/>
	Details:		
8C	Has visible material and associated soils been removed?	<input type="radio"/>	<input type="radio"/>
	Details:		
8D	Have appropriate samples been collected to confirm ACS has been removed?	<input type="radio"/>	<input type="radio"/>
	Details:		

Soils Disposition

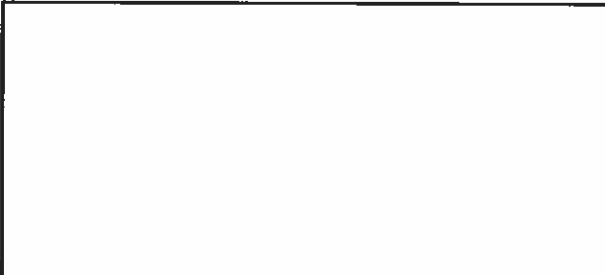
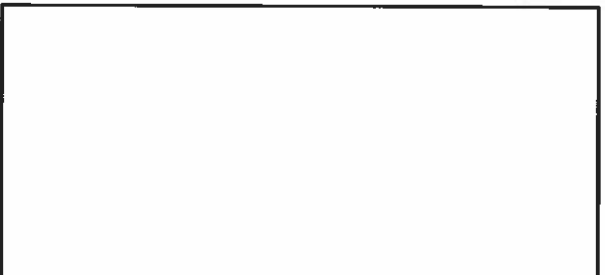
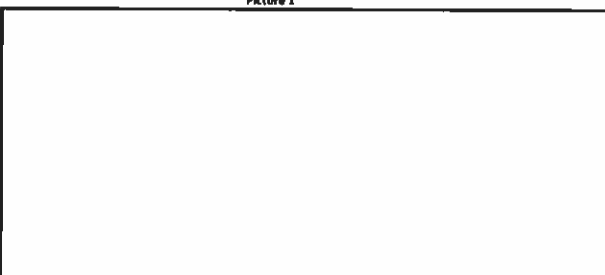
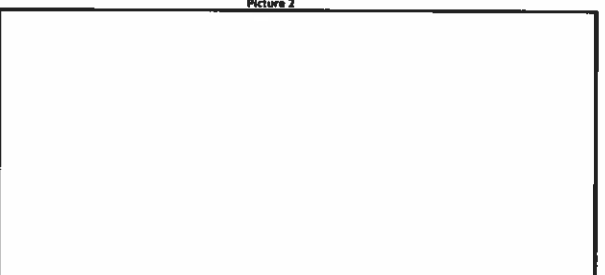
9A	Where did the soil originate (depth, specific area)?
9B	Temporary or final disposition of soil (where on-site or disposed)?
9C	Method of material movement (What type of truck and loading)?

How many cubic yards of soil excavated during shift? (0 - 10000 yds.)

Comments:

Provide at least 4 Photos From Daily Operations Where RACS Management is Being Done
During RACS Management Operations, include a Map of RACS Management Location(s) with this Documentation

ASSOCIATED PHOTOS

Picture 1

Picture 2

Picture 3

Picture 4

CABI Field Inspector Name _____ Date _____

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the requirements for demolition and removal of:
 - 1. Concrete or asphalt walks, slabs, stairs and curbs.
 - 2. Masonry structure
 - 3. Railings
 - 4. Bleachers
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls".
 - 2. Division 01 Section "Erosion and Sedimentation Control".
 - 3. Division 01 Section "Construction Waster Management".
 - 4. Division 01 Section "Tree Protection and Retention".
 - 5. Division 31 Section "Earth Moving".
- C. Materials Management Plan. All work shall be in accordance with the approved materials and management plan (MMP)

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to the City in a condition ready for re-use.
- C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- D. Recyclable Material: Material generated during demolition operations that can be reconditioned and reclaimed for the same or different use. Such materials include asphalt, concrete, metals (steel, iron, aluminum, copper, etc), rubber, glass and paper.

1.4 PROJECT CONDITIONS

- A. Keep dust to a minimum at removal areas. Use water trucks as necessary.
- B. Ensure safety of persons in demolition area. Provide temporary barricades as required per Division 01 Section "Temporary Facilities and Controls".

1.5 PRE-CONSTRUCTION MEETINGS

- A. Preconstruction: Inspect and discuss condition of construction to be selectively demolished.
- B. Review structural load limitations of existing structure.
- C. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
- D. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
- E. Review areas where existing construction is to remain and requires protection.
- F. Agenda Items

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for dust control and noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure the City's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to the City prior to start of demolition.
- D. Preconstruction Photographs or Video: Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory:
 - 1. Submit a list of items that have been removed and salvaged.
 - 2. Include documentation of the type and volume/weight of materials hauled to the nearest recycling center.
- B. Landfill Records: Provide records of receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. Soils as indicated on documents, free of debris, frozen materials, roots, and other organic matter. See Division 01 Section "Earth Moving".

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, pavement, trails, utilities, and vegetation to remain.
- B. Set up all barriers, including those for tree protection, in accordance with Division 01 Section “Temporary Facilities and Controls” and Division 01 Section “Tree Protection and Retention”, prior to proceeding with any demolition.
- C. Protection and Repair of Underground lines:
 - 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. The contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
 - 2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. The contractor is required to contact all private utility companies including Denver City departments to locate all private utilities. The contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy two (72) prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the contractor these shall be repaired at no cost to the city. If the contractor damages staked or located private utilities they shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.

3.2 DEMOLITION

- A. Pavement, Slabs, and Miscellaneous Concrete Items:
 - 1. Remove concrete slabs-on-grade, curbs, and miscellaneous concrete items as directed. Where concrete to be removed abuts concrete to remain, pavement shall be uniformly saw-cut along an existing joint. Jagged or crooked edges will not be acceptable. Concrete shall be broken up, hauled and disposed off site. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Project Manager.
 - 2. Remove asphalt paved roads, parking lots, walks, curbs and miscellaneous asphalt as indicated on Contract Drawings. Cuts between pavement to be removed and pavement to remain shall be saw-cut to full depth, straight, smooth and clean with no jagged edges. Asphalt shall be broken up, hauled and disposed off site. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Project Manager.

3. Remove concrete pipe sections and miscellaneous concrete items as directed.
 - a. Where concrete pipe is to be removed it shall be uniformly saw-cut along an existing joint or disassembled at the joints. Jagged or crooked edges will not be acceptable. Concrete shall be broken up, hauled and disposed off site. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Project Manager.
 - b. When Asbestos Concrete Pipe (ACP) is determined, or suspected to be present the Contractor will need to hand dig the pipe sections to be removed. Any ACP sections will need to remain intact. The use of mechanical trenching equipment within eighteen inches (18") of any known or suspected ACP will not be permitted. Once the section that is to be removed has been excavated, an abatement contractor will remove the sections of the pipe that are to be replaced or removed and the pipe shall be flush cut. The Contractor is responsible for notifying the Project Manager of any ACP that needs to be removed forty-eight (48)-hours prior to excavation of the area. If ACP is excavated that has not been previously identified the Contractor is responsible to contact the Project Manager either verbally or by email immediately upon discovery. Any ACP that is discovered to be damaged must be immediately reported to the Project Manager. The Project Manager will then notify the Abatement Contractor of the work that needs to be performed. The Abatement Contractor has twenty four (24)-hours to respond and remove the ACP section(s).
 4. Remove road base material that is exposed after removing the pavement. This material shall be hauled and disposed off site unless otherwise directed by the Project Manager. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Project Manager.
- B. Abandoned Utilities: Remove aboveground utilities and terminate as approved by the utility company and the Project Manager. Remove necessary portions of underground utilities to a minimum of twenty-four (24)-inches below the elevation of excavation or final grade. Cap off conduits with minimum twenty-four (24)-inch long concrete plugs.

3.3 RESTORATION

- A. Backfilling: Ensure that areas to be filled are free of standing water, frost, frozen material, vegetation, including roots and debris. Place fill materials in accordance with Division 31 Section "Earth Moving".
- B. Grading:
 1. Restored Areas: Grade surface to blend with original contours and provide free drainage flow. All ruts and depressions where any amount of standing water collects shall be re-graded to a smooth natural appearance to ensure positive drainage.
 2. New Construction Areas: Grade as indicated in Division 31 Section "Earth Moving".

3.4 DISPOSAL

- A. Remove trash, debris and waste materials, haul and legally dispose of it off the property. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials

shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Project Manager.

- B. Salvaged Material: All salvaged material remains the property of the City. Store or deliver as directed by the Project Manager.

3.5 QUALITY CONTROL

- A. Comply with safety requirements for demolition, ANSI A10.6-83.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Demolition. Measurement shall include the actual number of units of specified materials(s) removed or placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include all of the Contractor's costs, including labor, materials, and incidental work and equipment necessary to complete the work. The bid price shall include sawing or otherwise effectively cutting the existing paving smoothly and squarely in a manner satisfactory to the Project Manager. Price shall include the removal and offsite disposal of all materials including any base course deemed unsuitable by Project Manager. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Parks Project Manager. No payment will be made for the removal and/or replacement of any paving damaged by the Contractor beyond the authorized limits of removal.

END OF SECTION 02 41 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work shall be completed in accordance with the approved Materials Management Plan (MMP).

1.2 SUMMARY

- A. This Section of the Work includes furnishing, placing, shoring, bracing, and anchorage of formwork, concrete reinforcement, accessories, and placing concrete in connection with cast-in-place concrete installation including installation of control and expansion joints, concrete curing and concrete finishing
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys"
 - 2. Division 01 Section "Submittals".
 - 3. Division 01 Section "Contractor Quality Control".
 - 4. Division 01 Section "Erosion and Sedimentation Control".
 - 5. Division 31 Section "Earth Moving".
 - 6. Division 32 Section "Aggregate Base Course".
 - 7. Division 31 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 REFERENCES

- A. Note: All references below shall be from the most current edition.
- B. American Concrete Institute (ACI):
 - 1. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications of Structural Concrete for Buildings.
 - 3. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - 4. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
 - 5. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 6. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 7. ACI 347 - Recommended Practice for Concrete Formwork.
- C. American National Standards Institute (ANSI):

1. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
2. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

D. American Society for Testing and Materials (ASTM):

1. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
2. ASTM C33 - Concrete Aggregates.
3. ASTM C94 - Ready-Mixed Concrete.
4. ASTM C150 - Portland Cement.
5. ASTM C260 - Air Entraining Admixtures for Concrete.
6. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
7. ASTM C494 - Water Reducing Admixtures for Concrete.
8. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
9. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
10. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.
11. ASTM-C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

E. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.

F. Colorado Department of Transportation (CDOT) - Standard Specifications for Road and Bridge Construction.

G. National Ready Mixed Concrete Association (NRMCA)

1.5 QUALITY CONTROL

A. Reference Standards: Comply with following standards except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) Publications: Comply with the following unless modified by requirements in the Contract Drawings. Note: All references below shall be from the most current edition.
 - a. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - b. ACI 301 - Specifications of Structural Concrete for Buildings.
 - c. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - d. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
 - e. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - f. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - g. ACI 347 - Recommended Practice for Concrete Formwork.
 - h. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
 - i. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
 - j. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - k. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - l. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
 - m. ASTM C33 - Concrete Aggregates.
 - n. ASTM C94 - Ready-Mixed Concrete.
 - o. ASTM C150 - Portland Cement.
 - p. ASTM C260 - Air Entraining Admixtures for Concrete.
 - q. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
 - r. ASTM C494 - Water Reducing Admixtures for Concrete.

- s. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
 - t. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
- 2. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.
 - 3. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.
- B. Pre-Construction Conference: Conduct conference at location approved by Project Manager.
- 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.
- C. Refer to Part 3 QUALITY CONTROL for Contractor's testing requirements.

1.6 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Mix Designs:
- 1. Submit substantiating data for each concrete mix design specified for use to the Project Manager not less than four (4) weeks prior to first concrete placement. Data for each mix shall, as a minimum, include the following:
 - a. Mix identification designation (unique for each mix submitted).
 - b. Statement of intended use for mix.
 - c. Mix proportions.
 - d. Admixtures (must be approved by the Project Manager).
 - e. Wet and dry unit weight.
 - f. Entrained air content.
 - g. Design slump.
 - h. Strength qualification data.
- C. Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI Detailing Manual SP 66. Include all accessories specified and required to support reinforcement.
- D. Qualification Data: Installer to document for Owner's Representative experience on projects of similar scope and scale successfully completed within the past five (5) years.

- E. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials and aggregates.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Fiber reinforcement.
 - 6. Curing compounds.
 - 7. Bonding agents.
 - 8. Adhesives.
 - 9. Semirigid joint filler.
 - 10. Joint-filler strips.
 - 11. Repair materials.
 - 12. Epoxy joint filler.

- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

- G. Field quality-control reports.

- H. Minutes of Pre-Construction conference.

1.7 DELIVERY, STORAGE AND HANDLING

- A. General: Materials handling and batching shall conform to applicable provisions of ASTM C94.

- B. Reinforcing: Unload and store reinforcing bars so they are kept free of mud and damage.

- C. Hauling Time for Concrete: Deliver and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours, or three-hundred (300) revolutions of the drum after the initial mixing water has been added, whichever is earliest.

- D. Extra Water:
 - 1. Deliver concrete to site in exact quantities required by design mix.
 - 2. Should extra water be required for workability before depositing concrete, and the water/cement ratio of accepted mix design will not be exceeded, the General Contractor's superintendent shall have the sole authority to authorize addition of water. Additional water shall not exceed one (1) gal/cu. yd. Any additional water added to mix after leaving batch plant shall be indicated on truck ticket and signed by person responsible.
 - 3. Where extra water is added to concrete it shall be mixed thoroughly for thirty (30) revolutions of drum before depositing.
 - 4. Water may be added at the site only once for each batch.
 - 5. A full set of tests shall be performed after addition of water. Excessive slump or other out of range tests will be cause for rejection.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:

1. Cold Weather Placement:

- a. When for three successive days prior to concrete placement the average daily outdoor temperature drops below forty degree (40°) F or when the average outdoor temperature is expected to drop below forty degrees forty degree (40°) F on the day of concrete placement, preparation, protection and curing of concrete shall comply with ACI 306R.
- b. Minimum temperature of concrete upon delivery shall conform to ACI 301 Table 7.6.1.1. Concrete at time of placement shall conform to minimum values of ACI 306R Table 1.4.1, and shall not exceed minimum values by more than twenty degrees (20°) F.
- c. Subject to acceptance of the Project Manager an accelerating admixture may be used. Admixtures shall meet requirements of Part 2. Calcium Chloride and other chloride-type accelerating admixtures are not allowed.
- d. Comply with concrete protection temperature requirements of ACI 306R. Record concrete temperatures during specified protection period at intervals not to exceed sixteen (16) hours and no less than twice during any twenty four (24) hour period.

2. Hot Weather Placement:

- a. When depositing concrete in hot weather, follow recommendations of ACI 305R.
- b. Temperature of concrete at time of placement shall not exceed eighty-five degrees (85°) F.
- c. When air temperatures on day of placement are expected to exceed ninety degrees (90°) F, mix ingredients shall be cooled before mixing. Flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for all or part of mix water.
- d. Retarding admixture may be used subject to acceptance of the Project Manager. Admixtures shall meet requirements of Part 2.
- e. Protect to prevent rapid drying. Start finishing and curing as soon as possible.

- B. Protection: Protect newly finished slabs from vandalism and all weather related damage. Protect finished slabs from mortar leakage from pouring of concrete above. Cover masonry walls, glazing, and other finish materials with polyethylene or otherwise protect from damage due to pouring of concrete.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Hand Placed Steel Forms: Hand placed steel forms are only to be used for sections that are straight and have no bend, radii, or curvature in the sections to be used.
- B. Plywood Forms: Are to be used on any section of concrete that have bends, radii or curvature. Forms shall be made of Douglas Fir or Spruce species; solid one side grade; sound, undamaged sheets with straight edges.
1. Curved elements shown on plans are to be constructed with smooth-curved forms. Faceted forms composed of straight sections will not be accepted.

- C. Lumber: Douglas Fir or Spruce species; construction grade; with grade stamp clearly visible.
- D. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING STEEL

- A. Reinforcing Steel: ASTM A615, grade forty (40) for, ties and stirrups; grade sixty (60) for all other bar; billet-steel deformed bars, uncoated finish.
- B. Tie Wire: ASTM A82, minimum sixteen (16) gauge annealed type.
- C. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete. Wood, brick or other unacceptable material is not permitted.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade sixty (60), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class one (1) plastic-protected steel wire or CRSI Class two (2) stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 - 3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Provide materials in accordance with ACI 301, unless amended or superseded by requirements of this section or general notes on structural drawings.
 - 1. General: Ready-mixed Concrete: ASTM C94. On-site mixed concrete not allowed.
 - 2. Cement: ASTM C150. Type I/II
 - 3. Fly ash: ASTM C618 Class F.
 - 4. Aggregate: ASTM C33.
 - a. Obtain from same source throughout project.
 - b. All sand and aggregates to meet C-33 Table 3 for Class 4S "Severe Weathering Region".
 - 1) Fine Aggregate: Clean, natural sand.
 - 2) Coarse Aggregate: Clean gravel or crushed stone.
 - 5. Water: ASTM C 94/C 94M, clean and not detrimental to concrete.

2.5 ADMIXTURES

- A. General: Unless specified, no admixtures may be used without specific approval of the Project Manager.
- B. Prohibited Products: Calcium chloride or admixtures containing more than one half of one percent (0.05%) chloride ions or thiocyanates are not permitted.
- C. Air-Entraining Admixture: ASTM C260. Subject to compliance with requirements, provide one of the following:
 - 1. "Air Mix" by Euclid Chemical Co.
 - 2. "Darex ARA" by W. R. Grace.
 - 3. "Micro-Air" by Master Builders.
 - 4. Acceptable substitution.
- D. Water Reducing Admixture: ASTM C494, Type A. Subject to compliance with requirements, provide one of the following:
 - 1. "Eucon WR-75" by Euclid Chemical Co.
 - 2. "Rheobuild 1000" by Master Builders.
 - 3. "Plastocrete 106" by Sika Chemical Co.
 - 4. Acceptable substitution.
- E. High Range Water Reducing Admixture (Superplasticizer): ASTM C494, Type F or G. Subject to compliance with requirements, provide one of the following:
 - 1. "Eucon 37" by Euclid Chemical Co.
 - 2. "Pozzolith 400N" by Master Builders.
 - 3. "Sikament" by Sika Chemical Co.
 - 4. Acceptable substitution.
- F. Warm Weather Admixtures: ASTM C494. Use of admixtures will not relax warm weather placement requirements.
- G. Cold Weather Admixtures: ASTM C494. Use of admixtures will not relax cold weather placement requirements.

2.6 ACCESSORIES

- A. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, contain oils or waxes, or impair natural bonding or color characteristics of coating intended for use on concrete. Subject to compliance with requirements, use one of the following:
 - 1. "Pro-Cote" by Protex.
 - 2. "Cast Off" by Sonneborn.
 - 3. "Debond" by L&M Construction Chemicals.
- B. Epoxy Adhesive: ASTM C881; two (2)-component material suitable for use on dry or damp surfaces. Subject to compliance with requirements, use one of the following:
 - 1. "Sikadur Hi-Mod LV" by Sika Chemical Corp.
 - 2. "Patch and Bond Epoxy" by Burke.
 - 3. "Epoxitite" by A.C. Horn.
 - 4. "Sure-Poxy" by Kaufman Products, Inc.
 - 5. "Euco Epoxy 463 or 615" by Euclid Chemical Co.

- C. Expansion Joints:
 - 1. Interior Use or Exterior Use Where Sealants are Specified: Bituminous saturated fiber conforming to ASTM D1751, one half inch (1/2") thick. Provide manufacturer's certification of compatibility with specified sealants where required.
 - 2. Exterior Use Where Sealants are not Specified: Premolded asphalt and fiber conforming to ASTM D994, one half inch (1/2") thick.
- D. Slip Joints:
 - 1. Speed Dowel Model PSD09/#4TX, nine inch (9") long sleeve to accommodate eighteen inch (18") smooth steel round bar. Manufactured by Sika/Greenstreak, (800)325-9504.
 - 2. Dowel, eighteen inch (18") long smooth round steel bar, five eighth inch (5/8") diameter. De-bur cut ends.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, shaped as sized on the drawings.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials. Form-release agent is not to stain or discolor final concrete surface.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete surface.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch (1") to the plane of exposed concrete surface, or as shown on the drawings.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (1") in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- I. Spray Curing Compound: All spray curing compound shall meet ASTM C-1315, and be prepared by manufacturer's instructions. Use per where required in Section 3.9.

2.7 ANTI-GRAFFITI COATING

- A. Manufacturer: Rain Guard International
- B. Product: VandlGuard™ Non-Sacrificial Anti-Graffiti Coating, or acceptable substitution.

2.8 CONCRETE MIX

- A. Refer to the City and County of Denver Right of Way Services approved materials list of pre-approved concrete mixes at the following website:

<http://denvergov.org/rightofwayservices/RightofWayServices/ConstructionInspection/RightofWayConstructionInspection/ApprovedMaterials/tabid/442460/Default.aspx>

- B. All Concrete mixes from the approved list or submitted for approval shall meet the following criteria:
1. Mix concrete in accordance with ASTM C94 and ACI 301 Chapter 3.
 2. Cement Content: Type II cement, minimum of five hundred sixty four (564) pounds per cubic yard.
 3. Fly ash: ASTM C618 F. Fly ash shall not exceed fifteen (15%) of total cementitious material by weight unless approved by Project Manager.
 4. Maximum water-cement ratio: 0.45.
 5. Slump: Four inches (4") maximum.
 6. Air Entrainment: Five percent (5%) to eight percent (8%).
 7. Aggregate Size: three quarter inch (3/4"), maximum.
 8. Deliver concrete and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours from batch time, or three hundred (300) revolutions of the drum after the initial mixing water has been added, whichever is earliest.
 9. During cold weather (below forty five degree (45°) F), use heated water and aggregates if necessary to maintain concrete temperature between sixty degree (60°) F. and ninety degree (90°) F.
 10. Concrete for Footings, Walls, and Interior Slabs-on-Grade shall be Class B or Class D, as approved by the Project Manager.
 11. Fly Ash: Per CDOT Standard Specifications for Road and Bridge Construction Section 701.02.
 12. Concrete mixture shall have a minimum compressive strength of 4500 psi at 28 days.

2.9 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
1. When air temperature is between eighty five (85°) and ninety degrees (90°) F, reduce mixing and delivery time from one and one-half (1-1/2) hours to seventy five (75) minutes; when air temperature is above ninety degrees (90°) F, reduce mixing and delivery time to sixty (60) minutes.
 2. Project-Site Mixing: Not allowed without prior approval from Project Manager. If allowed, submit process description to Project Manager for approval prior to construction.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

- A. Requirements of Regulatory Agencies: Comply with all applicable provisions of the state and local building and safety codes.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer, unless otherwise approved by Project Manager.
- C. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- D. Testing: All testing shall be completed by the Contractor at their expense unless otherwise specified by the contract.
- E. Testing Agency Qualifications: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures. Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- F. Testing Frequency: Obtain at least one composite sample for each one hundred (100) cubic yards, or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five (5) compressive-strength tests for each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one (1) test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one (1) set of four (4) standard cylinder specimens for each composite sample.
 - 5. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at twenty eight (28) days. and keep one for backup in the event a sample should break.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at twenty eight (28) days.
- G. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than two-hundred (200) psi.

- H. Test results shall be reported in writing to Project Manager, concrete manufacturer, and Contractor within forty eight (48) hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at twenty eight (28) days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both seven (7) and twenty eight (28) day tests.
- I. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Project Manager.
- J. Concrete work will be considered defective if it does not pass tests and inspections.
- K. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- L. Prepare test and inspection reports.
- M. Record of Work: A record shall be kept by the Contractor listing the time and date of placement of all concrete for the structure. Such record shall be kept until the completion of the project and shall be available to the Project Manager for examination at any time.
- N. Mockups: If requested by the Project Manager, prior to starting any concrete work, provide a sample panel using materials indicated for project work. For each type, color and finish of concrete specified, build panel at the site of full thickness and approximately ten feet (10') by 10 feet (10'), including reinforcement, expansion joints, control joint, scales, fillers, and one radial edge. Provide the workmanship proposed for the work. Correct and replace sample panel until Project Manager's acceptance of the work. Retain panel(s) during construction as a standard for completed paving work.
 - 1. Build panel approximately one-hundred (100) sq. ft. in the location indicated or, if not indicated, as directed by Project Manager.
 - 2. Approved mockups may become part of the completed Work if approved prior to the construction of the mock up and is undisturbed at time of Substantial Completion.
 - 3. Notify the Project Manager a minimum of seven (7) days in advance of dates and times when mockups will be constructed.
 - 4. Obtain the Project Manager's written approval of the mockups before starting construction.
 - 5. If the Project Manager determines that the mockup does not meet the requirements, demolish and remove from the site and cast another until the mockup is approved.
 - 6. Maintain the mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed by Project Manager.
- O. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.

3.2 FORMWORK ERECTION

- A. Construct formwork to maintain tolerances in accordance with ACI 301.
- B. Verify lines, levels, and measurement before proceeding with formwork.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, one eighth inch (1/8") for smooth-formed finished surfaces.
 - 2. Class B, one-quarter inch (1/4") for rough-formed finished surfaces.
- D. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- E. Form Tie Holes: Form tie holes are to be filled with grout and finished to match adjacent concrete surface.
- F. Elements shown as curved on plans are to be formed with flexible form material to form smooth curve transitions. Disjointed, poorly transitioned form alignments will not be accepted. Curved sections formed with straight facets will not be accepted.
- G. Contractor shall notify the Project Manager a minimum of forty eight (48) hours in advance of placing concrete for review of formwork. Contractor shall make correction within twenty four (24) hours of review. If formwork is not in place at time of the scheduled inspection, then the Contractor will be responsible for compensation of the Project Manager's time and expenses per the General Contract Conditions.
- H. Minimize form joints. Symmetrically align form joints and make watertight to prevent leakage of mortar.
- I. Provide chamfer strips on all exposed corners or as indicated on construction documents.
- J. Do not apply form release agent other than specified materials where concrete surfaces receive special finishes or applied coatings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.
- K. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, dowels, anchors, and other inserts and embedded materials.
- L. Do not remove forms, shoring and bracing until concrete has sufficient strength to support its own weight, and construction and design loads which may be imposed upon it.
- M. During cold weather, remove ice and snow from forms. **Do not** use deicing salts. Do not use water to clean out completed forms unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than fifty

degrees (50°) F for twenty four (24) hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for structural elements that supports weight of concrete in place until concrete has achieved at least seventy percent (70%) of its twenty eight (28) day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Project Manager.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.6 REINFORCEMENT

- A. Place, support, and secure reinforcement against displacement.
- B. Locate reinforcing splices per ACI 318 unless indicated otherwise on the Contract Drawings.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Project Manager.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 1. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 2. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

- D. Joint Sealants: See Division 3 Section “Concrete Paving Joint Sealants”.

3.8 CONCRETE PLACEMENT

- A. Contractor’s Review: Contractor shall inspect forms and reinforcing prior to concrete placement to assure accurate placement of embedded items and overall acceptability.

- B. Project Manager’s Review: Contractor shall provide minimum of forty eight (48) hours notice to the Project Manager to allow review of forms and reinforcement before concrete is placed and to observe placing of concrete.

- C. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

- D. Do not add water to concrete during delivery, at Project site, or during placement. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least six inches (6”) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- E. Deposit and consolidate concrete for concrete pavements in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces as indicated on drawings.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
 6. Allow time for bleed water to appear, then scrape or push off all bleed water. Do not work water into surface.
 7. Final level, light bull float, but do not trowel surface.
 8. Broom or drag surface or other specified finish, per Subsection 3.8 this Section.
 9. Do not use evaporative retarders as finishing aid.
- F. Cold-Weather Placement: Comply with ACI 301, ACI 304, ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below forty degrees (40°) F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301, ACI 304, ACI 305R, and as follows:
1. Maintain concrete temperature below ninety degrees (90°) F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is prohibited.
 2. Spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- H. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

3.9 FINISHING

- A. Rough Form Finish: All texture imparted by form facing material, including tie holes and defective areas, shall be repaired and patched, and all fins and other projections exceeding one-quarter inch (1/4") shall be removed.
- B. Smooth Form Finish: Use form material to impart smooth, hard, uniform texture, and arrange form panels in orderly and symmetrical pattern with minimum seams. Repair and patch defective areas and completely remove and smooth all fins and other projections.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a one-to one (1:1) mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by spraying for at least thirty six (36) hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a one-to-one (1:1) mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 CONCRETE CURING, PROTECTION, AND SURFACE TREATMENTS

A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.
2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete unless test cylinders, made and kept adjacent to the structure and cured by the same methods, are tested with the average compressive strength equal to seventy percent (70%) of the specified twenty eight (28) day strength.
3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period. During hot and cold weather, cure concrete in accordance with ACI 305R and ACI 306R.

B. Curing Methods: Perform curing of concrete by moisture curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified and in accordance with ACI 308.1. Coordinate with and choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Provide moisture retaining cover curing as follows: Cover concrete surfaces with a moisture-retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least three inches (3") and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
2. Provide curing and sealing compound to interior slabs left exposed, and to exterior slabs, walks and curbs as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within thirty (30) minutes). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to rainfall within three hours after initial application.

- b. Maintain continuity of coating and repair damage during period.
 - c. Do not use membrane curing compounds on surfaces which are to be covered with materials applied directly to concrete: liquid floor hardener, waterproofing, dampproofing, painting, and other coating and finish materials.
- C. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above for specified curing time.
- D. Curing Unformed Surfaces:
 - 1. Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

3.11 FORM REMOVAL

- A. Removal of Forms: Supplement and Modify ACI 301 as follows:
 - 1. ACI 301 4.5.4: Formwork not supporting weight of concrete such as sides of grade beams, walls, and similar parts of the work, may be removed after cumulatively curing at not less than fifty degrees (50°) F for twenty four (24) hours after placing the concrete provided:
 - a. The concrete is sufficiently cured to be undamaged by form removal.
 - b. Required shores and supports are so arranged that they will not be loosened or disturbed during form removal.
 - c. Supplemental curing and protection is provided for exposed concrete surfaces.

3.12 ANTI-GRAFFITI COATING

- A. Apply to surfaces/elements indicated on drawings. Install per manufacturer's instructions following manufacturer-recommended concrete cure period.

3.13 TOLERANCES

- A. Formed Surfaces and Building Lines: Conform to ACI 301 4.3.
- B. Slab Finishing Tolerances: See Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
- C. Embedded Items: Unless noted otherwise on drawings, tolerances shall be as follows:
 - 1. Anchor Bolts:
 - a. Adjacent anchor bolts in a group receiving a single fabricated setting piece: Plus or minus one-eighth inch (1/8").
 - b. Location and alignment of anchor bolt groups from designated location and alignment: Plus or minus one-eighth inch (1/8").

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Project Manager. Remove and replace concrete that cannot be repaired and patched to Project Manager's approval.

- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a Number sixteen (#16) sieve, using only enough water for handling and placing. Achieve approval of Project Manager prior to any patching as to location of patches and patch material.
- C. Patch Testing: On a portion of the work which will, in the finished condition, be concealed, test patch materials and methods and obtain Project Manager's approval prior to patching concrete surfaces needing repair that will be visible in the final construction.
- D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than one half inch (1/2") in any dimension to solid concrete. Limit cut depth to three quarter inch (3/4"). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color and texture. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Project Manager.
- E. Repairing Unformed Surfaces: Test unformed surfaces, such tops of walls, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped for trueness of slope and smoothness; use a sloped template.
1. After obtaining approval of Project Manager, repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of one-one hundredths inch (0.01") wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - a. If, after repairs are complete, the Project Manager deems the repairs did not successfully correct the original deficiencies, the pavement or concrete element in question is to be removed and replaced per Subsection 3.13.E.1. above.
 2. After concrete has cured at least fourteen (14) days, test for low and high spots in finished surface. Areas that do not conform to the tolerances set forth in Division 32 and in other reference standards identified in this specification are to be sawcut to the nearest joint as approved by the Project Manager, defective concrete removed, and new conforming paving reinstalled. Color and finish is to match adjacent concrete.
 3. If approved by Project Manager, repair random cracks and single holes one inch (1") or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least seventy two (72) hours.

- F. Perform structural repairs of concrete, subject to Project Manager's approval, using epoxy adhesive and patching mortar.
- G. Repair materials and installation not specified above may be used, subject to Project Manager approval.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Cast in Place Concrete. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, compaction, sub-grade preparation, formwork, placing of concrete, reinforcing, joints, curing, finishing and all other items required to complete the work as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 03 30 00

PART 1 - GENERAL

1.1 DESCRIPTION

Furnish and install:

- A. Work Included: Work consists of furnishing all labor, material and equipment necessary for completion of the following work.
 - 1. Railings, welds, washers, bolts, nuts, shims, and anchor bolts and anchor plates.
 - 2. Erecting, connecting, field welding, and adjusting for plumb and level.
 - 3. All other work normally related to the above or specified under this section.
- B. All other miscellaneous angles, channels, pipes/tubes and plates as indicated.
- C. Definitions:
 - 1. Metal Fabrications: Synonymous with miscellaneous metals.
 - 2. Architecturally Exposed Structural Steel: As used under this section, includes all metal fabrications exposed to view.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 03300 Cast-in-place Concrete
Section 09900 Painting

1.3 QUALITY ASSURANCE

Welder Qualifications: Currently qualified according to AWS D1.1. AISC Specifications for Architecturally exposed Structural Steel.

Hand Rail Fabrication: Demonstrated experience with at least five projects of comparable scope.

Architectural metals shall be of the best commercial quality and their various forms shall be straight and true. All steel to be FY 36KSI, ASTM A36, all reinforced steel to be FY 60 KSI, and all tubes to be ASTM A 500, (grade b). There shall be no scratches, scars or creases, buckles, ripples or chatter marks. Finished surfaces must be smooth and true.

Material shall be selected for surface flatness, smoothness and freedom from surface blemishes when exposed to view in the finished unit. Exposed-to-view surfaces which exhibit pitting, seam marks, roller marks, "oil canning", stains, discolorations or other imperfections on the finished units will not be acceptable.

1.4 REFERENCES

- A. ASTM A336 - Structural steel.
- B. ASTM A36 - Steel sections.

- C. ASTM A307 - Low carbon steel externally and internally threaded fasteners.
- D. ASTM A500 - Steel tubing cold form.
- E. AWS D1.1 - Structural welding code.
- F. Meet requirements of AISC Specifications for Architecturally Exposed Structural Steel, latest edition.

1.5 SHOP DRAWINGS

A. Guardrails and Handrails:

1. Four sets of shop drawings, including a reproducible, prepared at an approved scale shall be submitted for review; refer to Section 01300 Submittals for additional requirements.
2. Indicate plans, elevations, detail sections, and profile. Show jointing, anchorage and accessory items, and specify finishes. Furnish setting diagrams and templates for items set in other work. Especially, show details for tubular steel junction at walls and all tubular steel connections.
3. Include erection drawings, elevations, and details where applicable.
4. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
5. Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for adjustments and fittings wherever the taking of field measurements before fabrication might delay the work.

1.6 SUBMITTALS

A. Guardrails and Handrails:

1. Do not order materials or begin fabrication until approval of submittals has been obtained.
Approved working models shall be used on the project as basis for approval of all future work.
2. Submit samples 6" sections, metal finish required.
3. Samples: Submit samples of all materials to be furnished under this section in size and form.
 - a. Steel for guardrail post and rail (2 each).
 - b. Steel for handrail post and rail (2 each).
 - c. One section of guardrail in place for review by Project Manager.
 - d. One section of decorative guardrail in place for review by Project Manager.
 - e. One section of handrail in place for review by Project Manager.
4. Show typical welds, fasteners and screws for compatible finish.
5. Provide completed painted sample for review.

1.7 PRODUCT HANDLING AND STORAGE

Deliver anchor bolts and other anchorage devices that are embedded in cast-in-place concrete or masonry construction to the project site in time to be installed before the start of cast-in-place concrete operations or masonry work.

Provide setting drawings, templates, and directions for the installation of anchor bolts and other similar devices.

Metals that are stored at the project site shall be above ground on platforms, skids, or other supports. Protect steel from corrosion. Store other materials in a weathertight and dry place until ready for use.

Handle in such a manner so as to protect surfaces and to prevent damage to fabricated pieces, during storage, erection and during construction.

Store packaged materials in their original, unbroken package or container. Materials shall be carefully handled and stored under cover in a manner to prevent deformation and damage to the materials and to shop finishes, and prevent rusting and the accumulation of foreign matter on the metal work.

All such work shall be repaired and cleaned before erection.

PART 2 - MATERIALS

2.1 Guardrails and Handrails

Guardrails and Handrails shall be fabricated from 16 ga tubular steel dipped in red-oxide primer.

2.2 ANCHOR STUD CONNECTORS

Anchor stud connectors shall meet requirements of AWS D1.1 Structural Welding Code, latest edition.

2.3 BOLTS, NUTS AND WASHERS

ASTM A307

2.4 WELDING MATERIALS

AWS D1.1: type required for materials being welded. Welding for Rail Extensions shall utilize E80 series electrodes which have the same weathering characteristics as corrosion-resistant steel.

2.5 FABRICATIONS

- A. Shop fabrication and tolerances shall conform to requirements of AWS and AISC specifications and shall be equal to the best practice in modern sheet metal and structural steel shops.
- B. Verify dimensions on-site prior to shop fabrication.
- C. Fabricate items with joints tightly fitted and secured. Joints exposed to weather shall be formed to exclude water.

- D. Fit and shop assemble in largest practical sections, for delivery to site. Curved work shall be true to radii. Posts for hand rail shall be vertical.
- E. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.
- F. Make exposed joints butt tight, flush, and hairline.
- G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.
- H. Do all cutting, punching, drilling and tapping required for attachment of hardware and of work of other Sections where so indicated or where directions for same are given prior to, or with approval of shop drawings.
- I. Live loads shall be not less than the minimum required by code. Where specific live loads are not set forth in the codes applicable to this work, and are not given on the Drawings, designs shall be such as to support live loads without deflection of more than $L/360$ of length of any member and without permanent deformation, all with a safety factor of not less than $2\ 1/2$ to 1.
- J. Zinc Electroplate: Components shall be zinc electroplated including all bolts, nuts, washers and other related ferrous metal items used herewith. Zinc electroplate shall comply with ASTM B633.

2.6 FINISH

- A. Clean surfaces of grease, concrete splatter, and foreign matter. Remove grease and soil with recommended solvents.
- B. Color: Black

PART 3 - EXECUTION

3.1 INSPECTION

- A. Prior to start of erection the steel erector shall check the location of all proposed anchor bolts and disclose any discrepancy in the setting plan to the Owner's Representative.

3.2 PREPARATION

- A. Field measurements: Take measurements on site as required for correct fabrication and installation. Fabricator shall be responsible for errors in fabrication and for correct fit of structural steel.
- B. The contractor assures that all components, specified or required to satisfactorily complete the installation are compatible with each other, with adjoining substrates, materials and work by other trades, and with the conditions of installation and expected use.
- C. Pre-assemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

3.3 INSTALLATION

- A. Perform all cutting, drilling, and fitting required for the installation of the metal items. Set the work accurately in location, alignment and elevation, plumb, level and true, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items that are to be built into concrete.
- B. Obtain Owner's Representative review prior to site cutting or making adjustments that are not part of scheduled work.
- C. Make provision for erection stresses by temporary bracing. Keep work in alignment.
- D. Replace items damaged in course of installation.
- E. Perform field welding in accordance with AWS D1.1.
- F. Do not cut finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing or provide new units at contractor's option.
- G. Joints shall be flush to conceal reinforcement, or welded where thickness of section permits. All welds shall be ground smooth and free of jagged edges or lumps.
- H. Contact surfaces of connected members shall be ground true. Parts shall be assembled so that joints will be tight and practically unnoticeable, without use of filling compound.
- I. Set all railings in sleeves with molten lead or non-shrink, non-metallic grout. Sulfur or gypsum-based products shall not be used for this purpose.
- J. Form tight joints with exposed connections accurately fitted with uniform reveals and spaces for sealants and joint fillers. All tube to tube welds shall be partial penetration groove welds. Where cutting, welding and grinding are required for proper shop fitting and jointing of the work, restore finishes and replace.
- K. Install drilled-in inserts in accordance with Manufacturer's recommendations in accurately drilled holes of required diameter and depth. Where adhesive inserts are used, thoroughly clean hole of all debris and drill dust prior to installation of insert and adhesive bonder. Do not drill holes in concrete or masonry until material has achieved full design strength.
- L. After completion of specified finishes on work, coat concealed surfaces which will be in contact with concrete or footings with a heavy coat of bituminous paint to prevent corrosion and galvanic action. Do not extend coating onto exposed surfaces.
- M. After installation, grind and touch-up field welds, and scratched or damaged prime painted or galvanized surfaces. Use a primer consistent with shop coat. Use a primer recommended for galvanized surfaces. See section 0990-Painting.

3.4 FIELD QUALITY CONTROL

Inspection by the Testing Agency shall include field Inspection: All welds 100% visual.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement: Measurement of will be contract unit specified of rail furnished and installed where indicated on the Drawings or as directed by the Parks Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- B. Payment: Payment will be made at the contract unit price and shall include all labor, materials, hardware and equipment required for installing the rail in accordance with the Drawings and Specifications. Concrete footings in accordance with Drawings and Specification will be included in the price.

END OF SECTION 05 50 00

PART 1 - GENERAL**1.1 EXECUTION OF THE WORK**

- A. The scope of work shown on the drawings and in these specifications, Division 26, is all a part of this contract and shall be included in the base bid unless otherwise noted.
- B. These Specifications call out certain duties of the Electrical Contractor and/or Subcontractors. They are not intended as a material list of items required by the Contract.
- C. These divisions of the Specifications cover the electrical systems of the project. It includes work performed by the electrical trades as well as trades not normally considered as electrical trades.
- D. Provide all items and work indicated on the Drawings and all items and work called for in the Specifications in accordance with the conditions of Contract (Division 1 General Requirements Documents). This includes all incidentals, equipment, appliances, services, hoisting, scaffolding, supports, tools, supervision, labor, consumable items, fees, licenses, etc., necessary to provide complete systems. Perform start-up and checkout on each item and system to verify the systems are fully operable.
- E. Comply with all provisions of the Contract Documents including Division 1, General Conditions, and Supplementary General Conditions of the Specifications.
- F. Certain terms such as "shall, provide, install, complete, start up" are not used in some parts of these Specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- G. Examine and compare the Electrical Drawings and Specifications with the Drawings and Specifications of other trades, and report any discrepancies between them to the Engineer and obtain written instructions for changes necessary in the work. At time of bid the most stringent requirements must be included in said bid. Install and coordinate the electrical work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. All changes required in the work of the Contractor caused by neglect shall be corrected at the expense of the Contractor.
- H. It is the intent of the drawings and specifications to provide a complete workable system ready for the Owner's operation. These specifications are equipment and performance specifications. Items described or called out in the specification but not shown on the drawings are considered to be part of the project. Any item not specifically shown on the drawings or called for in the specifications, but normally required to conform to the intent are to be considered a part of the contract. Installation of the equipment shall be in accordance with the N.E.C., manufacturer recommendation, and industry standards.

- I. All material furnished by the Contractor shall be new and unused (temporary lighting and power products are excluded) and free from defects. All materials used shall bear the Underwriters Laboratory, Inc label provided a standard has been established for the material in question.
- J. All products and materials to be new, clean, free of defects and free of damage and corrosion.
- K. No exclusion from, or limitation in, the symbolism used on the Drawings for electrical work or the languages used in the Specifications for electrical work shall be interpreted as a reason for omitting accessories necessary to complete any required system or item of equipment.
- L. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.
- M. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material shall be the product of one manufacturer throughout. Multiple manufacturers will not be permitted.

1.2 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the Contract Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades and the physical confines of the area to ensure that all material can be installed in the spaces allotted thereto including finished suspended ceilings. Make modifications thereto as required and approved.
- C. Transmit to other trades all information required for work to be provided under their respective sections in ample time for installation.
- D. Wherever work interconnects with work of other trades, coordinate with other trades to ensure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- E. Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- F. The locations of lighting fixtures, outlets, panels and other equipment indicated on the Drawings are approximately correct, but they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed in consequence of increase or reduction of the number of outlets, or in order to meet field conditions or to coordinate with modular requirements of ceilings, or to simplify the work, or for other legitimate causes.
- G. Exercise particular caution with reference to the location of panels, outlets, switches, etc., and have precise and definite locations approved by the Engineer before proceeding with the installation.

- H. The Drawings show only the general run of raceways and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the Engineer and shall receive approval before such alterations are made. All such modifications shall be made without additional cost to the Owner.
- I. Obtain from the Engineer in the field the location of such outlets or equipment not definitively located on the Drawings.
- J. Circuit "tags" in the form of arrows are used where shown to indicate the home runs of raceways to electrical distribution points. These tags show the circuits in each home run and the panel designation. Show the actual circuit numbers on the finished record tracing and on panel directory card. Where circuiting is not indicated, the Electrical Contractor must provide required circuiting in accordance with the loading indicated on the drawings and/or as directed.
- K. The Drawings generally do not indicate the exact number wires in each conduit for the branch circuit wiring of fixtures, and outlets, or the actual circuiting. Provide the correct wire size and quantity as required by the indicated circuiting and/or circuit numbers indicated and control wiring diagrams, if any, specified voltage drop or maximum distance limitations, and the applicable requirements of the NEC.
- L. Adjust locations of conduits, panels, equipment, pull boxes, fixtures, etc. to accommodate the work to prevent interferences, both anticipated and encountered. Determine the exact route and location of each raceway prior to installation.
 - 1. Right of way: lines which pitch to have the right-of-way over those which do not pitch. For example: steam, condensate, and plumbing drains normally have right-of-way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
 - 2. Make offsets, transitions and changes in direction in raceways and as required to maintain proper head room in pitch of sloping lines whether or not indicated on the Drawings.
- M. Whenever the work is of sufficient complexity, prepare additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work to be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field.
- N. Contractor shall furnish services of experienced Superintendent, who shall be in constant charge of all work, and who shall coordinate his work with the work of other trades. No work shall be installed before coordinating with other trades.

1.3 EXAMINATION OF SITE

- A. Prior to submitting of bids, the Contractor shall visit the site of the job and shall familiarize himself with all conditions affecting the proposed installation and shall make provisions as to the cost thereof. Failure to comply with the intent of this paragraph will in no way relieve the Contractor of performing all necessary work shown on the Drawings.

1.4 PROGRESS OF WORK

- A. The Contractor shall order the progress of his work so as to conform to the progress of the work of other trades and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from the defective or ill-timed work performed under this section shall be borne by the Contractor.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ship and store all products and materials in a manner which will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacement or repair. Any such repairs shall be subject to review and acceptance of the Engineer.
- B. Delivery of Materials: Deliver materials (except bulk materials) in manufacturer's unopened container fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- C. Storage of Materials, Equipment and Fixtures: Store materials suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage in dry, heated spaces.

1.6 EQUIPMENT ACCESSORIES

- A. Establish sizes and location of the various concrete bases required. Coordinate with General Contractor and provide all necessary anchor bolts together with templates for holding these bolts in position.
- B. Provide supports, hangers and auxiliary structural members required for support of the work.
- C. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls and floors and elsewhere as will be required for the proper protection of each raceway and passing through building surfaces.
- D. Wall mounted equipment, total weight of 100 pounds or less, may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment, with total weight of more than 100 pounds, shall be mounted on adequately free standing sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Globe-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.7 CUTTING, PATCHING, ETC.

- A. The work shall be carefully laid out in advance. Where Cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of raceway, outlets or other equipment, the work shall be carefully done. Any damage to the building, piping, equipment or defaced finish plaster, woodwork,

metalwork, etc. shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.

- B. The Contractor shall do no cutting, channeling, chasing or drilling of unfinished masonry, tile, etc., unless he first obtains permission from the Engineer. If permission is granted, the Contractor shall perform this work in a manner approved by the Engineer.
- C. Where conduits, outlet, junction, or pullboxes are mounted on a painted surface, or a surface to be painted, they shall be painted to match the surface. Whenever support channels are cut, the bare metal shall be cold galvanized.
- D. Slots, chases, openings and recesses through floors, walls, ceilings, and roofs will be provided by the various trades in their respective materials. The trade requiring them to properly locate such openings and be responsible for any cutting and patching caused by the neglect to do so.

1.8 NOMINAL VOLTAGES (UNLESS OTHERWISE NOTED)

- A. Secondary distribution: 277/480 volt, 3 phase, 4 wire.
- B. Secondary Distribution: 120/240 volt, 1 phase, 3 wire.

1.9 MOUNTING HEIGHTS

- A. Unless otherwise noted or required because of special conditions, locate outlets as follows:
 - 1. Heights listed are from finished floor to center of device. Verify exact locations with the Engineer before installation.
 - a. Wall switch outlets.....40"
 - b. Convenience outlets (general)18"
 - d. Convenience outlets (mechanical areas).....4' - 0"
 - e. Panelboard and distribution cabinet to top..... maximum 6' - 6"

1.10 CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc. resulting from the installation of work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean, subject to the Architect's instructions, which shall be promptly carried out.
- B. Contractor shall clean all fixtures and equipment at the completion of the project.
- C. All switchboards, panelboards, wireway, trench ducts, cabinets, enclosures, etc. shall be thoroughly vacuumed clean prior to energizing equipment at the completion of the project. Equipment shall be opened for observation by the Architect as required.

1.11 WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings. Perform work so as to maintain any warranties currently in effect.
- B. If this Contractor penetrates any walls or surfaces after they have been waterproofed, this Contractor shall restore the waterproof integrity of that surface at the expense of this Contractor and as directed by the Architect.

1.12 PRODUCTS

- A. If products and materials are specified or indicated on the drawings for a specific item or system, use those products or materials. Where noted in other sections of this specification, equipment has been specified for a specific performance and substitutions are not permitted. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of Shop Drawings where Shop Drawings are required or as approved in writing where Shop Drawings are not required.

1.13 OMISSIONS FROM THE DRAWINGS

- A. Should a Bidder find discrepancies in or omissions from the drawings or specifications or be in doubt as to their meaning, he shall notify the Architect before submitting his proposal. The Architect will in turn, send written instructions to all Bidders. Neither the Architect nor the Owner will be responsible for oral instructions. If the Contractor fails to comply with this requirement, he shall accept the Engineer's interpretations as to the intended meaning of the drawings and specifications.

1.14 EXECUTION

- A. Follow manufacturer's instructions for installing, connecting, and adjusting all equipment. Provide one copy of such instructions to the Architect before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Provide all special supports, connections, wiring, accessories, etc.
- B. Use mechanics skilled in their trade for all work.
- C. Clean all items before and after installation. Clean up all debris.
- D. Perform all tests required by local authorities in addition to tests specified herein, such as life safety systems.

- E. Applicable equipment and materials to be listed by Underwriters' Laboratories and manufactured in accordance with ASME, NEMA, ANSI or IEEE standards and as approved by local authorities having jurisdiction.
- F. Before commencing work, examine all adjoining, underlying, etc., work on which this work is in any way dependent for perfect workmanship and report any condition which prevents performance of first class work. Become thoroughly familiar with actual existing conditions to which connections must be made or which must be changed or altered.

1.15 VERIFICATION OF ELECTRICAL REQUIREMENTS FOR EQUIPMENT FURNISHED BY OTHERS

- A. Prior to the installation of wiring systems for any equipment furnished by others, this contractor shall verify that the electrical requirements of the equipment match those shown on the electrical drawings by examining the approved shop drawings of that equipment. Any discrepancies shall be immediately reported to the engineer.
- B. If the contractor fails to comply with this requirement, he shall be responsible for any additional costs incurred at no additional cost to the Owner.

1.16 PROTECTION OF BUILDING FIRE/SMOKE BARRIERS

- A. Passages of conduit through fire barriers and/or smoke barriers shall be protected as follows:
 - 1. The space between the penetrating item and the fire barrier and/or smoke barrier shall be filled with a material capable of maintaining the fire/smoke resistance of the barrier or be protected by an approved device designed for the specific purpose.
 - 2. Where the penetrating item uses a sleeve to penetrate the fire and/or smoke barrier the sleeve shall be solidly set in the fire/smoke barrier and the space between the item and the sleeve shall be filled as described above.
 - 3. Fire barriers shall include 1-hour, 2-hour, and 3-hour rated floors and walls. Refer to architectural plans for location of fire barriers and smoke barriers and provide protection required to maintain ratings in accordance with all codes.
 - 4. Approved fill material for fire barriers shall be packed mineral wool, with ASTM E-136 rating and 3M Fire Barrier caulk. Coordinate sealing of all openings with requirements of Division 7 of this specification.
 - 5. Perform work in accordance with the appropriate UL Ratings.
 - 6. Product Data: Provide manufacturer's specifications, recommendations and installation instructions for each application.

1.17 CODES AND FEES

- A. General: Comply with Codes in accordance with the Contract Documents.
- B. The electrical installation shall be in compliance with the requirements of OSHA, NEC and the rules, regulations and requirements of the power company supplying power to the building.

- C. The electrical installation shall comply fully with all township, county and state laws, ordinances and regulations applicable to electrical installations.
- D. All equipment shall be equal to or exceed the minimum requirements of NEMA, IEEE and UL.
- E. Should any change in Drawings or Specifications be required to comply with governmental regulations, the Contractor shall notify Architects prior to execution of the work. The work shall be carried out according to the requirements of such code in accordance with the instruction of the Architect and at no additional cost to the Owner.
- F. The local fees and permits and services of inspection authorities shall be obtained and paid for by the Contractor. The Contractor shall cooperate fully with local utility companies with respect to their services.
- G. Certificate of Inspection and approval shall be procured and paid for by this Contractor from an approved certified inspection agency.

1.18 GUARANTEE

- A. General: Provide a Guarantee in accordance with the Contract Documents.
- B. Submit a single guarantee stating that all portions of the work are in accordance with Contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one (1) year from date of final acceptance by the Owner, except that where guarantees or warranties for longer terms are specified herein, such longer term to apply. Within 24 hours after notification, correct any deficiencies which occur during the guarantee period at no additional cost to Owner, all to the satisfaction of the Owner and Architect. Obtain similar guarantees from subcontractors, manufacturers, suppliers and subtrade specialists.

1.19 DISPOSAL

- A. All electrical items not designated by the Owner for his use to be properly disposed of according to local, state and Federal regulations.
- B. Items containing polychlorinated biphenyl (PCB) to be removed, transported and disposed of according to Federal Toxic Substances Control Act (TSCA). Contractor to submit certification that these items have been properly disposed.

1.20 EXCAVATION AND TRENCHING

- A. Provide excavation for the work. Excavate all material encountered to the depths indicated on the Drawings or required. Remove from the site excavated materials not required or suitable for backfill. Provide grading as may be necessary to prevent surface water from flowing into trenches or other excavations. Remove any water accumulating therein. Provide sheeting and shoring as may be necessary for the protection of the work and for the safety of personnel.
- B. Provide trenches of widths necessary for the proper execution of the work. Grade bottom of the trenches accurately to provide uniform bearing and support the work on undisturbed soil at every point along its entire length. Where rock excavations are required, excavate rock to a

minimum overdepth of 4 inches below the trench depths indicated on the Drawings or required. Backfill overdepths in the rock excavation and unauthorized overdepths with loose, granular, moist earth, thoroughly machine tamped to a compaction level as specified by the Engineer. Whenever unstable soil incapable of properly supporting the work is encountered in the bottom of the trench as determined by the Engineer, remove soil to a depth required and backfill the trench to the proper grade with coarse sand, fine gravel or other suitable material.

1. All underground conduits: 3 feet (minimum).

1.21 BACKFILLING OF TRENCHES

- A. Do not backfill trenches until all required tests have been performed and the installation observed by the Engineer. Comply with the requirements of other sections of these Specifications. Deposit backfill in 6 inch layers and thoroughly and carefully tamp until for work has a cover of not less than 1 foot. Backfill and tamp remainder of trench at 12 inch intervals until complete. Uniformly grade the finished surface. Install a 6 inch marking ribbon 12 inches below finished grade.

PART 4-MEASUREMENT AND PAYMENT

1.22 MEASUREMENT

- A. No separate measurement shall be made for work under this section.

1.23 PAYMENT

- A. No separate payment will be made for work under this section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 26 05 00

SECTION 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- I. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 9 inches of slack.

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

- A. Contractor will perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for low voltage conductors and cables. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, trenching, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 26 05 19

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Overhead-line grounding.
 - 2. Underground distribution grounding.
 - 3. Ground bonding common with lightning protection system.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS**2.1 CONDUCTORS**

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned copper conductor.
 1. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 2. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this section.

4.2 PAYMENT

- A. No separate payment will be made for work under this section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

26 05 26 - 4

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb .
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or

greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils .
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this section.

4.2 PAYMENT

- A. No separate payment will be made for work under this section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

26 05 29 - 5

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY**A. Section Includes:**

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Division 27 Section "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.
3. Division 28 Section "Pathways for Electronic Safety and Security" for conduits, surface pathways, innerduct, boxes, and faceplate adapters serving electronic safety and security.

1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 3. Anamet Electrical, Inc.
 4. Electri-Flex Company.
 5. O-Z/Gedney; a brand of EGS Electrical Group.
 6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
 7. Republic Conduit.
 8. Robroy Industries.
 9. Southwire Company.
 10. Thomas & Betts Corporation.
 11. Western Tube and Conduit Corporation.
 12. Wheatland Tube Company; a division of John Maneely Company.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. FMC: Comply with UL 1; aluminum.
- H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: compression.
 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
 2. Anamet Electrical, Inc.
 3. Arnco Corporation.
 4. CANTEX Inc.
 5. CertainTeed Corp.
 6. Condux International, Inc.
 7. Electri-Flex Company.
 8. Kraloy.
 9. Lamson & Sessions; Carlon Electrical Products.
 10. Niedax-Kleinhuis USA, Inc.
 11. RACO; a Hubbell company.
 12. Thomas & Betts Corporation.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. LFNC: Comply with UL 1660.
- E. Rigid HDPE: Comply with UL 651A.
- F. Continuous HDPE: Comply with UL 651B.
- G. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- H. RTRC: Comply with UL 1684A and NEMA TC 14.
- I. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- J. Fittings for LFNC: Comply with UL 514B.
- K. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- L. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
 2. Hoffman; a Pentair company.
 3. Mono-Systems, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hoffman; a Pentair company.
 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 3. EGS/Appleton Electric.
 4. Erickson Electrical Equipment Company.
 5. FSR Inc.
 6. Hubbell Incorporated; Killark Division.
 7. Milbank Manufacturing Co.
 8. O-Z/Gedney; a brand of EGS Electrical Group.
 9. RACO; a Hubbell Company.
 10. Robroy Industries.
 11. Spring City Electrical Manufacturing Company.
 12. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
 13. Thomas & Betts Corporation.
 14. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: 4 inches square by 1-1/2 inches deep .
- K. Gangable boxes are prohibited.
- L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- M. Exterior Cabinet:
 - 1. NEMA 250, Type 4X 304 stainless-steel box, #4 brushed finish, with removable interior panel.
 - 2. Heavy duty stainless steel continous hinged doors with 316 stainless steel padlockable handles.
 - 3. Seamless foam in-place one-piece gasket.
 - 4. Heavy-duty 316 stainless steel lifting eyes .
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Removable center post.
 - 7. Approximate size is 72" high x 72" wide x 18" deep.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of fiberglass.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation; Hubbell Power Systems.
 - d. NewBasis.
 - e. Nordic Fiberglass, Inc.
 - f. Oldcastle Precast, Inc.; Christy Concrete Products.
 - g. Synertech Moulded Products; a division of Oldcastle Precast, Inc.
 - h. Quazite-Hubbell
- 2. Standard: Comply with SCTE 77.
 - 3. Color of Frame and Cover: Gray.
 - 4. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 - 5. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 - 6. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 7. Cover Legend: Molded lettering, "ELECTRIC."
 - 8. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

2.6 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - 1. Tests of materials shall be performed by an independent testing agency.
 - 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 - 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: GRC.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.

3. Exposed and Subject to Severe Physical Damage: GRC or IMC. Raceway locations include the following:
 - a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - b. Mechanical rooms.
 4. Concealed in Ceilings and Interior Walls and Partitions: MC.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: GRC.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- G. Install surface raceways only where indicated on Drawings.
- H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F .

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches of enclosures to which attached.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- N. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- P. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
 1. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- Q. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

- R. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- S. Locate boxes so that cover or plate will not span different building finishes.
- T. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- U. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 36 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Division 26 Section "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for conduit. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, trenching, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 26 05 33

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.

- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE.

2.3 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch .

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at terminations.
- G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 8 to 12 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.
- H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 3 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- B. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.
 1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- F. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- e. Substations.
- f. Enclosed circuit breakers.
- g. Enclosed controllers.
- h. Contactors.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this section.

4.2 PAYMENT

- A. No separate payment will be made for work under this section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 26 05 53

PART 1 - GENERAL**1.1 SCOPE**

- A. The Contractor shall furnish and install single-phase and three-phase general purpose individually mounted dry-type transformers of the two-windings type, self-cooled as specified herein, and as shown on the contract drawings.

1.2 REFERENCES

- A. The transformers and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of ANSI, NEMA and UL.
- B. Transformers shall meet the requirements of the most current version of federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment".

1.3 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
 - 1. Outline dimensions and weights
 - 2. Transformer ratings included:
 - a. kVA
 - b. Primary and secondary voltage
 - c. Taps
 - d. Basic impulse level (BIL) for equipment over 600 volts
 - e. Design impedance
 - f. Insulation class and temperature rise
 - g. Sound level
 - 3. Product data sheets

1.4 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes.
 - 1. Final as-built drawings and information for items listed in Paragraph 1.3, and shall incorporate all changes made during the manufacturing process
 - 2. Connection diagrams
 - 3. Installation information

1.5 QUALIFICATIONS

- A. The manufacturer of the dry-type distribution transformers shall be the same as the manufacturer of the other major electrical distribution equipment on the project.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer shall be a participant in the UL Data Acceptance Program (DAP) under the Client Test Data Program (CTDP) certification to ensure UL test methodologies and record traceability complies with the requirements of ISO 17025.
- D. Transformer must bear the UL Energy Efficiency Verification Mark to confirm that the unit meets the requirements of 10 CFR Part 431.
- E. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years.

1.6 REGULATORY REQUIREMENTS

- A. All transformers shall be UL listed and bear the UL label.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton/Cutler-Hammer products
- B. Square D
- C. General Electric
- D. Siemens

- E. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.2 RATINGS

- A. The kVA and voltage ratings shall be as indicated on the Drawings.
- B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96.
- C. Transformer shall meet the requirements of the most current version of federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment".
- D. Transformers efficiency shall be measured according to federal law 10 CFR Part 431.
- E. Transformer sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings:

Equivalent Winding kVA Range	Self-Cooled Ventilated		Self-Cooled Sealed
	K-Factor = 1 K-Factor = 4 K-Factor = 9	K-Factor = 13 K-Factor = 20	
3.00 and Below	40	40	45
3.01 to 9.00	40	40	45
9.01 to 15.00	45	45	50
15.01 to 30.00	45	45	50
30.01 to 50.00	45	48	50
50.01 to 75.00	50	53	55
75.01 to 112.50	50	53	55
112.51 to 150.00	50	53	55
150.01 to 225.00	55	58	57
225.01 to 300.00	55	58	57
300.01 to 500.00	60	63	59
500.01 to 700.00	62	65	61
700.01 to 1000.00	64	67	63
Greater than 1000	Consult Factory	Consult Factory	Consult Factory

2.3 CONSTRUCTION – GENERAL PURPOSE TRANSFORMERS

- A. Insulation Systems

- 1. Transformer insulation system shall be as follows:

- a. Less than 15 kVA: 180 degrees C insulation system with 115 degree C rise, encapsulated design; 15 kVA and above: minimum of 200 degree C insulation system with 150 degree C rise, ventilated design.]
2. Required performance shall be obtained without exceeding the above indicated .temperature rise in a 40 degrees C maximum ambient, and a 24-hour average ambient of 30 degrees C.
3. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method D635.

B. Core and Coil Assemblies

1. Transformer core shall be constructed with high-grade, non-aging, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade copper with continuous wound construction.
2. On single-phase and three-phase units rated 15 kVA and the core and coil assembly shall be completely encapsulated in a proportioned mixture of epoxy or resin and aggregate to provide a moisture proof, shock-resistant seal. The core and coil encapsulation system shall minimize the sound level.
3. On single-phase and three-phase units rated 15 kVA and above the coils assembly shall be impregnated with non-hydroscopic, thermosetting varnish and cured to reduce hot spots and seal out moisture; the core shall be coated with HAPs (Hazardous Air Pollutants) free water reducible electrical varnish to give good corrosion resistance. The assembly shall be installed on vibration-absorbing pads.
4. Terminals shall be welded to the leads of the coils for better conductivity, less maintenance, and lower risk of hot spots. Terminals shall not be spot welded or bolted to the coil leads.

C. Taps

1. Three-phase transformers rated 15 through 300 kVA shall be provided with six 2-1/2% taps, two above and four below rated primary voltage. Three-phase transformers rated greater than 300 kVA shall be provided with manufacturer's standard taps for that rating.
2. All single-phase transformers, and three-phase transformers rated below 15 kVA and above 500 kVA, shall be provided with the manufacturer's standard tap configuration.

D. Electrostatic Shielding

1. Provide shielded isolation transformers with an electrostatic shield consisting of a single turn of aluminum placed between the primary and secondary winding and grounded to the housing of the transformer.
 - a. Electrostatic shield shall provide primary to secondary winding capacitance between 24 and 18 picofarads over the range of 100 Hz to 20 kHz.

E. Core and Coil Assemblies

1. Transformer core shall be constructed with high-grade, non-aging, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade copper with continuous wound construction. The core shall provide reduced induced currents in the steel caused by the high ratios of peak-to-rms currents and voltages found in harmonic loads.
2. The neutral bus shall be configured to accommodate 200% of the rated current.
3. The coils assembly shall be impregnated with non-hydroscopic, thermosetting varnish and cured to reduce hot spots and seal out moisture; the core shall be coated with HAPs (Hazardous Air Pollutants) free water reducible electrical varnish to give good corrosion resistance. The assembly shall be installed on vibration-absorbing pads.

2.4 WIRING/TERMINATIONS

- A. Recommended external cable shall be rated 90 degrees C (sized at 75 degrees C ampacity) for encapsulated and 75 degrees C for ventilated designs. Connectors should be selected on the basis of the type and cable size used to wire the specific transformer.

2.5 ENCLOSURE

- A. The enclosure shall be made of heavy-gauge steel. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. The maximum temperature of the enclosure shall not exceed 90 degrees C. The core of the transformer shall be grounded to the enclosure.
- B. On three-phase units rated 15 kVA and below and single-phase units rated 15 kVA and below the enclosure construction shall be encapsulated, totally enclosed, non-ventilated, NEMA 3R, with lifting provisions.
- C. On three-phase units rated 15 kVA and above and single-phase units rated 15 kVA and above the enclosure construction shall be ventilated, NEMA 2, drip-proof, with lifting provisions. All ventilation openings shall be protected against falling dirt. On outdoor units, provide weathershields over ventilated openings.
- D. Ventilated type transformers that meet 10 CFR Part 431 efficiency requirements, with a core size of 150 kVA or less, shall be suitable for installation with 2-inch clearance from a wall or other obstruction behind the transformer enclosure.

2.6 FINISH

- A. Steel enclosures shall be finished with ANSI 61 color, weather-resistant enamel.

2.7 ACCESSORIES

- A. On ventilated outdoor units provide suitable weather shields over ventilation openings.

PART 3 - EXECUTION

3.1 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.
 - 1. Ratio tests at the rated voltage connection and at all tap connections.
 - 2. Polarity and phase relation tests on the rated voltage connection.
 - 3. Applied potential tests.
 - 4. Induced potential test.
 - 5. No-load and excitation current at rated voltage on the rated voltage connection.

3.2 INSTALLATION

- A. Transformers shall be floor mounted except where indicated on the Drawings to be suspended or wall mounted.
- B. Suspended transformers shall be mounted on hanger rods with a spring isolator in each rod.
- C. Floor mounted transformers shall be mounted on 4 inch high concrete housekeeping pads. Provide neoprene pads between transformer legs and housekeeping pad and anchor transformer to floor.
- D. Provide grounding electrode conductor from transformer secondary neutral to nearest effectively grounded building structural steel.
- E. Conduit connected to transformers shall be flexible metal conduit, 24 inches minimum length, 60 inches maximum length.

3.3 FIELD ADJUSTMENTS

- A. Adjust taps to deliver appropriate secondary voltage.

3.4 FIELD TESTING

- A. Measure primary and secondary voltages for proper tap settings.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for low voltage conductors and cables. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, trenching, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 26 22 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for stripping sod, and removing and disposing of vegetation and debris.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls".
 - 2. Division 01 Section "Erosion and Sedimentation Control".
 - 3. Division 01 Section "Tree Retention and Protection".
 - 4. Division 31 Section "Earth Moving"
 - 5. Division 32 Section "Tree Transplanting".
- C. Materials Management Plan. All work shall be in accordance with the approved materials and management plan (MMP)
 - 1.

1.3 DEFINITIONS

- A. The term "sod stripping" shall be used when the vegetative material to be removed is mowable and generally less than twelve-inches (12") tall.
- B. The term "tree removal" refers to individual woody plants with a caliper over four-inches (4"). Any removals shall be performed by a tree Contractor licensed through Denver Forestry.
- C. The term "clearing" refers to removing and disposing trees, brush, stumps, logs, grass, weeds, roots, decayed vegetable matter, poles, stubs, rubbish, refuse dumps, sawdust piles, and loose boulders of one cubic yard (1 yd³) or less existing outside of the construction limits, debris resting on or protruding through the ground surface, or appearing on the construction limits before final acceptance of the work. Clearing also includes removing and disposing of obstructions, such as fences, bridges, buildings, and other incidental structures within the construction limits and shown on the Site Demolition Plans.
- D. The term "grubbing" refers to removal from the area within the construction limits and proper disposal of all objectionable matter defined above under clearing, which is embedded in the underlying soil. Grubbing also includes removing and properly disposing of sidewalks, driveways, catch basins, drop inlets, manholes, curbing, retaining walls, utilities, foundations, paved floors, underground tanks, and portions of plants to be removed that are below grade, and other structures within the construction limits.
- E. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

- F. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil reasonably free of subsoil, clay lumps, gravel, and other objects more than two-inches (2”) in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- G. Plant-Protection Area: Area surrounding shrub beds or massings, or other vegetation or sensitive areas to be protected during construction, and indicated on Contract Drawings.
- H. Tree-Protection Area: Area surrounding individual trees or groups of trees to be protected during construction, see Division 01 Section “Tree Retention and Protection”.
- I. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. All materials except for stripped topsoil, those materials indicated to remain or to be stockpiled, shall remain the property of the City, all other materials shall be removed at the Contractor's expense.

1.5 SUBMITTALS

- A. Existing Conditions: Documentation of existing conditions, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or videotape.
 - 2. Include plans and notations to indicate specific damaged conditions of existing construction, site elements, and landscape.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions. Submit to Project Manager prior to start of construction.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Project Manager.
- B. Improvements on Adjoining Property: Not allowed without prior approval from Project Manager. Work only within Work Limit Line as defined on drawings.
- C. Salvable Items: Carefully remove items indicated to be salvaged and store on City property where indicated.
- D. Protection and Repair of Underground lines:
 - 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. The contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth

to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.

2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. The contractor is required to contact all private utility companies including Denver City departments to locate all private utilities. The contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy two (72) prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the contractor these shall be repaired at no cost to the city. If the contractor damages staked or located private utilities they shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.

- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree and or plant protection measures are in place.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect existing site improvements to remain from damage during construction.
 1. Restore existing improvements damaged by Contractor during the work of this Contract to their original condition, as acceptable by Project Manager.

3.2 TRANSPLANTING

- A. See Division 32 Section "Tree Transplanting".

3.3 CLEARING

- A. Remove brush and vegetation from areas designated to be cleared. As directed by Project Manager, trim low hanging, unsound, or unsightly branches on existing trees and shrubs designated to remain. All cuts shall be in accordance with Denver Forestry standards.

3.4 GRUBBING

- A. Remove all stumps, roots, and debris a minimum of twelve-inches (12") below finish grade in all areas as required. Use hand methods for grubbing inside drip line of trees to remain. Backfill and compact stump and root holes to a maximum of eighty five percent (85%) in landscape areas and ninety five percent (95%) under hardscape or as directed by the City Forester and Project Manager.

3.5 TOPSOIL STRIPPING

- A. See Division 31 Section "Earth Moving".

3.6 SOD STRIPPING

- A. Strip sod in all areas to be re-graded to a depth of one-inch (1"), so that a relatively clean dirt surface remains.

3.7 TREE REMOVAL

- A. In all proposed landscaped areas, stumps and surface roots shall be ground to a minimum of twelve-inches (12") below finish grade. In proposed hardscape areas, all roots shall be removed entirely.

3.8 DISEASED TREE REMOVAL AND DISPOSAL

- A. The removal of diseased and infested trees includes the requirement of offsite burial of all parts of the trees immediately following removal. This includes logs, stumps, roots, branches and composted and un-composted chips. Under no circumstances should diseased or infected wood be left or taken for firewood, mulch or taken to a wood processing mill.

3.9 DISPOSAL

- A. Haul and dispose of all removed materials, trash, debris and waste materials legally outside of the City's property. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Project Manager.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for Clearing and Grubbing.

4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include required materials, transportation, equipment, labor. The lump sum price shall include all clearing and grubbing of miscellaneous debris or items defined in Part 1 - General, including, tree removal and all other work necessary to ensure a clear dirt surface remains on the site. Price shall include the removal and offsite disposal of all materials. No payment will be made for the removal of any brush and vegetation damaged by the Contractor beyond the authorized limits of removal.

END OF SECTION 31 11 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Report Documentation
 - 1. All work shall be completed in accordance with the Geotechnical Engineering Study, Proposed Rude Park ADA Improvements, West Holden Place and Federal Boulevard, Denver, Colorado. Completed by Kumar & Associates March 2, 2016, revised May 3, 2016.
 - 2. All work shall be completed in accordance with the approved Materials Management Plan (MMP).

1.2 SUMMARY

- A. This Section includes the requirements for excavation, re-grading, stripping and stockpiling of topsoil, filling, backfilling, compaction, hauling, and legal off-site disposal of spoil materials to meet the required lines and grade as specified to complete the work.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 01 Section "Removals".
 - 3. Division 01 Section "Tree Retention and Protection".
 - 4. Division 01 Section "Clearing and Grubbing".
 - 5. Division 31 Section "Excavation and Backfilling of Trenches".
 - 6. Division 32 Section "Topsoil".

1.3 DEFINITIONS

- A. Excavation: The removal of material encountered to subgrade or over-excavation and subsequent disposal or placement of materials removed.
- B. Unclassified Excavation: The term "unclassified excavation", as used herein, includes the excavation of all materials required for the work obtained within construction limits of project, including bedrock, surface boulders, wasted sections of concrete, asphalt or other debris including historic landfills that may be encountered. All excavation will be considered unclassified regardless of the nature of material encountered.
- C. Classified Excavation: The term "classified excavation", as used herein, defines the soil conditions that are expected to be encountered and makes provisions for measurement and payment of any rock encountered at an agreed upon unit price.
- D. Unauthorized Excavation: Inadvertent or purposely removing materials beyond indicated subgrade elevations or dimensions without specific direction of the Project Manager. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation shall be at Contractor's expense.

- E. Unsuitable Materials: For the purposes of classified excavation, unsuitable material shall be defined as material below subgrade elevation that exhibits excessive pumping or that does not meet density requirements due to unsatisfactory material as determined by geotechnical engineer and/or Project Manager.
- F. Subgrade: The undisturbed earth or the compacted soil layer immediately below proposed pavement topping materials.
- G. Structure: Walls, foundations, slabs, pavement or other man-made stationary features occurring above or below ground surface.
- H. Structural Fill: The term “structural fill”, as used herein, includes soil materials used for general site filling under pavements or structures.

1.4 SUBMITTALS

- A. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Warning Tape: Twelve-inches (12”) long; of each color.
- B. Qualification Data: For qualified testing agency.
- C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Location of soil source.
 - 2. Classification according to ASTM D 2487.
 - 3. Laboratory compaction curve according to ASTM D 698.
 - 4. If not previously profiled, analyzed and profiled per the Material Reuse-Soil section of the MMP
- D. Provide one (1) cubic foot sample of imported backfill material for approval by Project Manager.
- E. For imported backfill materials, general or structural, the Contractor shall provide, at a minimum, a soils report meeting City and County of Denver Soil Testing for Imported Materials requirements, and indicating gradation tests, liquid limit, plasticity index and standard proctor density test and free of environmental contaminants. Depending on the use of the imported backfill materials the Project Manager may request that a soils analysis be performed to determine percent organic content of the soils, salt levels, and environmental contaminants of concern. Division 32 Section “Topsoil” for additional information.
- F. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 QUALITY CONTROL

- A. Coordinated and paid for by Contractor.
- B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

- C. Comply with requirements within project Geotechnical Report.
 - D. Codes and Standards: Comply with all applicable local, state and Federal rules, regulations and ordinances concerning sloping of excavation, trenching and safety of workers, including the latest version of OSHA requirement.
 - E. Testing Agency: All testing required to determine compliance for the work of this section will be completed as specified in Division 01 Section "Contractor Quality Control". Testing Agency to test the following, and as stated throughout this Section:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material and maximum lift thickness comply with requirements.
 - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
 - F. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
 - G. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Project Manager.
 - H. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every two thousand (2,000) sq. ft. or less of paved area or building slab, but in no case fewer than three (3) tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 50 feet (50') or less of wall length, but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every one hundred fifty feet (150') or less of trench length, but no fewer than two tests.
 - 4. Landscaped areas: At least one test every twenty thousand (20,000) sq. ft or less of disturbed landscaped area, but in no case fewer than two tests.
 - I. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.
 - J. Submit testing report documentation to Project Manager per Division 01 Section "Quality Assurance".
- 1.6 DELIVERY, STORAGE, & HANDLING
- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of existing trees or within Tree Protection Fencing. Refer to Division 01 Section "Tree Retention and Protection".

1.7 PROJECT CONDITIONS

- A. Protection and Repair of Underground lines:
 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. The Contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
 2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. The Contractor is required to contact all private utility companies including Denver City departments to locate all private utilities. The Contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy two (72) hours prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the Contractor these shall be repaired at no cost to the city. If the Contractor damages staked or located private utilities they shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
- B. Use of Explosives: Use of explosives is not permitted.
- C. Protection of Persons and Property: The Contractor is responsible for installing barricades and posting with warning lights all open excavations occurring as part of this work.
 1. Protect structures, utilities, walkways, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- D. Environmental Requirements: Blasting is not permitted. Employ jack hammering and other loud noises and methods sparingly; comply with all applicable noise abatement ordinances or regulations. Onsite burning is not allowed.
- E. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the City.
- F. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 01 Sections "Temporary Facilities and Controls" and "Tree Retention and Protection", and Division 31 Section "Clearing and Grubbing," are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: All fill material, regardless of intended use category, must meet the requirements of the draft MMP and Appendix B: Guidance for re-use of soil on City Projects, October 2017; and be clean and free from organic matter, roots, brush or other vegetation, trash, debris or other detrimental substances, and rocks or unbroken lumps larger than three-inches (3"). Project Manager to approve material prior to placement.
 - 1. The Contractor is responsible for furnishing load tickets and providing a daily log of cubic yards of soil materials imported or exported.
- B. Structural Fill: Shall be Class 1 or Class 2 material composed of non-organic mineral aggregates and soil from excavations of existing soils obtained from on-site or imported fill, including granular or aggregate base course from removed pavements. Fill containing organic matter or any other deleterious substances, including overly wet soils, bedrock, or high swell content soils will not be accepted. If sufficient materials meeting the above requirements are not available from on-site sources, provide additional material obtained from off-site sources and approved by the testing and inspections agency, at no additional cost to the City. The soil must be compactable and pass, at minimum, a proof roll prior to being accepted for supporting paving materials.
- C. On-Site Topsoil: The top four-inches (4") minimum of organic material in the excavation zone shall be stripped stockpiled prior to other earthwork operations. All stockpiled topsoil shall be reused on site.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to thirty-inches (30") deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 2. Verify that final grades are completed in accordance with the drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

3.2 GENERAL PROCEDURES

- A. Comply with Division 01 Section "Erosion and Sedimentation Control" and all local, state and national erosion control requirements.
- B. Erosion Control shall be maintained during all phases of site excavation and site development and maintained throughout the construction period in order to protect adjacent properties, streets, and storm sewers from erosion and sediment runoff during the construction process. Do not commence excavation and grading work until erosion control measures are in place and have been inspected and approved by the Wastewater Management Inspector. Contractor shall be responsible for maintaining erosion control measures throughout construction. Frequent monitoring, cleaning and other work required for proper operation shall be Contractor's responsibility. Contractor shall modify/replace all erosion control measures to fit field conditions following direction for corrective actions from Project Manager and or Wastewater Management Inspector.

3.3 DEWATERING

- A. Wherever possible, prevent surface water and subsurface or groundwater from flowing into excavations and from flooding the project site and surrounding area.
- B. Contractor shall be required to dewater excavated areas by pumping, or otherwise control the water so that the project can be constructed in accordance with the plans. Any controlling of the water must be performed in such a manner that recently constructed portions of the project are not damaged. Repairs shall be at the Contractor's expense.
- C. Damage to adjacent property that results from the Contractor's alteration of any surface drainage, ground water flows or pumped water shall be repaired by the Contractor at no additional cost to the City.

3.4 GROUND SURFACE PREPARATION

- A. Complete clearing and grubbing operations in accordance with Division 31 Section "Clearing and Grubbing". Where new material is to be placed on compacted subgrade, scarify ground

surface until surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction and bond between old and new material.

- B. Prior to placing any new sections of asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of six-inches (6"). In areas where existing pavement is to be removed and replaced the existing compacted subgrade may be reused if the subgrade meets specified compaction. In areas of existing subgrade that do not meet the specified compaction, materials shall be removed, replaced and compacted to meet the specified proctor density. Adjust moisture content and compact as hereinafter specified.

3.5 STRIPPING AND STOCKPILING TOPSOIL

- A. Strip all topsoil from the excavation zone for new facilities (four-inches (4") in depth for all disturbed areas). Stockpile topsoil in locations indicated on the Drawings or as directed by the Project Manager.
- B. Placing topsoil, refer to Division 32 Section "Topsoil".

3.6 EXCAVATION

- A. Stability of excavations: Comply with local codes, ordinances, and requirements of agencies having jurisdiction to include the latest revision to OSHA standards.
- B. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of +/- one tenth foot (0.1'), and extending a sufficient distance to permit installation of services and other construction, and for inspection.
- C. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as indicated within a tolerance of +/- one tenth foot (0.1').
- D. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. Twenty four-inches (24") outside of concrete forms other than at footings.
 - b. Twelve-inches (12") outside of concrete forms at footings.
 - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
 - f. Six-inches (6") beneath pipe in trenches, and the greater of twenty four-inches (24") wider than pipe or forty two-inches (42") wide.
- E. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Project Manager and approved by Project Manager. The Contract Sum will be

adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. Twenty four-inches (24") outside of concrete forms other than at footings.
 - b. Twelve-inches (12") outside of concrete forms at footings.
 - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
 - f. Six-inches (6") beneath pipe in trenches, and the greater of twenty four-inches (24") wider than pipe or forty two-inches (42") wide.

3.7 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions shown on Contract Drawings within a tolerance of plus or minus one tenth foot (0.1'). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Pile Foundations: Stop excavations six to twelve-inches (6" – 12") above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3.8 EXCAVATION FOR WALKS AND PAVEMENTS

- A. See project Geotechnical Report.
- B. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 foot.
- C. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
 1. Prior to placing the pavement section, the entire subgrade should be scarified to a depth of six-inches (6"), adjusted to a moisture content near optimum and compacted as indicated in the Geotechnical Report.

3.9 SUBGRADE INSPECTION

- A. Notify Project Manager when excavations have reached required subgrade.
- B. If Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

- C. Proof-roll subgrade in twenty (20) locations identified by the Project Manager with a pneumatic-tired and loaded ten (10-wheel), tandem-axle dump truck weighing not less than fifteen (15) tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to three (3) mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Project Manager, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Project Manager, without additional compensation.

3.10 SPECIAL CONDITIONS

- A. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than thirty five degrees (35°) F.
- B. Dust Control: Provide dust control to alleviate dust nuisance to the public, to adjacent properties and other work underway at the project site.
- C. Unanticipated Conditions: Notify the Project Manager immediately upon finding subsurface or other conditions which are not shown or which cannot be reasonably assumed from existing surveys. Secure Project Manager's instructions before proceeding with further work in such areas.
- D. Unsatisfactory Soils: Remove or otherwise correct unsanitary, sour, or otherwise unsatisfactory soil. Remove contaminated or unsuitable material from under paved areas.
- E. Additional Excavation: When excavation has reached required subgrade elevations, the Contractor shall contact the testing agency, which will make an observation of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the testing agency.
- F. Handling of Construction Spoils in Area of Environmental Concern: Buried historical construction debris is present in the area of environmental concern as identified in the Limited Subsurface Investigation. All spoils from soil disturbing activities containing this debris shall be removed from the site and disposed of at DADS per all CCoD regulations.
- G. Management of RACS within Area of Environmental Concern: A Limited Subsurface Investigation was conducted for this project which did not identify RACS in the Area of Environmental Concern. If RACS or suspected RACS is encountered within the Area of Environmental Concern, the CABI, where allowed, will use hand methods as identified in the final Materials Management Plan. In the event that the amount or type of RACS encountered cannot be managed using hand methods, and after review and approval by the Project Manager, Contractor may use mechanical methods to manage and dispose of materials per the MMP.

3.11 FILL AND BACKFILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in this Section.
 - 1. Under grassed areas, use satisfactory, excavated or borrow material.
 - 2. Under walks and pavements, use satisfactory, excavated or borrow materials, or a combination to meet structural fill requirements.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 - 2. Removal of all trash and debris from excavation.

3.12 PLACEMENT AND COMPACTION

- A. Abide by requirements of project Geotechnical Report unless otherwise directed by Project Manager.
- B. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Ground surfaces that are steeper than four-to-one (4:1) (horizontal to vertical) shall be stripped of vegetation, scarified to a depth of six-inches (6") and create excavated benches to ensure that fill material will bond with the existing surface.
 - 1. Present remediation options to Project Manager for any soils that do not meet the specified standard proctor density to bring those soils into compliance with the specifications.
- C. Place backfill and fill materials in layers not more than eight-inches (8") in loose depth for material compacted by heavy compaction equipment, and not more than four-inches (4") in loose depth for material compacted by hand-operated tampers, each layer to be compacted to meet requirements herein.
- D. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- E. Compaction of Fill for Hardscape Areas:
 - 1. Select fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").
 - 2. Compaction shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment required to meet specifications. Granular fill shall be compacted using vibratory equipment or other equipment required to meet specifications. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained. Refer to Paragraph 3.12.I herein for criteria.
 - 3. Prior to placement of any base or surfacing materials, one hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.

- F. Compaction of Landscape Slope Areas:
1. Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable. Fills placed in slopes should be compacted to at least 95% of the standard Proctor (ASTM D698) maximum dry density. The fills should be placed at a moisture content within 2 percentage points of optimum. Permanent fill slopes shall not exceed two-to-one (2:1) (horizontal to vertical).
 2. Where natural slopes are steeper than four-to-one (4:1) (horizontal to vertical) and the placement of fill is required, cut benches shall be provided at the rate of one bench for each two to four feet in height (minimum of two benches). Benches shall be at least ten feet (10') in width. Fill shall be placed on completed benches as outlined within this specification.
- G. Control soil and fill compaction, providing minimum percentage of density specified. Correct improperly compacted areas or lifts as directed if soil density tests indicate inadequate compaction.
- H. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
1. Moisture Content: The Contractor may be required to add moisture to the excavation materials in the stockpile area if it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rip or disc the fill soils to provide uniform moisture content through the soils.
 2. The application of water to the embankment materials shall be made with any type of watering equipment which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.
 3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 4. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
- I. Density Tests: Field density tests shall be made by the Contractor per Division 01 Section "Contractor Quality Control" locations and depths selected by the Project Manager. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several-inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved. Criteria for acceptance are as follows:
1. Under pavements and structures: Intervals and quantities of tests required shall be established by the Project Manager. On-site or imported clay materials shall be compacted to at least ninety five percent (95%) of maximum standard Proctor dry density (ASTM D 698) at moisture content within two percent (2%) of optimum. Granular material, whether imported or developed on-site, shall be moisture conditioned to within two percent (2%) of optimum and compacted to at least 95% of maximum modified Proctor dry density (ASTM D 1557).
 2. Under landscape areas (top 12-inches): Eighty five percent (85%) of maximum standard Proctor dry density at moisture content within two percent (2%) of optimum (ASTM D 698).

3.13 GRADING

- A. General: Uniformly grade areas within project limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations or contours are indicated or between such points and existing grades.
- B. Subgrade tolerances are as follows:
 - 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than one tenth foot (0.10') above or below required subgrade elevations.
 - 2. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than two one-hundredths foot (0.02') above or below required subgrade elevation.
- C. Under no circumstances shall variations from specified grade elevations create any ponding or retention of water on intermediate pavement levels, or finished surfaces.

3.14 PLACING STOCKPILED TOPSOIL

- A. Refer to Division 32 Section "Topsoil".

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Project Manager may engage a qualified special inspector to perform the inspections in addition to the Contractors requirements for testing for the purposes of verifying results of Contractor's Testing Agency.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Project Manager; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work.

3.17 MAINTENANCE

- A. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface

or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal from City's Property: Remove waste materials, including materials not allowed for fill, backfill or site grading as specified within, trash, contaminated materials, and debris, and legally dispose of it off City's property at Contractor's expense. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Project Manager.
- B. Remove any excess fill material from the site, unless otherwise directed by the Project Manager.
- C. Remove any materials determined to be hazardous or contaminated to DADS. DADS Disposal tickets or hazardous waste manifest tickets shall be provided to the Contractor by Project Manager.
- D. Removal of unsuitable material above and beyond the amounts indicated in the area of environmental concern, and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

PART 4 - MEASUREMENT AND PAYMENT

4.1 EARTHWORK AND SOIL IMPORT

A. MEASUREMENT

- 1. Measurement will be made by the contract unit specified for Earthwork and shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

B. PAYMENT

- 1. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, stockpiling, disposing, hauling off, importing fill, re-transporting to fill locations (from locations of excavation or from onsite stockpiles), watering, compaction, sub-grade preparation, measuring of subgrade to bring within tolerances, backfilling, dust control, erosion and sediment control, rough grading, fine grading, as required in accordance with the Contract Drawings and Specifications. Stripping and stockpiling of topsoil shall be paid for separately under Division 32 Section "Topsoil".

4.2 CABI FOR WORK WITHIN AREA OF ENVIRONMENTAL CONCERN AND RACS USING HAND METHODS

A. MEASUREMENT

- 1. Measurement will be made by the contract unit specified. Measurement shall include the actual number of days of labor performed by the Certified Asbestos Building Inspector as directed by the Project Manager, and in accordance with the Specifications.

B. PAYMENT

1. Payment will be made at the contract unit price and shall include required materials, transportation, equipment, and labor required to review excavation spoils, management of RACS using hand methods on surface or subsurface, bag and remove from site encountered RACS, and identify/profile impacted soils.

4.3 MANAGEMENT AND DISPOSAL OF RACS IN AREA OF ENVIRONMENTAL CONCERN USING MECHANICAL METHODS

A. MEASUREMENT

1. Measurement will be made by the contract unit specified and shall include the actual number of units of specified material(s) removed from the site as shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

B. PAYMENT

1. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, stockpiling, disposing, hauling off, watering, compaction, dust control, erosion and sediment control, as required in accordance with the Contract Drawings and Specifications.

4.4 SOIL EXPORT IN AREA OF ENVIRONMENTAL CONCERN

A. MEASUREMENT

1. Measurement will be made by the contract unit specified and shall include hauling the actual number of units of specified material(s) as shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

B. PAYMENT

1. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, and labor for hauling and transporting excavated soils, as required in accordance with the Contract Drawings and Specifications.

4.5 EARTHWORK IN AREA OF ENVIRONMENTAL CONCERN

A. MEASUREMENT

1. Measurement will be made by the contract unit specified for Earthwork in Area of Environmental Concern and shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

B. PAYMENT

1. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, stockpiling, disposing, hauling off, importing fill, re-transporting to fill locations (from locations of excavation or from onsite stockpiles), watering, compaction, sub-grade preparation, measuring of subgrade to bring within tolerances, backfilling, dust control, erosion and sediment control, rough grading, fine grading, as required in accordance with the Contract Drawings and Specifications. Stripping and stockpiling of topsoil shall be paid for separately under Division 32 Section "Topsoil".

END OF SECTION 31 20 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

1. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. All work shall be completed in accordance with the approved Materials Management Plan (MMP).

1.2 SUMMARY

- A. This Section includes requirements for the excavation and backfill for all piping, conduit, or related appurtenances, as shown on the plans and as specified herein. All work shall be done in conformance with the Detail and Technical Specifications for Storm Drainage and Sanitary Sewer Construction - 4.0 Utility Trenching and Excavation and 5.0 Bedding and Backfilling, available from Denver Wastewater Management Division.
- B. <https://www.denvergov.org/content/dam/denvergov/Portals/711/documents/StormMasterPlan/StormDrainageDesignTechnicalCriteria.pdf>
- C. Related Work: Contractor shall comply with the requirements of the following Sections when installing underground utilities.
 1. Division 01 Section "Layout of Work and Surveys".
 2. Division 01 Section "Tree Retention and Protection".
 3. Division 31 Section "Clearing and Grubbing".
 4. Division 31 Section "Earth Moving".
 5. Division 32 Section "Soil Preparation".
 6. Division 32 Section "Topsoil".
 7. Division 32 Section "Sodding".
 8. Division 32 Section "Landscape Irrigation".
 9. Division 32 Section "Automatic Irrigation Controllers"
- D. Materials Management Plan. All work shall be in accordance with the approved materials and management plan (MMP)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

- 4.1 MEASUREMENT: No separate measurement shall be made for work under this Section.
- 4.2 PAYMENT: No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 31 23 16

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing, hauling, and applying water required for compaction of embankments, backfills, sub-grade, and for landscaping, dust control, and other construction operations.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Earth Moving".
 - 3. Division 31 Section "Excavation and Backfilling of Trenches.
 - 4. Division 32 Section "Aggregate Base Course".
 - 5. Division 32 Section "Turfgrass Seeding".
 - 6. Division 32 Section "Native Seeding".
 - 7. Division 32 Section "Sodding".
 - 8. Division 32 Section "Trees, Plants, and Groundcovers".

PART 2 - PRODUCTS**2.1 WATER**

- A. If water supply is from a hydrant, the Contractor shall supply a Denver Water approved and calibrated water meter to measure water usage and be responsible to pay all costs related to water usage. The cost of water shall be charged at the current City and County of Denver rate through Denver Water.
- B. Water applied for moisture density control, pre-wetting, and as dust palliative shall be free of debris, organic matter, and other objectionable substances.
- C. Water for landscaping shall be free from oils, acids, salts or any substance that may be harmful to plant life. Non-potable water may be accepted on a case-by-case basis as approved by Project Manager.
- D. When the water source proposed for use by the Contractor is not known, the Contractor shall provide an analysis of water samples from an approved testing laboratory. The analysis shall be provided to the Project Manager prior to use.

PART 3 - EXECUTION

3.1 WATER TRUCK

- A. At least one water truck shall be on site or as directed by Project Manager.
 - 1. Truck shall have capacity of at least one-thousand (1,000) gallons, or be of adequate size related to the scope of work or as directed by the Project Manager.
 - 2. Water is to be metered for measurement, the Contractor shall provide and use an approved Denver Water metering device.
 - 3. Monthly water usage readings either from the vehicle or from a meter are to be provided to the Project Manager

3.2 APPLICATION

- A. Pressure type distributors or a pipeline equipped with sprinkler system.
- B. Moisture and Density Control: Ensure a uniform and controlled application of water without ponding or causing erosion for optimum moisture content.
- C. Pre-wetting: Pre-wetting material in excavation areas prior to removal for placement in embankments will be allowed as approved by the Project Manager. Prior to excavation the Contractor shall drill, bore or dig test holes to the full depth of excavation to determine moisture requirements. The contractor will identify and confirm with the Project Manager the areas for pre-wetting, including equipment to be used for the pre-wetting operations.
- D. Landscape Watering: The Contractor shall provide water for seeding, mulching, planting, transplanting, sodding, herbicide treatment, maintenance operations including watering during warranty periods or any other landscape related activities when called out on the Contract Drawings or Specifications.
- E. If overwatering occurs during any of the above operations, de-water at no additional expense to the City.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 31 32 50

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the requirements for furnishing and placing crushed aggregate, bonded with fine aggregate, constructed on a prepared underlying course in accordance with these specifications and in conformity with the dimensions, typical cross section, and the lines and grades shown on the Contract Drawings. The locations where aggregate base course will be used are shown on the Contract Drawings.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Contractor Quality Control".
 - 3. Division 01 Section "Erosion and Sedimentation Control".
 - 4. Division 31 Section "Earth Moving".
 - 5. Division 32 Section "Asphalt Pavement".
 - 6. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

1.3 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Certification: Contractor shall provide a certificate of compliance for any imported Aggregate Base Course materials.
- C. Gradation and Standard Proctor Density Test Results: For imported backfill materials, at a minimum, submit results of gradation tests and standard proctor density test.
- D. Sample: Provide a 1-pound (1#) sample of material(s) for approval.

PART 2 - PRODUCTS**2.1 AGGREGATE BASE COURSE**

- A. Aggregate base course shall meet the requirements of Item 703.03 of the Standard Specifications for Road and Bridge Construction of the Colorado Department of Highways, latest revision for Class five (5) or Class (6), or as specified by the Soils Engineer and on Contract Drawings.

2.2 RECYCLED CONCRETE

- A. May be substituted for five (5) or Class (6) Aggregate, if acceptable to the Project Manager.

2.3 AGGREGATE

- A. The use of this term implies the use of Aggregate Base Course within this Section only.

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. All equipment necessary for the proper construction of this work shall be in working condition, and shall be free of fluid leaks. Project Manager reserves the right to have any piece of equipment removed from the site if it is deemed inoperable and/or is leaking fluids.

3.2 PREPARING SUBGRADE

- A. The underlying subgrade or base course shall be tested at the Contractors expense and accepted by the Project Manager before placing and spreading operations are started. See Division 01 Section "Contractor Quality Control".

3.3 METHOD OF SPREADING

- A. The aggregate material shall be placed on the prepared underlying course and compacted in layers not to exceed six-inches (8") in depth before compaction. The depositing and spreading of material shall commence where designated and shall progress continuously without breaks. The material shall be deposited and spread in a uniform layer and without segregation of size to a uniform thickness.
- B. The aggregate spread shall be of uniform grading with no pockets of fine or coarse materials. During the spreading process, sufficient caution shall be exercised to prevent the incorporation of underlying materials in the aggregate.

3.4 COMPACTION OF AGGREGATE BASE COURSE

- A. When aggregate base course is used as part of asphalt roadway system (asphalt and base course composite section), the aggregate base course shall be compacted to 95% of Modified Proctor per ASTM D-1557, within 2% of optimum moisture.
- B. Aggregate material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").
- C. Compaction shall be obtained by the use of vibratory rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Project Manager. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Project Manager. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained.
- D. Prior to placement of any base or surfacing materials, one-hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.

3.5 PROTECTION

- A. Spreading of aggregate shall not take place when temperatures are below freezing. When the aggregate base course contains frozen material or the underlying subgrade is frozen, construction shall not occur.

3.6 MAINTENANCE

- A. Following the completion of the base course, the Contractor shall perform all maintenance work necessary to keep the aggregate in a satisfactory condition until acceptance of the project. The surface shall be kept clean and free from foreign material. The base course shall be properly drained at all times. Any work, maintenance or necessary repairs shall be performed at the expense of the Contractor.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 32 11 16

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for the following:
 - 1. Constructing one or more surface courses composed of a mixture of aggregate, filler if required, and bituminous material, placed on a prepared base.
 - 2. Asphalt surface treatments.
 - 3. Pavement-marking paint.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Contractor Quality Control".
 - 3. Division 01 Section "Erosion and Sedimentation Control".
 - 4. Division 01 Section "Material and Equipment".
 - 5. Division 31 Section "Earth Moving".
 - 6. Division 31 Section "Excavation and Backfilling of Trenches".
 - 7. Division 32 Section "Aggregate Base Course".
 - 8. Division 32 Section "Concrete Walks, Curbs and Miscellaneous Flatwork".
 - 9. Division 32 Section "Traffic Markings".

1.3 REFERENCES

- A. Plant mix pavements for this project shall be done in accordance the Metropolitan Government Pavement Engineers Council (MGPEC) Specification Item 20 for Hot Mix Asphalt Pavement (HMA) and Stone Matrix Asphalt (SMA). The latest issue is available from www.Mgpec.org.
- B. The MGPEC specifications to be used for this project are written as a stand-alone document. Included with the specifications Item 20 for mix identifying Asphalt Mixture criteria (grading, binder, %RAP and design level).

1.4 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Mix Designs: Submit substantiating data for each Asphalt mix design specified for use to the Project Manager not less than four (4) weeks prior to first Asphalt placement. Data for each mix shall, as a minimum, include the following:
 - 1. Mix identification designation (unique for each mix submitted).
 - 2. Statement of intended use for each mix.
 - 3. Mix proportions.

- C. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.5 QUALITY CONTROL

- A. Installer Qualifications: Submit supportive documentation as to the asphalt installer's qualifications relative to training and experience for installation of asphalt required for this Project. Installer to have been in business in the State of Colorado continuously for a minimum of five (5) years, and can prove experience on completed jobs of similar scope and complexity.
- B. Preinstallation Conference: Conduct conference at Project Site.
 - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review condition of subgrade and preparatory work.
 - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- C. Quality Control: The Contractor is responsible for Quality Control Testing, including workmanship and materials furnished by his subcontractors and suppliers.
 - 1. Per MGPEC requirements.
 - 2. Inspection or testing does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.
 - 3. Contractor is responsible for proof rolling and or testing of all sub-grade prior to placement of Aggregate Base Course. The Contractor shall verbally or in writing inform the Project Manager the day of any failed or passed tests.
 - 4. The Project Manager shall be notified a minimum of forty eight (48) hours prior to the dates of concrete placement and testing.
 - 5. Contractor shall provide written test results within forty eight (48) hours of receiving results from testing agency.
 - 6. Should a test result come back as failed, the Contractor is responsible for removal, disposal and replacement of failed sections until specifications have been met. This work shall be completed at no additional cost to the City.
 - 7. City reserves the right to provide Quality Assurance testing at any time during the project.
- D. Testing:
 - 1. Contractor is responsible for providing Quality Control testing through a third party testing agency. The third party testing agency will provide testing at random locations and times as directed by the Project Manager to insure that quality Control standards are being achieved.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Prime Coat: Minimum surface temperature of sixty (60) deg F.
 - 2. Tack Coat: Minimum surface temperature of sixty (60) deg F.
 - 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 - 4. Asphalt Base Course: Minimum surface temperature of forty (40) deg F and rising at time of placement.
 - 5. Asphalt Surface Course: Minimum surface temperature of sixty (60) deg F at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of forty (40) deg F for oil-based materials fifty five (55) deg F for water-based materials, and not exceeding ninety five (95) deg F.

PART 2 - PRODUCTS

- 2.1 ASPHALT MIX: Refer to MGPEC Specification: The latest issue is available from www.Mgpec.org.
 - A. Item 7- Aggregate Base Course
 - B. Item 20-Hot Mix Asphalt Pavement (HMA) and Stone Matrix Asphalt (SMA).
 - C. Item 22- Paving Fabric

2.2 PAVEMENT MARKING PAINT AND ASSOCIATED MATERIALS

- A. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
 - 1. Color: White and Blue

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than fifteen (15) tons.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Project Manager, and replace with compacted backfill or fill as directed.
 - C. Proceed with paving only after unsatisfactory conditions have been corrected.
- 3.2 REFERENCE STANDARD: Refer to MGPEC Specification. The latest issue is available from www.Mgpec.org.
- A. Item 5- Stabilized Subgrade
 - B. Item 7- Aggregate Base Course
 - C. Item 20-Hot Mix Asphalt Pavement (HMA) and Stone Matrix Asphalt (SMA).
 - D. Item 22- Paving Fabric
 - E. Items 13A through 19 pertaining to cutting, sealing and patching.
- 3.3 QUALITY CONTROL
- A. Record of Work: Contractor to keep a record listing the time and date of placement of all asphalt materials. Such record shall be kept until the completion of the project and shall be available to the Project Manager for examination at any time. A copy of the record shall be kept and included as part of the O&M manuals at project closeout.
 - B. Manufacturer Qualifications: Submit supportive documentation as to the paving mix manufacturer's qualifications, registered with and approved by Project Manager. Manufacturer is to have been in business in the State of Colorado continuously for a minimum of five (5) years.
 - C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Denver Department of Public Works for asphalt paving work.
 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- 3.4 ASPHALT PAVEMENTS
- A. Pavement sections shall be installed in accordance to the project geotechnical report and MGPEC, following the more stringent of the two sources.
 1. Parking Lot Asphalt Pavement:
 - a. Sub-grade shall be reconditioned to a minimum depth of 8-inches or as required per the geotechnical data, whichever is greater. The sub-grade shall be moisture conditioned and compacted to ninety-five percent (95%) of Standard Proctor for ABC.
 - b. Base course shall be a minimum six-inch (6") thickness, moisture conditioned and compacted to ninety-five percent (95%) of Standard Proctor in accordance with MGPEC Item 7.
 - c. Parking areas shall have a minimum asphalt thickness of 5-inches.
 - d. Total thickness of pavement section is eleven-inches (11").
 2. Main drive isles Asphalt Pavement:

- a. Sub-grade shall be reconditioned to a minimum depth of 8-inches or as required per the geotechnical data, whichever is greater. The sub-grade shall be moisture conditioned and compacted to 95% of Standard Proctor.
 - b. Base course shall be a minimum six-inches (6") thickness, moisture conditioned and compacted to ninety-five percent (95%) of Standard Proctor in accordance with MGPEC Item 7.
 - c. Main drive aisles shall have a minimum asphalt thickness of six inches (6").
 - d. Total thickness of pavement section shall be twelve inches (12").
3. Pedestrian Walk Asphalt Pavement:
- a. Sub-grade shall be reconditioned to a minimum depth of eight-inches (8") or as required per the geotechnical data, whichever is greater. The sub-grade shall be moisture conditioned and compacted to ninety-five percent (95%) of Standard Proctor.
 - b. **[If required by geotech and shown on Contract Drawings.]** Base course shall be a minimum six-inch (6") thickness, moisture conditioned and compacted to ninety-five percent (95%) of Standard Proctor in accordance with MGPEC Item 7.
 - c. Asphalt pedestrian walkways shall have a minimum asphalt thickness of four-inches (4"), installed in two (2) equal lifts.
 - d. Total thickness of pavement section is ten-inches (10").

3.5 PATCHING AND REPAIRS

- A. Refer to MGPEC Items 19, 23, and 27.

3.6 SURFACE PREPARATION

- A. Refer to MGPEC Item 20.

3.7 SURFACE TREATMENTS

- A. Fog Seal: Refer to MGPEC Item 24.
- B. Chip Seal: Refer to MGPEC Item 25.
- C. Slurry Seals: Refer to MGPEC Item 26.

3.8 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Project Manager.
- B. Sweep and clean surface to eliminate loose material and dust.
- C. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of fifteen (15) mils.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Asphalt Pavement. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, sub-grade preparation, base course aggregate, base course placement, asphalt compaction, testing, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 12 16

SECTION 32 13 13 CONCRETE WALKS, CURBS, AND MISCELLANEOUS FLATWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing, placing, shoring, bracing, and anchorage of formwork, concrete reinforcement, accessories, and placing concrete flatwork, including walks, curbs and gutters, ramps, and pans, including installation of control and expansion joints, concrete curing and concrete finishing.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Submittals".
 - 3. Division 01 Section "Contractor Quality Control".
 - 4. Division 01 Section "Erosion and Sedimentation Control".
 - 5. Division 03 Section "Cast-In-Place Concrete".
 - 6. Division 31 Section "Earth Moving".
 - 7. Division 32 Section "Aggregate Base Course".

1.3 REFERENCES

- A. Project Geotechnical Report (Geotechnical Engineering Study, Proposed Rude Park ADA Improvements, West Holden Place and Federal Boulevard, Denver, Colorado March 2, 2016, revised May 3, 2016).
- B. Note: All references below shall be from the most current edition.
- C. American Concrete Institute (ACI):
 - 1. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications of Structural Concrete for Buildings.
 - 3. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - 4. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
 - 5. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 6. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 7. ACI 347 - Recommended Practice for Concrete Formwork.
- D. American Society for Testing and Materials (ASTM):
 - 1. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
 - 2. ASTM C33 - Concrete Aggregates.
 - 3. ASTM C94 - Ready-Mixed Concrete.
 - 4. ASTM C150 - Portland Cement.
 - 5. ASTM C260 - Air Entraining Admixtures for Concrete.

6. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
7. ASTM C494 - Water Reducing Admixtures for Concrete.
8. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
9. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
10. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.

E. CRSI - Manual of Standard Practice.

F. Colorado Department of Transportation (CDOT) – Standard Specifications for Road and Bridge Construction, latest edition

G. NRMCA: National Ready Mixed Concrete Association

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

B. Definitions: Refer to ACI 301 11.7 for definition of slab surface finishes.

1.5 QUALITY CONTROL

A. Reference Standards: Comply with following standards except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) Publications: Comply with the following unless modified by requirements in the Contract Drawings. Note: All references below shall be from the most current edition.
 - a. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - b. ACI 301 - Specifications of Structural Concrete for Buildings.
 - c. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - d. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
 - e. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - f. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - g. ACI 347 - Recommended Practice for Concrete Formwork.
 - h. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
 - i. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
 - j. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - k. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - l. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
 - m. ASTM C33 - Concrete Aggregates.
 - n. ASTM C94 - Ready-Mixed Concrete.
 - o. ASTM C150 - Portland Cement.
 - p. ASTM C260 - Air Entraining Admixtures for Concrete.
 - q. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
 - r. ASTM C494 - Water Reducing Admixtures for Concrete.
 - s. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
 - t. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
2. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.

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3. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.
- B. Pre-Construction Conference: Conduct conference at location approved by Project Manager.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Special concrete finish subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.
- C. Testing: Refer to Part 3 QUALITY CONTROL for Contractor's testing requirements.

1.6 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Product Data: For each type of product indicated.
- C. Material Certificates: For the following, from manufacturer:
1. Cementitious materials.
 2. Steel reinforcement and reinforcement accessories.
 3. Fiber reinforcement.
 4. Admixtures.
 5. Curing compounds.
 6. Applied finish materials.
 7. Bonding agent or epoxy adhesive.
 8. Joint fillers.
- D. Field quality control reports.
- E. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- F. Mix Designs:
1. Submit substantiating data for each concrete mix design specified for use to the Project Manager not less than four (4) weeks prior to first concrete placement. Data for each mix shall, as a minimum, include the following per section 2.7.B:
 - a. Mix identification designation (unique for each mix submitted).
 - b. Statement of intended use for mix.
 - c. Mix proportions.
 - d. Aggregates.
 - e. Admixtures (must be approved by the Project Manager)
 - f. Wet and dry unit weight.

- g. Entrained air content.
- h. Design slump.
- i. Strength qualification data.

1.7 DELIVERY, STORAGE AND HANDLING

- A. General: Materials handling and batching shall conform to applicable provisions of ASTM C94.
- B. Reinforcing: Unload and store reinforcing bars so they are kept free of mud and damage.
- C. Hauling Time for Concrete: Deliver and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours from batch time, or three hundred (300) revolutions of the drum after the initial mixing water has been added, whichever is earliest.
- D. Extra Water:
 - 1. Deliver concrete to site in exact quantities required by design mix.
 - 2. Should extra water be required for workability before depositing concrete, and the water/cement ratio of accepted mix design will not be exceeded, the General Contractor's superintendent shall have the sole authority to authorize addition of water. Additional water shall not exceed one (1) gallon/cu. yd. Any additional water added to mix after leaving batch plant shall be indicated on truck ticket and signed by person responsible.
 - 3. Where extra water is added to concrete, it shall be mixed thoroughly for thirty (30) revolutions of drum before depositing.
 - 4. Water may be added at the site only once for each batch.
 - 5. A full set of tests shall be performed after addition of water. Excessive slump or other out of range tests will be cause for rejection.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Placement:
 - a. When for three successive days prior to concrete placement the average daily outdoor temperature drops below forty degrees (40°) F or when the average outdoor temperature is expected to drop below forty degrees (40°) F on the day of concrete placement, preparation, protection and curing of concrete shall comply with ACI 306R. Concrete temperature shall be maintained above fifty degrees (50°) F using concrete blankets or heating.
 - b. Minimum temperature of concrete upon delivery shall conform to ACI 301 Table 7.6.1.1. Concrete at time of placement shall conform to minimum values of ACI 306R Table 1.4.1, and shall not be below minimum temperature of fifty degrees (50°) F.
 - c. Subject to acceptance of the Project Manager an accelerating admixture may be used. Admixtures shall meet requirements of Part 2. Calcium Chloride and other chloride-type accelerating admixtures are not allowed.
 - d. Comply with concrete protection temperature requirements of ACI 306R. Record concrete temperatures during specified protection period at intervals not to exceed sixteen (16) hours and no less than twice during any twenty four (24) hour period.
 - 2. Hot Weather Placement:

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- a. When depositing concrete in hot weather, follow recommendations of ACI 305R.
 - b. Temperature of concrete at time of placement shall not exceed eighty five (85°) F.
 - c. When air temperatures on day of placement are expected to exceed ninety degrees (90°) F, mix ingredients shall be cooled before mixing. Flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for all or part of mix water.
 - d. Retarding admixture may be used subject to acceptance of the Project Manager. Admixtures shall meet requirements of Part 2.
 - e. Protect to prevent rapid drying. Start finishing and curing as soon as possible.
- B. Protection: Protect newly finished slabs from vandalism and all weather related damage. Protect finished slabs from mortar leakage from pouring of concrete above. Cover masonry walls, glazing, and other finish materials with polyethylene or otherwise protect from damage due to pouring of concrete.
- C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- D. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of forty degrees (40°) F for oil-based materials, fifty five degrees (55°) F for water-based materials, and not exceeding ninety five degrees (95°) F.

1.9 RIGHT OF WAY WORK

- A. Contractor shall obtain all necessary permits when working with in the Right of Way.
- B. Contractor shall preserve and protect all permanent land survey control markers. Per the General Contract Conditions Article 319 “Preservation of Permanent land Survey Control Markers”.

PART 2 - PRODUCTS

2.1 SUBGRADE MATERIAL

- B. Dense, readily compactible material, free from organic matter, clay, and loose rock in excess of one and one half-inches (1-1/2”). Material excavated from on-site that meets this requirement may be used if approved by Project Manager. Material properties to be in conformance with project Geotechnical Report.

2.2 FORM MATERIALS

- A. Hand Placed Steel Forms: Hand placed steel forms are only to be used for sections that are straight and have no bend, radii or curvature in the sections to be used.
- B. Plywood Forms: Are to be used on any section of concrete that have bends, radii or curvature. Forms shall be made of Douglas Fir or Spruce species; solid one side grade; sound, undamaged sheets with straight edges. Staking shall be adequate to hold wet concrete while maintaining the desired radii.
- C. Lumber: Douglas Fir or Spruce species; construction grade; with grade stamp clearly visible.

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- D. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 CONCRETE MATERIALS

- A. Provide materials in accordance with ACI 301, unless amended or superseded by requirements of this section or general notes on structural drawings.
 - 1. General: Ready-mixed Concrete: ASTM C94. On-site mixed concrete not allowed.
 - 2. Cement: ASTM C150. Type II minimum of five hundred sixty four (564) pounds per cubic yard.
 - 3. Fly Ash: ASTM C618 Class F. Fly ash shall not exceed fifteen percent (15%) of total cementitious material by weight.
 - 4. Aggregate: ASTM C33.
 - a. Obtain from same source throughout project.
 - b. All sand and aggregates to meet C-33 Table 3 for Class 4S "Severe Weathering Region".
 - 1) Fine Aggregate: Clean, natural sand.
 - 2) Coarse Aggregate: Clean gravel or crushed stone.
 - 5. Water: ASTM C 94/C 94M, Clean and not detrimental to concrete.

2.4 STEEL REINFORCEMENT

- A. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than twenty five percent (25%).
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars.
- D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.
- E. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars.
- F. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- G. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

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1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

I. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

2.5 SLIP "SPEED" DOWELS

A. Slip Joints:

1. Speed Dowel Model PSD09/#4TX, 9" long sleeve to accommodate 18" smooth steel round bar. Manufactured by Sika/Greenstreak, (800)325-9504, or equal.
2. Dowel, 18" long smooth round steel bar, 5/8" diameter. De-bur cut ends.

2.6 ADMIXTURES

A. General: Unless specified, no admixtures may be used without specific approval of the Project Manager.

B. Prohibited Products: Calcium chloride or admixtures containing more than 0.05% chloride ions or thiocyanates are not permitted.

C. Air-Entraining Admixture: ASTM C260. Subject to compliance with requirements, provide one of the following:

1. "Air Mix" by Euclid Chemical Co.
2. "Darex ARA" by W. R. Grace.
3. "Micro-Air" by Master Builders.
4. Or equal.

D. Water Reducing Admixture: ASTM C494, Type A. Subject to compliance with requirements, provide one of the following:

1. "Eucon WR-75" by Euclid Chemical Co.
2. "Rheobuild 1000" by Master Builders.
3. "Plastocrete 106" by Sika Chemical Co.
4. Or equal.

E. High Range Water Reducing Admixture (Superplasticizer): ASTM C494, Type F or G. Subject to compliance with requirements, provide one of the following:

1. "Eucon 37" by Euclid Chemical Co.
2. "Pozzolith 400N" by Master Builders.
3. "Sikament" by Sika Chemical Co.
4. Or equal.

F. Warm weather admixtures: ASTM C494. Use of admixtures will not relax warm weather placement requirements.

G. Cold Weather Admixtures: ASTM C494. Use of admixtures will not relax cold weather placement requirements.

H. Color Admixtures

1. Davis Colors chart or approved equal.

2.7 CONCRETE MIX

- A. Refer to the Denver Right of Way Services approved materials list of pre-approved concrete mixes at the following website:

<https://www.denvergov.org/content/denvergov/en/right-of-way-services/engineering-regulatory-analytics/engineering-plan-review/manuals-regulations.html>

- B. All Concrete mixes from the approved list or submitted for approval shall meet the following criteria.
 1. All concrete for flatwork shall be Class P (four thousand five hundred (4,500) PSI) unless otherwise requested by the Project Manager.
 2. Mix concrete in accordance with ASTM C94 and ACI 301 Chapter 3.
 3. Cement Content: Type II cement, minimum of five hundred sixty four pounds (564#) per cubic yard.
 4. Maximum water-cement ratio: 0.44.
 5. Slump: 4-inches maximum when hand placed.
 6. Air Entrainment: five percent (5%) to eight percent (8%).
 7. Aggregate Size: three quarter-inch (3/4") maximum.
 8. Deliver concrete and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours from batch time, or three hundred (300) revolutions of the drum after the initial mixing water has been added, whichever is earliest.
 9. During cold weather (below forty five degrees (45°) F), use heated water and aggregates if necessary to maintain concrete temperature between sixty degrees (60°) F. and ninety degrees (90°) F.
 10. Concrete for Footings, Walls, and Interior Slabs-on-Grade shall be Class B, as approved by the Project Manager.
 11. Concrete for Exterior Flatwork, including Pavement, Curb and Gutter, and Drainage Pans shall be Class P, as approved by the Project Manager.
 12. Fly Ash: Per CDOT Standard Specifications for Road and Bridge Construction Section 701.02.

2.8 FIBROUS CONCRETE REINFORCEMENT

- A. Shall be one hundred percent (100%) virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation utilizing twenty five (25) individual fiber designs for use as concrete secondary reinforcement. Volume per cubic yard shall be one and one-half (1.5) pounds, or in accordance with manufacturer's recommendations. Fiber manufacturer must document evidence of five (5) year satisfactory performance history, compliance with applicable building codes and ASTM C1116 Type III 4.1.3 and ASTM C1116 Performance Level I.
 1. Fibrous concrete reinforcement shall be utilized in all flatwork applications.

2.9 EXPANSION JOINT MATERIAL

- A. Interior Use or Exterior Use where sealants are specified: Bituminous saturated fiber conforming to ASTM D1751, one half-inch (1/2") thick. Provide manufacturer's certification of compatibility with specified sealants where required.

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- B. Pre-molded closed cell polyethylene foam: Backer rod if required, equal to “Sonoflex F” by BASF, Provide half-inch (1/2”) thick by depth of the slab material, allow half-inch (1/2”) thickness for joint sealer.
- C. Joint Sealant: Sonolastic Sealant as manufactured by BASF or a silicone material that is on CDOT’s approved silicone sealant list. Where color additive is used, color to match.

2.10 CONTROL JOINTS

Shall be in conformance with current Denver Department of Public Works Traffic Engineering Standards and Details and as shown on Contract Drawings:
<https://www.denvergov.org/content/dam/denvergov/Portals/730/documents/dpw-transportation-standards-details-may-2015.pdf>

2.11 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately nine (9) oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
 - 1. Products: Subject to compliance with requirements,
 - a. BASF Construction Chemicals, LLC; Confilm.
 - b. Or approved equal.
- E. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type two (2), Class B, dissipating.
 - 1. Products: Subject to compliance with requirements :
 - a. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
 - b. Or approved equal.

2.12 RELATED MATERIALS

- A. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of one eighth-inch (1/8”) to one quarter-inch (1/4”) to match Project Manager’s sample.
 - 1. Products: Subject to compliance with requirements:
 - a. Conspec by Dayton Superior; Delay S.
 - b. Or approved equal.

2.13 TRUNCATED DOME INSERTS FOR RAMPS

- A. Shall be in conformance with current Denver Department of Public Works standards.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

- A. Requirements of Regulatory Agencies: Comply with all applicable provisions of the state and local building and safety codes.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer, unless otherwise approved by Project Manager.
- C. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- D. Testing: All testing shall be completed by the Contractor at their expense unless otherwise specified by the contract.
- E. Testing Agency Qualifications: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures. Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- F. Testing Frequency: Obtain at least one composite sample for each one hundred (100) cubic yards, or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five (5) compressive-strength tests for each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one (1) test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one (1) set of four (4) standard cylinder specimens for each composite sample.
 - 5. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at twenty eight (28) days. and keep one for backup in the event a sample should break.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at twenty eight (28) days.
- G. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than two-hundred (200) psi.

- H. Test results shall be reported in writing to Project Manager, concrete manufacturer, and Contractor within forty eight (48) hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at twenty eight (28) days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both seven (7) and twenty eight (28) day tests.
- I. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Project Manager.
- J. Concrete work will be considered defective if it does not pass tests and inspections.
- K. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- L. Prepare test and inspection reports.
- M. Record of Work: A record shall be kept by the Contractor listing the time and date of placement of all concrete for the structure. Such record shall be kept until the completion of the project and shall be available to the Project Manager for examination at any time.
- N. Mockups: If requested by the Project Manager, prior to starting any concrete work, provide a sample panel using materials indicated for project work. For each type, color and finish of concrete specified, build panel at the site of full thickness and approximately ten feet (10') by 10 feet (10'), including expansion joints, control joint, scales, fillers, and one radial edge. Provide the workmanship proposed for the work. Correct and replace sample panel until Project Manager's acceptance of the work. Retain panel(s) during construction as a standard for completed paving work.
 - 1. Build panel approximately one-hundred (100) sq. ft. in the location indicated or, if not indicated, as directed by Project Manager.
 - 2. Approved mockups may become part of the completed Work if approved prior to the construction of the mock up and is undisturbed at time of Substantial Completion.
 - 3. Notify the Project Manager a minimum of seven (7) days in advance of dates and times when mockups will be constructed.
 - 4. Obtain the Project Manager's written approval of the mockups before starting construction.
 - 5. If the Project Manager determines that the mockup does not meet the requirements, demolish and remove from the site and cast another until the mockup is approved.
 - 6. Maintain the mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed by Project Manager.
- O. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.

3.2 PREPARATION OF SUBGRADE

- A. Excavate to required depth in accordance with geotechnical report. Remove soft, yielding material and replace with select fill. Compact to minimum ninety five percent (95%) Standard Proctor within two percent (2%) of optimum moisture.
- B. Refer to Division 31 Section: Earth Moving for requirements for subgrade testing and proof-rolling.

3.3 MAINTENANCE OF SUBGRADE

- A. Maintain subgrade in a compacted condition until concrete is placed.

3.4 FORMS

- A. Metal or uniform warp free lumber, coated with form release agent. Slope forms to give slabs positive drainage and stake securely. Obtain approval of Project Manager for alignment and grade of forms a minimum of forty eight (48) hours prior to placing concrete. Any concrete work installed without obtaining approval from the Project Manager shall be subject to removal and replacement at the discretion of the Project Manager, at no cost to the City.
- B. Radii shall be continuous and flowing to avoid angular intersections in the horizontal alignment, radial forming shall use bender board or approved equal as directed by Project Manager.

3.5 STEEL REINFORCEMENT

- A. Install steel reinforcement only in locations shown on Contract Drawings.
- B. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- C. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- D. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.6 CONCRETE PLACEMENT

- A. Prior to placing any new sections of asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of 6-inches. In areas where existing pavement is to be removed and replaced the existing compacted subgrade may be reused if the subgrade meets specified compaction. In areas of existing subgrade that do not meet the specified compaction, materials shall be removed, replaced and compacted to meet the specified proctor density. Adjust moisture content and compact as hereinafter specified.
- B. Before placing concrete, inspect and complete formwork installation, steel reinforcement (if present), and items to be embedded or cast-in.
- C. Do not place concrete on frozen surfaces.

- D. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- E. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- F. Do not add water to concrete during delivery.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not use vibratory equipment to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Screed paving surface with a straightedge and strike off.
- J. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- K. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- L. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- M. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below forty degrees (40°) F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than fifty degrees (50°) F and not more than eighty degrees (80°) F at point of placement.
 - 2. If subgrade is frozen, as determined by Geotechnical Engineer and/or Project Manager, thaw subgrade to depth of eight (8") prior to placing concrete.
 - 3. Do not use frozen materials or materials containing ice or snow.
 - 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- N. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below ninety degrees (90°) F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 CONCRETE FINISHING

- A. Allow time for bleed water to appear, then scrape or push off all bleed water. Do not work water into surface.
- B. Final level, light bull float, but do not trowel surface.
- C. After darbying or bullfloating, stop finishing until bleeding has ceased and until concrete can support foot pressure with only about one eighth-inch (1/8") indentation. During or after the first floating, check planeness of surface with a ten foot (10') straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within one eighth-inch (1/8") in ten feet (10').
- D. Finishes:
 1. Medium Broom Finish: Provide a medium broom finish for all exterior concrete unless otherwise noted. Immediately after float finishing and tool work, roughen surface with fiber-bristle broom to match the approved mockup panel. Confirm direction or pattern of broom finish with the Project Manager prior to commencing slab placement.
 2. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:
 - a. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 - b. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 - c. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 - d. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
 3. Seeded Exposed-Aggregate Finish:
 - a. Immediately after initial floating, spread a single layer of aggregate uniformly on paving surface. Tamp aggregate into plastic concrete and float finish to entirely embed aggregate with mortar cover of one sixteenth-inch (1/16").
 - b. Spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 - c. Cover paving surface with plastic sheeting, sealing laps with tape, and remove sheeting when ready to continue finishing operations.
 - d. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half (1/2) of the diameter of the smallest aggregate.
 - e. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.

- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a three eighths-inch (3/8") radius. Final concrete finish to completed following jointing. Surface/edging tool marks are not acceptable.
- F. Handicap Ramps:
 - 1. Provide score joints in handicap ramps, tooled in a pattern in accordance with standard Denver Public Works standards.
 - 2. Install truncated dome inserts flush with the adjacent ramp surface in accordance with standard Denver Public Works standards, taking care to achieve a tight bond with the concrete, free of air pockets.
 - 3. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.
- G. Do not use evaporative retarders as finishing aid.

3.8 CONCRETE CURING, PROTECTION AND SURFACE TREATMENTS

- A. Refer to the list of curing materials in PART 2 - MATERIALS. Apply curing materials as specified by the manufacturer.
- B. General:
 - 1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.
 - 2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete unless test cylinders, made and kept adjacent to the structure and cured by the same methods, are tested with the average compressive strength equal to seventy percent (70%) of the specified twenty eight (28) day strength.
 - 3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period. During hot and cold weather, cure concrete in accordance with ACI 305R and ACI 306R.
- C. Curing Methods: Perform curing of concrete by moisture curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified. Coordinate with and choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.
 - 1. Provide moisture curing by one of the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping it continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
 - 2. Provide moisture retaining cover curing as follows: Cover concrete surfaces with a moisture-retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least 3-inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Provide curing and sealing compound to exterior slabs, walks, curbs, etcetera as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within thirty (30) minutes). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to rainfall within three hours after initial application.
 - b. Maintain continuity of coating and repair damage during period.
- D. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above for specified curing time.

3.9 JOINTS

- A. Construct joints true to line with faces perpendicular to surface.
- B. Expansion Joints: Expansion joint material shall be provided at the following locations and shall be in place prior to the placing of concrete:
 1. As shown on the Contract Drawings; or
 2. At each end of curb return.
 3. Between sidewalk and driveway slabs or service walks.
 4. Between new concrete and existing concrete.
 5. Between new concrete and fixed vertical objects.
 6. At maximum one hundred twenty foot (120') spacing.
 7. As directed by Project Manager.
 8. Thoroughly clean all surfaces prior to installation of sealant material.
- C. Speed Dowels:
 1. Attach bases to the face of concrete forms using a double-headed nail or self-tapping screw.
 2. Center of base shall be centered on form.
 3. Prior to pouring concrete, Speed Dowel sleeve shall be slipped over base.
 4. Pour concrete minimum eighteen-inches (18") from Speed Dowel system and work concrete around the Speed Dowel System.
 5. Concrete forms shall be removed with bases still attached. Bases may be reused.
 6. Install slip dowels to the full depth of the embedded Speed Dowel sleeve and proceed with next concrete pour.
 7. Greasing of dowels is not required. Embedded Speed Dowel Sleeve accommodates expansion and shrinkage movements that may occur.
 8. Bent or badly sheared slip dowels shall not be used. Saw cut dowels recommended.
 9. Concrete shall not be poured directly over the Speed Dowel System.
 10. Place edge forms plumb. Out of plumb forms may result in misaligned dowels.
- D. Contraction (Control) Joints in Walks: Contraction joints shall be formed with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut one eighth-inch (1/8") wide joints into concrete that has hardened sufficiently that cutting action will not tear, abrade, or otherwise damage surface, but before development of random contraction cracks. Saw cut joints shall be spaced at a distance equal to the width of the walk, but not over ten feet (10') unless approved by the Project Manager. Depth of joints shall be one-fourth (1/4) the slab thickness.

1. Tooled joints will not be allowed on concrete trails, unless directed by the Project Manager.

E. Curb and Gutter Contraction (Control) Joints: Space curb and gutter joints not more than twelve foot six-inches (12'-6") on center, and align them with sidewalk joints. Contraction joints shall be tooled. Form plane of weakness by inserting and later removing a metal divider, finish with an edger or groover, or by saw cutting a previously tooled joint.

3.10 FORM REMOVAL

A. Remove forms after concrete surface is hard enough so as not to be damaged in any way. Reasonable care is to be used in removing forms. Repair minor defects with high strength grout as per Project Managers direction. Plastering will not be permitted on exposed faces.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Project Manager.

B. Drill test cores, where directed by Project Manager, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.12 PAVING TOLERANCES

A. Comply with tolerances in ACI 117, the drawings, and as follows:

1. Elevation: In conformance with grading plans.
2. Thickness: Plus three eighths-inch (3/8"), minus one quarter-inch (1/4").
3. Surface: Gap below ten foot (10') long, unlevelled straightedge not to exceed one eighty - inch (1/8").
4. Lateral Alignment and Spacing of Dowels: one-inch (1").
5. Vertical Alignment of Dowels: one quarter-inch (1/4").
6. Joint Spacing: three-inches (3").
7. Contraction Joint Depth: Plus one quarter-inch (1/4"), no minus.
8. Joint Width: Plus one eighth-inch (1/8"), no minus.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement will be made by the contract unit specified for Concrete Walks, Curbs and Miscellaneous Flatwork. Measurement shall include the actual number of units of specified

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material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, compaction, sub-grade preparation, formwork, placing of concrete, reinforcing, joints, curing, finishing and all other items required to complete the work as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 13 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for demolition, earthwork, grading, furnishing, and placement of crushed stone paving.
 - 1. Furnish and place crushed stone paving, bonded with fine aggregate, constructed on a prepared underlying base course in accordance with these specifications and in conformity with the dimensions, typical cross section, and the lines and grades shown on the Contract Drawings. The locations where crushed stone paving will be used are shown on the Contract Drawings.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Contractor Quality Control".
 - 3. Division 01 Section "Erosion and Sedimentation Control".
 - 4. Division 31 Section "Earth Moving".

1.3 REFERENCES

- A. ASTM C117 – Test Method for Materials Finer than No. 200 (75-um) Sieve in Mineral Aggregates by Washing.
- B. ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D4318 – Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

1.4 SUBMITTALS

- A. Material Analysis: Contractor shall provide copies of the following test data required by ASTM:
 - 1. ASTM C136 - Sieve Analysis.
 - 2. ASTM C127 - Specific Gravity and Absorption.
 - 3. ASTM C131 - L.A. Abrasion.
- B. Samples: Provide a one (1) gallon sample of material for approval.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas, plant materials or within critical root zones.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Rejection of material.
 - 1. Evidence of inadequate protection or improper handling or storage shall be cause for rejection.
 - 2. Any product or material exhibiting signs of damage due to nonconformity to specifications or due to delivery, storage or handling shall be rejected by the Project Manager. Contractor shall be responsible for hauling off-site and disposing of according to general conditions and codes of the governing jurisdiction.

1.6 PROJECT CONDITIONS

- A. Environmental requirements: Work shall occur only when weather and soil conditions permit in accordance with locally accepted practice.
- B. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with proposed crushed stone paving areas by field measurements before proceeding with work.
- C. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others.
- D. Existing Conditions:
 - 1. Utilities: Determine location of existing and proposed underground utilities. Perform work in a manner to avoid damage. Hand excavate, as required.
 - 2. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- E. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained.

1.7 MAINTENANCE SERVICE

- A. General: Maintain Work in accordance with Division 01.
 - 1. Maintenance Period: Begin maintenance immediately after Work is completed. Maintain areas until the end of the Warranty period.

1.8 WARRANTY

- A. See Division 01 Section "Warranty".

PART 2 - PRODUCTS

2.1 CRUSHED STONE PAVING

- A. Type: Crushed granite stone or gravel. Shall be unused material free of shale, lay, friable materials, organics and debris.
1. Size Range: 3/8 inch maximum

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inch	100
3/8 inch	100
No. 4	85
No. 8	63
No. 16	50
No. 30	39
No. 50	29
No. 100	18

2. Color: Uniform pink.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 2. Verify that final grades are completed in accordance with the drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

3.2 QUALITY CONTROL

- A. Mock-up: Provide field constructed sample installation of crushed stone paving, and prepared subgrade.
1. Mock-up to be ten foot (10') x ten foot (10') and located where directed by Project Manager. Mock-up shall include proposed edge and banding, and surface stabilization if specified.
 2. Project Manager shall review mock up within forty eight (48) hours of notification by the contractor.
 3. Make necessary adjustments as directed by Project Manager.
 4. Obtain approval from Project Manager before proceeding with the Work.
 5. Retain and protect mock-up during construction as a standard for judging completed crushed stone paving work. Do not remove or destroy mock-up until work is completed.
 6. Accepted and properly maintained sample installations may remain in completed work if approved in writing by Project Manager.

7. All work shall match accepted field mock-up.

3.3 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas, existing landscape areas, and trees from damage.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of
- C. Install edging of type and in locations shown on drawings. Obtain acceptance of layout by Project Manager before excavating or installing. Make minor adjustments as required.

3.4 PLACEMENT OF CRUSHED STONE PAVING

- A. Cut earthwork to width of trail/area to receive crusher fines paving to approximate depth section as specified on the Contract Drawings. Remove, haul and dispose of excess material off site, or use on-site with approval of Project Manager.
- B. Complete excavation required in sub-grade before fine grading and final compaction of sub-grade is performed. Extend sub-grade compaction one foot (1') beyond proposed edge of crushed stone paving or as indicated on drawings.
 - 1. Where earth moving is required the sub-grade shall be compacted to ninety five percent (95%) standard proctor within two percent (2%) of the optimum moisture.
 - 2. Keep areas being graded or compacted shaped and drained during construction. Ruts greater than or equal to 1 inch deep in sub-grade shall be graded out and reshaped as required, and re-compacted before crushed stone paving placement.
 - 3. If the trail is part of a cross slope it should drain in the direction of the slope no greater than two percent (2%). Ensure that no low spots exist so that ponding does not occur.
- C. Prior to placement of Crushed Stone Paving material, the sub-grade shall be proof rolled. Where soft spots are detected, scarify subgrade beneath Crushed Stone Paving trail to a minimum of six inch (6") depth. Moisture treat and compact to a minimum ninety five percent (95%) proctor density as determined by ASTM D698 or AASHTO T-99. Take moisture density tests every two hundred fifty (250) lineal feet of trail or proof roll. Treat and compact sub-grade, leaving it 5-inches below final grade for placement of Crushed Stone Paving. Compact material and retest by proof rolling to achieve approval of Project Manager.
- D. Install crushed stone paving only after excavation and construction work which might injure it have been completed, and after edging has been completely installed on the compacted sub-grade. Install crushed stone paving, over compacted base course in areas indicated on plan.
- E. Spread crushed stone evenly to fifty percent (50%) of specified depth. Avoid segregation of aggregate and contamination with lower courses or sub-grade.
- F. Compact to ninety five percent (95%) of maximum density as determined by ASTM D1557.
 - 1. Maintain surface course moisture content within plus/minus three percent ($\pm 3\%$) of optimum. Add water to quarry fines paving as required to achieve optimum moisture content and a uniform, compacted surface conforming to the finish grades indicated.
 - 2. Compact areas inaccessible to rolling by mechanical tamping.
- G. Protect crushed stone paving from soil or other contaminates during and following installation.

- H. Spread and compact additional crushed stone paving to achieve the required minimum compacted thickness. Compact per 3.3.F above.

3.5 MAINTENANCE AND REPAIRS:

- A. Crusher Fines Paving:
 - 1. Areas that do not compact, become eroded or are degraded in visual quality and/or performance as determined by the Project Manager are to be removed and/or repaired. Obtain approval of repair methods from Project Manager prior to affecting repairs.
- B. Stabilized Crusher Fines Paving:
 - 1. To repair, excavate damaged area leaving a minimum one inch depth of existing stabilized crushed stone paving. Apply stabilized crusher fines to existing surface as described above. Compact per 3.3.F above.
 - 2. Do not allow traffic on repaired stabilized crushed stone paving for two days or until paving has fully cured.

3.6 CLEANUP AND PROTECTION

- A. All areas shall be clean at the end of each workday.
- B. The contractor shall maintain protection during installation, curing, and maintenance periods.
 - 1. Erect temporary fencing or barricades and warning signs as required protecting newly installed Crushed Stone Paving areas from traffic, other trades, and trespassers. Maintain fencing and barricades throughout initial maintenance period and remove with approval of Project Manager.
- C. Project completion: All debris, soil, trash, and excavated and/or stripped material resulting from Crushed Stone Paving operations and unsuitable for or in excess of requirements for completing work of this Section shall be disposed of off-site.
- D. Maintain protection during installation and maintenance periods. See Division 1. Treat, repair or replace damaged work as required.

3.7 QUALITY ASSURANCE

- A. Refer to Division 1 Section "Quality Assurance".

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Crushed Stone Paving. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, grading, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, landscape renovation required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 15 40

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing and applying traffic markings as shown on the Contract Drawings and as directed by the Project Manager. All work shall be done in accordance with the City and County of Denver's Traffic Engineering Service Standards which can be found at the following link:
- B. Related Sections:
 - 1. Division 31 Section "Asphalt Pavement".
 - 2. Division 31 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, eight-inches (8") square.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of forty degrees (40°) F for alkyd materials, fifty five degrees (55°) F for water-based materials, and not exceeding ninety five degrees (95°) F.

1.5 WARRANTY

- A. Refer to Division 01.

PART 2 - PRODUCTS

2.1 PAINT

- A. AASHTO M248-86, Type F, white or yellow traffic paint.

2.2 PREFORMED PLASTIC MATERIAL

- A. Preformed plastic pavement marking material shall conform to ASTM D4505, Type 1, Class B, C, D, or E, and shall have a minimum thickness of sixty (60) mils and shall be non-preheating.

2.3 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.
 - 1. Colors: **White and Blue.**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 QUALITY CONTROL

- A. Pre-installation Conference: Conduct at Project Site.
 - 1. Review methods and procedures related to marking pavement including, but not limited to, the following:
 - a. Pavement aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

3.3 PREPARATION

- A. Do not apply pavement-markings until layout, colors, and placement have been verified with Project Manager.
- B. Allow paving to age for a minimum of thirty (30) days before starting pavement marking.
- C. Thoroughly clean all surfaces where markings are to be applied by brooming, airblasting, or other acceptable method. Surface shall be thoroughly dry prior to application.

3.4 THERMAL PLASTIC PAVEMENT MARKINGS

- A. Crosswalks and Symbols: Apply preformed plastic pavement marking material in accordance with manufacturer's instructions and to the Denver Department of Public Works standards.

3.5 PAINT

- A. Line Location: Before applying paint, chalk all striping locations for approval by Project Manager to ensure accurate location of line.
- B. Parking Lot Striping: Lines shall be four-inches (4") wide (+/- one-quarter-inch (1/4")). Double lines shall be six-inches (6") apart. Stop lines shall be twenty four-inches (24") wide (+/- one-quarter-inch (1/4)).
- C. Symbols and Lettering:
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
- D. Equipment: Spray machine equipped with mechanical agitator, multiple applicators, and automatic skip control, capable of painting a clean-edged stripe of the designated width with straight edges. Bead dispenser shall be directly behind and synchronized with paint applicator. Spray nozzle and bead dispenser shall be shielded to prevent overspraying. Use adequate hand operated equipment in areas not accessible to striping machine.
- E. Minimum Application Rates:
 - 1. Four-inch (4") Traffic Stripes: Solid, sixteen and one half (16.5) gallons per mile.
 - 2. Legends and Symbols: One one-hundredth (0.01) gallon per square foot.
 - 3. Stop Bars: One one-hundredth (0.01) gallon per square foot.
 - 4. Where required, broadcast glass beads uniformly into wet markings at a rate of six (6) pounds/gallon.

3.6 ACCEPTANCE

- A. Markings shall be accurately placed, and appear clean and uniform day and night. Unsatisfactory markings, overspray or spills shall be corrected and removed at no additional expense to the City.

3.7 PROTECTION

- A. Protect pavement markings until dry or bonded.

3.8 QUALITY ASSURANCE

- A. Refer to Division 1 Section "Quality Assurance".

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Pavment markings will not be measured but will be a lump sum item and accepted at the locations shown on the Drawings or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the lump sum price, and shall include required materials, transportation, equipment, labor and materials as required and in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 17 23

PART 1 - GENERAL**1.1 SUMMARY**

A. This section includes the material and labor requirements for construction of a complete infield skin surface.

B. Related Sections:

1. Site Preparation

2. Earthwork

1.2 SUBMITTALS

Product Data: For the product specified, submit a 1 quart sample along with a private lab test result indicating the particle size analysis of the material specified. All tests shall be performed in accordance with ASTM F-1632.

1.3 PROJECT/SITE CONDITIONS

A. All site work and earthwork shall be performed in accordance with the preceding sections. Sub- base material shall compact to 90 percent. If conditions do not warrant such compaction then an imported select granular fill shall be installed. Furthermore, the compacted sub-grade shall be installed in accordance with the final slope and shall mirror finish grade in order to ensure an even depth of material once placement has occurred.

B. Under no circumstances are perforated pipe under drains necessary or recommended for use under any infield skin material. Geotextile fabric is not recommended between the compacted sub-base and the infield skin material.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installers of materials specified shall have, at minimum, five successful installations of similar projects and materials. Installers shall be in possession of and demonstrate knowledge of the use of laser guided finishing equipment.

B. Material: If quality control samples are specified, they shall be completed at a rate of one per 250 tons of material delivered to the jobsite. All tests shall be conducted by the lab specified in Section 1.2 (B). All testing will be compared to and be in accordance with the material specifications provided in Section 2.2.

PART 2 – MATERIALS

- 2.1 Infield Mix is an engineered soil product which is mechanically mixed offsite in a controlled environment using a pugmill-type mixer. This process ensures thorough mixing of the sand and clay components to exact specifications.
- 2.2 Performance Specification
- A. Infield mix shall be clean, dry clay mixed with washed mason-type sand resulting in a weed-free mixture that is reddish brown in color having a yield of 1.35 tons per cubic yard when placed loose or 1.5 tons per cubic yard when compacted 85% - 90% on a Standard Proctor Test (ASTM D 689-07). The material possesses the following particle size analysis:
- a. Total sand content shall be 70-75 percent.
 - b. The combined amount of sand retained on the medium, coarse and very coarse sieves shall be greater than or equal to 50 percent.
 - c. The combined amount of silt and clay shall be 25-30 percent.
 - d. The ratio of silt divided by clay, otherwise known as the SCR, shall be 0.5 – 1.0.
 - e. No particles greater than 3 millimeters.
 - f. Equal to or less than 5 percent of particles shall be retained on the 2 millimeter.
- B. Materials meeting this specification would be DuraEdge Classic Infield Mix as manufactured by DuraEdge Products, Inc., Grove City, PA, (866) 867-0052, or an approved equal.

PART 3 – EXECUTION

3.1 PLACEMENT

- A. Place the material in lifts of 2 to 3 inches and lightly compact until an optimum compaction between 85 and 90 percent is achieved on a standard proctor test (ASTM D 689-07). Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved. Completing this process as described will minimize settling and improve the performance of the product.
- B. Depth of the material shall be 4 inches for new construction when finished and compacted.

:

3.2 WATERING

In most cases, the material is delivered with optimum moisture and adding water is not necessary. If unable to achieve optimum compaction, a light application of water may be needed.

3.3 FINISH GRADING

For best results the material shall be finish graded with a laser device that allows accuracy to +/- 1/8 inch. A slope of 1/2 percent to 1 percent shall be placed on the infield surface to facilitate surface drainage.

3.4 INSPECTION

The finished surface of the infield shall be smooth and free from any visible dips, humps, bumps or other blemishes which would hinder the removal of water through positive surface drainage. Where warranted, a finished elevation survey shall be conducted to assure proper installation.

3.5 TOPDRESSING

- A. Following successful inspection, topdressing shall be applied to the surface for optimum product performance. This topdressing is either expanded shale or calcined clay product and shall be added at a rate of 0.5 pounds per 1 square foot for maintenance, or 1 pound per 1 square foot for new construction.

- B. Product is either ProSlide Engineered Topdressing (expanded shale) or Turface Pro League Heritage Red Conditioner (calcined clay). Both products are available through DuraEdge Products, Inc., Grove City, PA, (866) 867-0052.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Skinned Infield. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, excavation, grading, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, landscape renovation as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 18 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing and installing entire chain link fence system, including fence framework, fabric and accessories, manual gates and all related hardware.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Contractor Quality Control".
 - 3. Division 01 Section "Erosion and Sedimentation Control".
 - 4. Division 01 Section "Material and Equipment".
 - 5. Division 01 Section "Tree Retention and Protection".
 - 6. Division 03 Section "Cast-In-Place Concrete".
 - 7. Division 31 Section "Earth Moving".
 - 8. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
 - 9. Division 32 Section "Sodding".

1.3 REFERENCES

- A. Comply with the following standards unless noted otherwise.
 - 1. ASTM A116 – Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
 - 2. ASTM A53/A53M – Pipe, steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Use.
 - 3. ASTM A123 – Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A153 – Zinc-Coated (Hot-Dip) on Iron and Steel Hardware.
 - 5. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.
 - 6. ASTM A392-11a – Top and Bottom Knuckled Selvage Chain Link Fabric.
 - 7. ASTM A817 - Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire
 - 8. ASTM A824 - Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
 - 9. ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - 10. ASTM F567 - Standard Practice for Installation of Chain-Link Fence
 - 11. ASTM F668 – PVC Coated Steel Chain Link Fence Fabric.
 - 12. ASTM F900 - Industrial and Commercial Swing Gates
 - 13. ASTM F934 – Colors for PVC Fence Coatings.
 - 14. ASTM F1043 - Strength and Protective Coatings on Steel Industrial Fence Framework
 - 15. ASTM F1664 - Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence
 - 16. ASTM F1083 - Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

1.4 PERFORMANCE REQUIREMENTS

- a. Replace chain link fence materials disturbed by construction activities. If any materials are damaged during the construction process, replace with like materials.

1.5 QUALITY CONTROL

- A. Contractor is responsible for Quality Control procedures.
- B. Testing Agency Qualifications: For testing fence grounding. Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- C. The Contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.6 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling.
- B. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

1.7 WARRANTY

- A. See Division 1 Section "Warranty and Bonds".

1.8 SITE CONDITIONS

- A. Protection of Monuments: Locate, protect and maintain benchmarks, monuments, control points and project engineering reference points. Re-establish disturbed or destroyed items at the Contractor's expense.
- B. Site Drainage and Dust: The Contractor shall maintain positive drainage into all existing drainage ways. The project area shall be graded to smooth all uneven areas prior to installation of fencing materials and at the completion of fence installation. Control dust caused by the work. Dampen surfaces as required.
- C. Site Access: The Contractor shall access each project site at locations designated by the Project Manager. No heavy trucks are allowed on turf areas. Should the work be for the installation of a ball field fence access for fence installation will only be allowed from outside the ball field area.
- D. Field Measurements: Verify layout information for chain-link fences and gates shown on Contract Drawings in relation to property survey and existing structures. Verify dimensions by field measurements prior to installation.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All fence materials shall meet the minimum requirements established by the Chain Link Fence Manufacturers Institute (CLFMI).

2.2 FENCE FABRIC

- A. Galvanized Fabric: hot dip galvanized after weaving in accordance with ASTM A116.
 - 1. Fabric Height: As indicated on Contract Drawings.
 - 2. Steel Wire Fabric: Wire with a diameter of nine (9) or six (6) gauge per plans.
 - a. Mesh Size: two inches (2”).
 - b. Zinc-Coated Fabric: ASTM A 392, Type II, with zinc coating applied after weaving.
- B. Selvage: Knuckled at both selvages, top and bottom.
- C. Vinyl Coated Fabric: Galvanized fabric as specified above, with Polyvinyl Chloride (PVC) coating. PVC coating to be Class 2B (thermally fused and bonded to metallic coated steel wire). Color in accordance with ASTM F934, as shown on the Contract Drawings. Wire with an interior (not including vinyl coating) diameter of nine (9) or six (6) gauge per plans.

2.3 FENCE FRAMEWORK

- A. Galvanized Posts and Rails: Hot dip galvanized HT-25 Fence Pipe, conforming to ASTM F1043, of sizes noted on the drawings.
- B. Polyester Powder Coated Posts and Rails: For use in conjunction with vinyl coated fabric. Min. thickness of finish polyester powder coat shall be two (2) to three (3) mils over two (2) mil zinc epoxy. Color of fabric and framework to match approved sample.

2.4 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824, with the following metallic coating:
 - 1. Type II, zinc coated (galvanized) by process, with the following minimum coating
 - a. Matching chain-link fabric coating weight.
 - 2. Type III, Zn-5-Al-MM alloy with the following minimum coating weight:**[Choose one]**
 - a. Class sixty (60): Not less than six tenths (0.6) oz./sq. ft. of uncoated wire surface.
 - b. Class one hundred (100): Not less than one (1) oz./sq. ft. of uncoated wire surface.
 - c. Matching chain-link fabric coating weight.
- B. Polymer-Coated Steel Wire: tension wire complying with ASTM F 1664.
 - 1. Color: Match framing members, chain-link fabric, and approved sample, complying with ASTM F 934.

2.5 TIE WIRES

- A. Steel Wire: Six (6) gauge, wire complying with ASTM A 817 and ASTM A 824. Coating to match fence fabric and structure. Aluminum tie wires are not acceptable.

2.6 SWING GATES

- A. General: Comply with ASTM F 900 for gate posts and swing gate types.
- B. Materials for gates shall match fence materials relative to finish and color.
- C. Dimensions and member sizes as indicated on drawings.
- D. Pipe and Tubing:
 - 1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; [protective coating and finish to match fence framing and approved sample.
 - 2. Gate Posts: Round tubular steel.
 - 3. Gate Frames and Bracing: Round tubular steel.
- E. Frame Corner Construction:

2.7 FENCE FITTINGS

- A. The material for fence fittings shall be manufactured to meet the requirements of ASTM F626. The coating for all fittings shall be the same as that required for the framework and matching the approved sample.
- B. Post Caps: Provide for each post.
 - 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than six inches (6") long.
 - 2. Rail Clamps: Line and corner boulevard clamps for connecting **[intermediate]** **[and]** **[bottom]** rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than two inches (2") shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies

2.8 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. Existing Conditions:

1. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
2. Soil Conditions: Investigate the type of soil and conditions in which lines are to be installed and allow for same in proposal. No extra payment will be allowed due to difficulty in excavating, unless approved by the Project Manager.
3. Contractor is responsible for understanding the scope of related operations as specified and indicated in the Contract Drawings and Specifications before beginning Work under this Section.
4. Report unsatisfactory conditions in writing to the Project Manager. Commencement of installation means acceptance of existing conditions by the Contractor.
5. Do not begin installation before final grading is completed unless otherwise permitted by Project Manager.

B. Protection of Property:

1. Preserve and protect all trees, plants, monuments, structures, and paved areas from damage due to Work of this Section. In the event damage does occur, all damage to inanimate items shall be completely repaired or replaced to satisfaction of the Project Manager, and all injury to living plants shall be repaired or replaced by the City. All costs of such repairs shall be charged to and paid by Contractor.
2. Protect buildings, walks, walls, and other property from damage. Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site. Damage caused to asphalt, concrete, or other building material surfaces shall be repaired or replaced at no cost to the City. Restore disturbed areas to original condition.

C. Protection of Existing Trees:

1. Consult with Denver City Forester as requested by Project Manager prior to digging within critical root zones. All digging or work within critical root zones of any tree shall be dug by hand or by other methods as directed by the City Forester or Project Manager so as to prevent damage to limbs or branches and root system. See Division 01 Section "Tree Retention and Protection".

D. Protection and Repair of Underground Lines:

1. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. Take whatever precautions are necessary, including pot holing to verify location and depth to protect these underground lines from damage. If damage does occur, all damage shall be repaired by the Utility Owner. All costs of such repairs shall be paid by Contractor.
2. Contractor is required to contact all private utility companies including City departments to locate all private utilities. A minimum of seventy two (72) prior to proceeding with any excavation. If, after such requests private utilities are encountered and damaged by the contractor these shall be repaired by the City at no cost to the contractor. If Contractor damages staked or located private utilities, they shall be repaired by Utility Owner at Contractor's expense.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of five hundred feet (500') or line of sight between stakes. Indicate locations of utilities, irrigation systems, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with recommendations of the Chain Link Fence Manufacturers Institute and in compliance with ASTM F 567
 - 1. Install fencing on established boundary lines inside property line.
- B. Workmanship: The complete fence shall be plumb, both in line and transverse to the fence, straight and rigid with fabric tightly stretched and held firmly in place. Install fencing with bottom of fabric flush with grade. Details of construction, not specified shall be performed in keeping with good standard fencing practice.
- C. Concrete: Set all posts in concrete, designed to have a minimum compressive strength of three thousand (3,000) PSI at twenty eight (28) days. Allow all posts to set at least forty eight (48)-hours before top rails, center rails, wire fabric, and fittings are installed.
- D. Posts:
 - 1. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of fifteen (15) degrees or more or as indicated on Contract Drawings. Set posts plumb.
 - 2. Line Posts: Space line posts uniformly as indicated on Contract Drawings. Set posts plumb.
 - 3. Set posts in concrete as shown on Contract Drawings or per manufactures specifications. Install mow strip per Division 03 Section "Cast in Place Concrete" (when applicable) where required and as indicated on Contract Drawings, with control joints centered on posts.
- E. Rails:
 - 1. Set rails as nearly parallel to finish grade as possible and at the specified height shown on the Contract Drawings.
 - 2. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
 - 3. Intermediate and Bottom Rails: Install and secure to posts with fittings.
- F. Fabric:
 - 1. Fabric shall be full height as shown on details.
 - 2. Where applicable, all fabric shall be attached to the ball field side of the fence with the ties spaced at one foot (1') intervals (maximum) on all posts and two foot (2') intervals (maximum) on all rails, with no sharp ends projecting.
 - 3. Selvages shall be knuckled top and bottom throughout, as detailed.
 - 4. Fabric shall be tightly stretched and securely fastened with fittings and accessories provided by the manufacturer.

5. Minimum width of fabric on fences shall be no less than the distance between two panels or posts.
6. Fabric on high fences shall lap or splice only at intermediate rails.
7. Bottom knuckled selvage of fabric shall be in contact with top of mowing strips – no gaps allowed.
8. Fasten fabric to top rail, line post, braces and bottom tension wire/bottom rail with tie wire at maximum twelve inches (12”) on center.
9. Attach fabric to end, corner and gate posts with tension bars and tension bar clips. The tension bars shall be of lengths two inches (2”) less than the full height of the fabric with which they are to be used. Bars shall be attached to the fabric by threading through the fabric, by bands or other mechanical means, and installed at all terminal or corner posts and gate posts.

G. Install gates with fabric, structure and ties to match fence.

3.4 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

3.5 TOLERANCES

- A. Variation from plumb: one quarter inch (1/4”) in six feet (6’); one half inch (1/2”) maximum overall.
- B. Variation in line of posts: one quarter inch (1/4”) in twenty feet (20’) horizontal; one half inch (1/2”) maximum overall.

3.6 CLEAN UP

- A. Maintain a neat and orderly work site at all times.
- B. Upon completion of site work, clean up area, remove tools, equipment, materials and debris.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Chain Link Fencing. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, including associated fittings, hardware, gates and all other related labor, materials and equipment required to construct and complete the fence, gates, foul poles, dugouts and backstops as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 31 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes consists of furnishing and installing site furnishings listed below.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Contractor Quality Control".
 - 3. Division 01 Section "Material and Equipment".
 - 4. Division 03 Section "Cast-In-Place Concrete".
 - 5. Division 32 Section "Chain Link Fencing".
 - 6. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

1.3 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. PRODUCT DATA for the following:
 - 1. Enclosure

1.4 QUALITY CONTROL

- A. Contractor is responsible for Quality Control procedures.

1.5 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling.
- B. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

1.6 SITE CONDITIONS

- A. Site Access: The Contractor shall access each project site at locations designated by the Project Manager for work for the installation of furnishings. No heavy trucks are allowed on turf areas or concrete flatwork.
- B. Field Measurements: Verify layout information for all site furnishings shown on Contract Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 PRO-PANEL II -METAL ROOFING

- A. METAL SALES MANUFACTURING, INC
- B. CONTACT: 303.702.5440
- C. COLOR: DENVER GREEN

2.2 See Furnishing Schedule as shown in drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install furnishings in accordance with manufacturer's instructions and as shown on the drawings.
- B. Workmanship: All furnishings shall be installed in keeping with good standard of furnishing installation.

3.2 CLEAN UP

- A. Maintain a neat and orderly work site at all times.
- B. Upon completion of site work, clean up area, remove tools, equipment, materials and debris.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Site Furnishings. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, loading, transporting, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, concrete pad, hardware, paint, and all maintenance required until Final Acceptance of the work as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 33 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work shall be completed in accordance with the approved Materials Management Plan (MMP).

1.2 SUMMARY

- A. This Section includes the requirements for the installation of an underground irrigation system including the following:
 - 1. Trenching, stockpiling excavation materials, refilling and compacting trenches.
 - 2. Complete irrigation system including but not limited to piping, valves, fittings, heads and wiring, sensors, backflow preventer(s), Automatic Irrigation Controller(s) and final adjustments to insure complete coverage.
 - 3. Water connections.
 - 4. Replacement of unsatisfactory materials.
 - 5. Cleanup, inspections, and approval.
 - 6. Testing.
- B. Related Sections:
 - 1. Division 01 Section "Contractor Quality Control".
 - 2. Division 01 Section "Erosion and Sedimentation Control".
 - 3. Division 01 Section "Tree Retention and Protection".
 - 4. Division 31 Section "Earth Moving"
 - 5. Division 31 Section "Excavation and Backfilling of Trenches".
 - 6. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
 - 7. Division 32 Section "Soil Preparation".
 - 8. Division 32 Section "Topsoil".
 - 9. Division 32 Section "Automatic Irrigation Controllers"
 - 10. Division 32 Section "Turfgrass Seeding".
 - 11. Division 32 Section "Native Seeding".
 - 12. Division 32 Section "Sodding".
 - 13. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 REFERENCES

- A. Conform to requirements of reference information listed below except where more stringent requirements are shown or specified in Contract Documents.
 - 1. American Society for Testing and Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section.
 - 2. Underwriters Laboratories (UL) - UL Wires and Cables.
 - 3. National Sanitation Foundation (NSF) – Piping and backflow prevention.
 - 4. American Water Works Association – Piping and backflow prevention.

1.4 QUALITY CONTROL

A. Special Requirements.

1. Tolerances: Specified depths of mains and laterals and pitch of pipes shall be installed per the Contract Drawings and specifications.
2. Compaction: Settlement of trenches is cause for removal of finish grade treatment, refilling, compaction, and repair of finish grade treatment.
3. Coordination with Other Contractors: Protect, maintain, and coordinate work with work under other Sections.
4. Damage to other Improvements: Contractor shall replace or repair damage to grading, soil preparation, seeding, sodding, planting and/or new site features done under other Sections during Work associated with installation of irrigation system at no additional cost to the City.
5. Damage or Disturbance to the Existing Irrigation Components: Damage to existing components as a result of work being performed by the Contractor will require the Contractor to replace the damaged components to the Cities current standards, at no additional cost to the City. This includes boxes, manifolds, valves, angle valves, risers, wire, heads, pipe, and autom.
6. Water Delivery Interruption: When working on an existing irrigation system, the Irrigation Contractor shall contact the Project Manager and inform him seventy two (72) hours in advance of any water interruption that is required. The maximum irrigation system interruption is to be no more than seventy two (72) hours during the growing season. The contractor shall make all necessary provisions including material, equipment, labor, delivery and scheduling as required to complete all points of connection, upgrades, and improvements within seventy two (72) hours.
7. Watering: The Contractor is responsible for following all Denver Water rules and regulations for sod and seed establishment, available at <http://www.denverwater.org>. The Contractor shall post signage per Denver Water in a visible location(s) on site indicating "IRRIGATION TESTING AND MAINTENANCE IN PROGRESS" when Work (establishment, construction or warranty) requires irrigation system operation between the hours of 10 AM to 6 PM. The signs are to be used are available from Denver Water.
8. Permits: Work involving plumbing for installation of copper piping, ductile iron piping, backflow preventer(s), and related Work shall be executed by licensed and bonded plumber(s). Secure a permit at least forty eight (48) hours prior to start of installation. Work involving high voltage electrical wiring, grounding and related Work shall be executed by licensed and bonded electrician(s). Secure a permit at least forty eight (48) hours prior to start of installation
9. Refer to maintenance requirements for water during construction, 1.9.B.1.

B. Pre-Construction Conferences and Site Meetings:

1. Contractor shall schedule and conduct a pre-construction conference to review in detail quality control and construction requirements for equipment and materials used to perform the Work. Conference shall be scheduled not less than ten (10)-days prior to commencement of Work. All parties required to be in attendance shall be notified no later than seven (7) days prior to date of conference. Contractor shall notify qualified representatives of each party concerned with that portion of Work to attend conference, including but not limited to the Project Manager, Denver Parks Superintendent, Operations Supervisor, Water Conservation, Contractor's Superintendent, and Installer.
2. Prior to commencement of Work, Contractor shall schedule an on-site conference with Project Manager, Denver Forestry and any other parties designated by Project Manager to

discuss tree protection requirements, marshalling locations, traffic control, and equipment access. Provide a minimum of seven (7) days notice prior to date of conference.

3. Contractor shall schedule on-site conferences the frequency of which is to be determined by the Project Manager and any other parties designated by the Project Manager to review project progress.
4. Contractor shall record Minutes of each conference and distribute to all parties in attendance within three (3) days of conference.

1.5 FIELD QUALITY CONTROL

- A. Flushing: After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupler assemblies, and hose valves, thoroughly flush piping system under full head of water pressure from dead end fittings. Maintain flushing for five (5) minutes through furthest valves. Cap risers after flushing.
- B. Testing Pressurized Mainline: Prior to installing any plant materials (sod, seed, trees, shrubs, perennials) arrange and conduct pressure test(s) in the presence of the Project Manager. Arrange for testing a minimum of forty eight (48) hours in advance. The contractor is responsible to supply the hydrostatic test pump and all other equipment required to complete the test.
 1. Set in place, cap and pressure test all piping under paving, in presence of the Project Manager prior to backfilling and paving operations.
 2. After backfilling and installation of all control valves, fill pressure supply line with water, and pressurize to forty (40)-PSI over the designated static pressure or one hundred twenty (120)-PSI, whichever is greater, for a test period of two (2)-hours.
 3. All isolation valves, angle valves, ball valves and zone valve flow controls are to remain open during testing.
 4. Leakage, Pressure Loss:
 - a. Solvent welded PVC Pipe: Test is acceptable if zero pounds of pressure is evident during the test period.
 - b. Ring Tight Pipe: Test is acceptable if two (2) pounds of pressure or less is evident during the test period.
 5. Leaks: Detect and repair leaks. Replace defective PVC pipe with new full length pipe section. No pipe splices will be accepted within pipe sleeve. No PVC pressure couplings or slip-fix repair couplings will be allowed.
 6. Retest system until test pressure can be maintained for duration of test.
- C. Walk-Through for Substantial Completion:
 1. Arrange for the Project Manager to be present. Provide minimum of forty eight (48) hours notice in advance of walk-through.
 2. Entire system shall be completely installed and operational and trenches shall be finish graded and sod and seed in place prior to scheduling of walk-through.
 3. Electrically operate each zone in its entirety for the Project Manager the time of walk-through.
 4. A project inspection walk through shall include but is not limited to the following:
 - a. Contractor shall adjust, straighten and nozzle all heads prior to walk through. Review operation, coverage, head/nozzle adjustment, and system adjustment per specifications.
 - b. Contractor shall have all valves boxes unlocked prior to walk through. Open valve boxes to confirm materials, filter fabric, gravel bedding, wire splices, compaction,

elevation, workspace access within boxes, clearance from lid and bedding, locking mechanisms, and zone branding. Interior of boxes should be free of foreign material, only filter fabric shall be visible in the bottom of boxes. All valves must be tagged with zone identification, Christy's valve marker tags or equal and valve box lids must be branded with zone valve identification. Verify connections in all valve and wire splice boxes.

- c. Contractor shall provide documentation that resistance tests for all spare common and hot wires has been performed and the results for each OHMS reading on each wire tested.
- d. Confirm irrigation heads are at specified elevation and distance(s) from paved surfaces and curbs, plumb and soil compacted.
- e. Inspect concrete size and elevation of pads for backflow assemblies, master valves, and enclosure pads. Confirm quality of concrete, finishes, access to the Automatic Irrigation Controller and spare conduit/sleeving as required for wiring.
- f. Review trench and related excavation repair including backfill, compaction, fine grade, seed and sod installation.
- g. Review appropriate use of purple valve lids and other product as required for reuse water applications.
- h. Generate a punch list of items to be corrected prior to Final Completion.
- i. Furnish all materials and perform all work required to correct all inadequacies of coverage due to deviations from Contract Documents.

D. Walk-Through for Final Completion:

- 1. Arrange for Park Operations Supervisor, the Project Manager and Consultant to be present a minimum of seventy two (72) hours in advance of walk-through.
- 2. Show evidence to the Project Manager that the City has received all maintenance items and accessories, charts, record Contract Drawings, equipment, backflow certification reports and Automatic Irrigation Controller grounding assembly certificates as required before Final Completion walk-through is scheduled.
- 3. Operate each zone, in its entirety for the Project Manager at time of walk-through to insure correction of all incomplete items.
- 4. Items deemed not acceptable by the Project Manager shall be reworked to complete satisfaction of the Project Manager.
- 5. If after the walk-through for Final Completion of irrigation system the Project Manager finds items which have not been properly adjusted, reworked, or replaced per the previous punch list, the Contractor shall be charged for all subsequent walk-throughs. Funds will be withheld from final payment and/or retainage to Contractor, in amount equal to additional time and expenses required to conduct and document additional walk-throughs by Project Manager to ensure compliance with Contract Documents.

1.6 SUBMITTALS

- A. Prepare and make submittals in accordance with conditions of the Contract prior to installation of any irrigation equipment:
- B. Material List: Submit a PDF file of complete list of materials, and cut sheets indicating manufacturer, model number and description of all materials and equipment to be used. Show appropriate dimensions and adequate detail to accurately portray intent of construction.

- C. Shop Contract Drawings: If applicable, submit shop Contract Drawings for pumps, backflows and assemblies. Include plumbing and foundation/support systems if the installation differs from the manufacturer’s recommended installation.
- D. Mock Ups:
 - 1. Valve clusters: Provide a completely built electrical valve cluster. This mockup, to include three electric valves, angle valve, manifold, unions and riser, the mock up may be incorporated into the work toward the end of the project.
 - 2. Swing joints: Provide a pre-manufactured or constructed swing joint assembly for each detail shown (eg. - quick coupler, rotors) or as directed by the Project Manager
 - 3. Drain valves: Provide a mock up including the service tee, and required fittings, and drain valve.
 - 4. Other: Mock ups that may be requested by the Project Manager.
- E. Operation and Maintenance Manual: Coordinate scheduling/precipitation instructions with the City’s operations staff. Submit three (3) bound manuals and one (1) digital copy to the Project Manager including:
 - 1. Winterization and spring start-up procedures.
 - 2. Cut sheets of products.
 - 3. Manufacturer’s maintenance and checking instruction for backflow preventer (if applicable).
 - 4. Manufacturer’s maintenance and operation instruction for pump station (if applicable).
- F. Warranty: Submit two year written warranty, in accordance with WARRANTY/GUARANTY section.

1.7 CONTRACT RECORD DRAWINGS

- A. Prior to the installation of irrigation system, the Contractor will provide on-site copies of original irrigation design Contract Drawings “Record Contract Drawings”. Contractor to revise Record Contract Drawings in red ink as Work progresses to show any changes to the plan and include field dimensions.. Record Contract Drawings shall be brought up-to-date prior to any Pay Application Submittals that contain irrigation installation. Should the Contractor choose to utilize GPS for the purposes of documenting Work in progress, a hard copy print will need to be provided prior to Pay Application Submittal. A print of Record Contract Drawings shall be available at Project Site for review by the Project Manager at any time during the project.
- B. Record Contract Drawings shall encompass entire scope of work including any altered existing equipment and altered zones, and notate the Automatic Irrigation Controller zone number, type of irrigation, GPM, operating PSI for any altered or added zone.
- C. Preparation of Contract Record Drawings: Dimension from two permanent points of reference (building corners, sidewalk, road intersections or permanent structures) the location of the following items:
 - 1. Point of connection.
 - a. Meters and vault dimensions
 - b. Curb Stops
 - c. Isolation Valves
 - d. Drain Valves
 - e. Pumps

- f. Backflows
 - g. Bypass lines
 - h. Service lines
2. Routing of irrigation mainline. Provide dimensions for each one-hundred linear feet (100 L.F.) maximum along each routing and for each change of direction.
 3. Routing of non-pressure lateral lines, layout and size.
 4. Sprinkler control valves.
 5. Quick coupling valves.
 6. Drain valves
 7. Master valves
 8. Flow sensors
 9. Rain sensors/weather station
 10. Wire splice boxes
 11. Control wire routing if not with pressure mainline.
 12. Gate valves.
 13. Air relief valves.
 14. Sleeves.
 15. Flush valves.
 16. Power service drop.
 17. Other related equipment as directed.
 18. Two-wire grounding rods
- D. Make dimensions accurately at the same scale used in the original Contract Drawings, or larger. Notes and dimension lettering must be legible.
- E. The irrigation legend must be changed to accurately reflect the irrigation equipment installed, if such equipment is not the same as originally specified on the contract documents. This includes flow rates, effective spray diameter/radius and operating pressure of all sprinkler heads.
- F. The Project Manager will not certify any pay request submitted by the Contractor if the Contract Record Drawings are not current, and processing of pay request will not occur until Contract Record Drawings are updated.
- G. Final Submittal: Upon completion of Project, prior to final acceptance, secure digital copy of irrigation design from the Project Manager and record installation information that reflects all changes made over the course of the construction project, prepared by a qualified draftsman. Contract Record Drawings shall include details, including any revisions as per actual installation. Deliver and submit to the Project Manager for review the following items:
1. Digital Contract Record Drawings in both PDF and AutoCAD release 2007 bound format (include any related X-ref files, plot files and pen settings.) Make any additional changes to the file as directed by the Project Manager prior to final submittal and approval.
- H. Request for final payment will not be certified or processed until all Contract Record Drawing prints and digital files have been received and approved.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Packing and Shipping: Deliver all components to job site in original unopened packaging containers prominently displaying manufacturer's name, volume, quantity, contents, instructions, and conformance to local, state, and federal law. Remove and replace cracked,

broken, or contaminated items or elements prematurely exposed to moisture, inclement weather, snow, ice, temperature extremes, fire, or jobsite damage.

- B. Handling, Storage, and Delivery of PVC Pipe:
 - 1. Exercise care in handling, loading and storage of PVC pipe.
 - 2. Provide forty eight (48) hours advance notice of delivery to the Project Manager for observation of unloading and handling of PVC materials during delivery.
 - 3. All PVC pipe shall be transported in a vehicle which allows length of pipe to lie flat so as not to subject it to undue bending or concentrated external loads. All sections of pipe that have been dented or damaged shall be discarded, and shall be replaced with new piping.
- C. Storage and Protection: Deliver, unload, store, and handle materials, packaging and bundling products in dry, weatherproof condition in manner to prevent damage, breakage, deterioration, intrusion, ignition, and vandalism.
- D. Only materials and equipment meeting project specifications and to be used as part of Project shall be stored on site. Project Manager to may verify at any time during construction period.

1.9 JOBSITE CONDITIONS

- A. Existing Conditions:
 - 1. Soil Conditions: The Contractor is responsible for investigating the type of soil and conditions in which lines are to be installed. No extra payment will be allowed due to difficulty in trenching, unless approved by the Project Manager.
 - 2. Contractor is responsible for understanding the scope of related operations as specified and indicated in the Contract Drawings and Specifications before beginning Work under this Section.
 - 3. Report unsatisfactory conditions in writing to the Project Manager within twenty four (24) hours of discovery. Commencement of installation means acceptance of existing conditions by the Contractor.
- B. Protection of Property:
 - 1. Protect buildings, walks, walls, and other property from damage. Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site. Damage caused to asphalt, concrete, monuments, structures or other building material surfaces shall be repaired or replaced at no cost to the City. Restore disturbed areas to original condition.
 - 2. The Contractor is responsible for potholing of all existing utilities, irrigation lines or any other underground improvements that may be damaged due to the installation of Irrigation Systems.
- C. Protection of Existing Trees:
 - 1. Refer to Division 01 Section "Tree Retention and Protection".
 - 2. Consult with the Denver City Forester as requested by the Project Manager prior to trenching or boring within tree drip-lines. All trenching or work under drip line of any tree shall be dug by hand or by other methods as directed by the Forester or the Project Manager so as to prevent damage to limbs or branches and root system.
 - 3. Directional boring that is permitted within tree protection area must occur at thirty six inches (36") below grade and may not take place anywhere within four feet (4') of the drip line. Any exception must be agreed upon by the Denver City Forester or the Project Manager.

- D. Protection and Repair of Underground Lines:
 - 1. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. Take whatever precautions are necessary, including pot holing to verify location and depth to protect these underground lines from damage. If damage does occur, all damage shall be repaired by the Utility Owner. All costs of such repairs shall be paid by Contractor.
 - 2. The Contractor is required to contact all private utility companies including Denver City Departments to locate all private utilities. The request for locates shall be a minimum of seventy two (72) hours prior to proceeding with any excavation. If, after such requests private utilities are encountered and damaged by the Contractor these shall be repaired at no cost to the City. If the Contractor damages staked or located private utilities, they shall be repaired by the Utility Owner at the Contractor's expense.
- E. Replacement of Paving and Curbs: Any damage do to work that occurs adjacent to or crosses existing roadways, paths, trails, curbing, sidewalks, etc. shall be restored to original condition at the contractors expense, and the satisfaction of the Project Manager.

1.10 WARRANTY/GUARANTY

- A. Provide a two year written warranty for material and installation from date of Substantial Completion.
- B. Expenses due to vandalism before Final Acceptance shall be the Contractor's responsibility.
- C. Any settling of backfilled trenches that occurs during warranty period shall be repaired at no expense to the City, including complete restoration of damaged property.
- D. Once final acceptance is granted, the City will maintain turf and planting areas during warranty period, unless maintenance by Contractor is specified in the contract. Contractor is responsible to monitor and coordinate Automatic Irrigation Controller scheduling and maintenance with Project Manager for any seeding, sodding or planting areas under Contractor's warranty.
- E. Project Manager reserves the right for his staff to make temporary repairs during the warranty period as necessary to keep systems in operating condition without voiding the Contractor's warranty, nor relieving the Contractor of his responsibilities.
- F. Contractor shall make repairs and replacements within three days of notification. If Contractor fails to make repairs within three days, the City will make such repairs at Contractor's expense.

1.11 TURN OVER ITEMS

- A. Where applicable, furnish the following maintenance items to City prior to Final Acceptance:
 - 1. Two (2) sprinkler heads for each size and type specified.
 - 2. Two (2) nozzles for each type of head.
 - 3. Two (2) head adjustment tools for each type of head installed.
 - 4. Two (2) valve keys for operating each type of manual valve. (Manual drain valves, isolation valves).
 - 5. Two (2) valve keys and hose swivels for each type of quick coupling valve.

1.12 MAINTENANCE DURING PROJECT CONSTRUCTION

- A. Within Limits of Construction: Contractor shall fence, water, and keep weed free any turf, trees and any plantings within the limits of construction. Contractor is responsible for maintenance which includes picking up trash, weed control and mowing of turf and native areas within the limits of construction. Contractor is responsible for watering existing landscape within limits of construction. Turf and plants affected by mainline work or irrigation water service shutdown during irrigation season shall receive watering per Parks' schedule, with no interruption of watering greater than seventy two (72)-hours. Contractor is responsible for maintenance until final acceptance is granted.
- B. Outside Limits of Construction: Coordinate Automatic Irrigation Controller scheduling and maintenance operations with Project Manager for portions of City property unaffected by construction.
- C. Additional Maintenance During Warranty Period:
 - 1. Make repairs and replacements needed due to defective workmanship and materials.
 - 2. Winterization: Include cost in bid for winterizing complete system at conclusion of irrigation season (during which system received final acceptance) within three (3)-days of notification by the City. System shall be voided of water using compressed air or similar method accepted by the Project Manager. Coordinate with the Denver Parks Operations Supervisor and the Project Manager to be present during the winterization procedures. The Contractor shall notify all persons that are to be present at the winterization a minimum of forty eight (48) hours prior to the winterization of the system.
 - 3. Spring Start Up: Reopen, operate, adjust system malfunctions and make any necessary system repairs, the following season within three (3) days of notification by the City. Coordinate with the Denver Parks Operations Supervisor and the Project Manager to be present during the spring start up procedures. The Contractor shall notify all persons that are to be present at the spring start up a minimum of 48-hours prior to starting of the system.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Equipment must have performance characteristics to operate per the design conditions indicated. If any discrepancy or conflict exists between the quantities of equipment listed in the schedule and quantities shown on the Contract Drawings, the greater quantity shall govern.
- B. All material shall be of the highest grade possible and where applicable, shall be marked accordingly and shall be new.

2.2 PIPE AND PIPE FITTINGS

- A. Ductile Iron Pipe and Fittings:
 - 1. Ductile Iron Pipe: Centrifugal cast ductile iron in metal molds for water pipe in accordance with ANSI C151 and AWWA A21.51 with asphaltic exterior coating and interior lining and coating in accordance with ANSI C151 and AWWA A21.51. Rubber-Gasket joints shall conform to ANSI/AWWA C111/A2.11. Fittings - Fittings shall be available in three inches (3") through twelve inches (12") sizes and shall be cast from

ductile iron in accordance with ANSI/AWWA C153/A21.53 with mechanical joint bells. Glands, bolts, nuts and gaskets shall be in accordance with requirements of ANSI/AWWA C153/A21.53. The working pressure rating shall be 350 PSI. Fittings shall have an asphaltic outside coating in accordance with ANSI/AWWA C153/A21.53. Secure mechanical joint fittings to piping via installation of Meg mechanical joint restraints as manufactured by EBBA or approved equal.

B. Copper Pipe and Fittings:

1. Pipe: Type K, rigid, hard tempered.
2. Fittings - Wrought copper, solder joint type. Joints - Soldered with solder, forty five percent (45%) silver, fifteen percent (15%) copper, sixteen percent (16%) zinc, and twenty four percent (24%) cadmium and solidus at 1125° F and liquids at 1145° F.

C. Main and Lateral Lines:

1. Main Lines (pressurized, downstream of backflow prevention units):
2. Class 200 PVC BE, size one inch (1") to two and one half inch (2-1/2").
3. Class 200 PVC RT/Gasketed, size three inches (3") and greater).
4. Velocities in PVC mainline shall not exceed five feet (5') per second.
5. All PVC pipe shall conform to the requirements of the United States Department of Commerce commercial standard Type 1-ASTM-D-2241.
6. Lateral Lines: One hundred 100 PSI High Density NSF Polyethylene Piping – one inch (1") minimum diameter.
 - a. Velocity of water flow in polyethylene pipe shall not exceed seven and one half (7-1/2) feet per second.

D. Sleeving:

1. Horizontal sleeves under paved surfaces: Class 200 PVC.
2. Vertical sleeves for access to drains and valves: Class 200 PVC.

E. Plastic Pipe and Fittings:

1. Identification Markings: Identify all pipe with following indelible markings:
 - a. Manufacturer's name.
 - b. Nominal pipe size.
 - c. Schedule of class.
 - d. Pressure rating.
 - e. NSF (National Sanitation Foundation) seal of approval.
 - f. Date of extrusion.
2. Class 200 PVC Pipe (pressurized main line two and one-half inches (2-1/2") and under):
 - a. Pipe will be assembled with Schedule 80 PVC fittings using ASTM-F-656 purple primer followed with heavy bodied ASTM-D-2564 glue.
 - b. Fittings shall be installed with concrete thrust blocks as per Details.
3. Gasketed End Pipe (pressurized main line 3-inches and larger): Manufactured from virgin Polyvinyl Chloride compound in accordance with ASTM D2241 and ASTM D1784; cell classification 1254-B, Type 1, Grade 1.
 - a. All fittings and service tees, three inches (3") and larger: Harco or Leemco ductile iron, grade 70-55-05 in accordance with ASTM A-536. Fittings shall have deep bell push-on joints with factory installed gaskets meeting ASTM F-477.
 - b. Lubricant: As recommended by manufacturer of pipe fittings.

- c. Pipe Restraints on all fittings and service tees and pipe to pipe restraints: Harco or Leemco, installation as recommended by the manufacturer. Each fitting bell shall be restrained to the pipe inserted in it per manufacturer's recommendations. See Manufacturer catalog for appropriate selection or chart supplied on plans.
4. Flexible Plastic Pipe (non-pressure lateral lines):
- a. Manufactured from virgin polyethylene in accordance with ASTM D2239, designated as PE 3408. Maximum size two inches (2"); minimum size one inch (1").
 - b. Fittings: Manufactured in accordance with ASTM D2609; PVC Type 1 cell classification 12454-B.
 - c. Clamps: All stainless steel worm gear screw clamps. Use two (2) clamps per joint on all insert fittings.
 - d. Risers for Pop-up Heads: Shall be swing pipe, 0.49 ID, operating pressure of eighty (80) PSI, manufactured by Rainbird or approved equal.

2.3 VALVES

A. Gate Valve or Isolation Valve:

1. Valve for two and one-half inch (2-1/2") and smaller mainline (solvent-weld): Shall be cast iron body, threaded ends, left-hand opening, square nut operated, rubber resilient seated, FIPT joint AWWA gate valve with clear waterway equal to full diameter of pipe. Able to withstand continuous working pressure of one hundred fifty (150) PSI. Wheel type handle is unacceptable. Matco Norca 10RS series.
2. Valve for three inch (3") and larger mainline: Shall be cast iron body, push-on, left-hand opening, square nut operated, rubber resilient seated, mechanical joint AWWA gate valve with clear waterway equal to full diameter of pipe. Able to withstand continuous working pressure of one hundred fifty (150) PSI. Wheel type handle is unacceptable. Martco-Norca 10RT series

B. Automatic Control Valve:

1. Automatic Valve for Potable Water System: Rain Bird PEB Series Valve having manual flow adjustment and manual bleed nut. PRS-D shall be used if pressure at the heads is greater than ten pounds over the optimal pressure as stated on the plans or measured in the field.
2. Manifold: Manifold to be constructed out of Schedule 80 PVC pipe, fittings, and nipples. Use ductile iron riser nipple and Champion angle valve brass body 200RS angle valve with brass unions as per details and plans.
3. Install one flexible marker tag on each valve. Mark each tag with indelible ink indicating zone number. Tags shall be: Potable water systems (yellow Christy's ID-MAX-Y1-PW014), Non-potable systems (purple Christy's ID-MAX-P1-NP011)

C. Manual Drain Valve:

1. Drain Valve: Mueller Oriseal #H-10283 or MacDonald AY, one inch (1") 3061 with brass swing joint assembly, or approved equal.

D. Quick Coupling Valves:

1. Buckner "Wing Thing" Q44LCAR10 brass two-piece body with winged stabilizer, designed for working pressure of one hundred fifty (150) PSI; one inch (1") FIP.. Size as shown on drawing.

2. Quick Coupling Valves immediately after the backflow shall be used for winterization and shall be constructed of all brass swing joint and fittings. All other Quick Coupling Valve swing joints shall be constructed as shown on the details.

E. Valve Boxes:

1. All valve boxes will have a stainless steel hex bolt locking system.
2. Isolation Valves, Quick Coupling Valves, Drain Valves, Wire Splices and Ground Rods: Carson Brooks, Model #910-4, ten inch (10") round box.
 - a. Brand Lids as follows:
 - 1) Isolation/Gate Valve "GV"
 - 2) Quick Coupler Valve "QC"
 - 3) Manual Drain Valve "DV"
 - 4) Air Relief Valve "AR"
 - 5) Master Valve "MV"
 - 6) Flow Sensor "FS"
 - 7) Wire Splice Box "SB"
 - 8) Grounding Rod "GR"
 - 9) Filter "FIL"
3. Electric Control Valve Box: Shall have locking cover branded with the zone numbers.
 - a. Single valve location only, three-quarter inch (3/4") through two inch (2"): Carson Brooks, Model #1220 jumbo box with bolt down T-cover.
 - b. Multiple valve clusters, maximum three (3) control valves per box: Carson Brooks, Model #1730-18 box with bolt down T-cover.
4. Box color for valves:
 - a. Green for potable systems.
5. Gravel Leveling Bed and Drainage Sump in Valve Boxes: three quarters inch (3/4") crushed gravel lined in geo-textile, as indicated on Contract Drawings.

- F. Air Relief Valve: On mainlines three inches (3") or larger, as per plan: Bermad 4415 (all cast iron) 2-inch double purpose vacuum air release valve or approved equal.

2.4 SPRINKLER HEADS

- A. Heads: Provide fabricated riser units of the type and size as indicated on the Contract Drawings. Heads of a specific type or function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification in such a position that they can be identified without being removed from the system.
1. Pop-Up Sprinkler Heads in turf areas: 1806 SAM-PRS.
 2. Pop-Up Sprinkler Heads in native grass areas and flower bed areas: Rain Bird 1812 SAM-PRS.
 3. Pop-Up Sprinkler Nozzles shall be Rain Bird MPR Series nozzle. Strip series, rotary, and VAN nozzles may be used for specific approved applications at the direction of the Project Manager.
 4. Gear Driven Heads: Hunter I-20, I-25, I-40 or Rain Bird 5000 Plus, or 8005 series with stainless steel risers, internal check valve, PRS and MPR as specified per Contract Drawings. Riser height shall be six inches (6") in turf areas, and twelve inches (12") stainless steel in native areas.

- B. Flexible Connectors to Lateral Pipe:
 - 1. Pop-up Heads: Shall be one-half inch (1/2") swing pipe, connected to lateral pipe with male x insert spiral barbed ell PVC insert fittings.
 - 2. Gear Driven Heads: Shall be field constructed PVC swing joints as per detail, connected to lateral pipe with PVC insert fittings.

2.5 AUTOMATIC CONTROL SYSTEM

- A. See Division 32 Section "Automatic Irrigation Controllers".
- B. Electrical Control Wiring:
 - 1. Standard Low Voltage Wire Systems:
 - a. Electrical Control Wire for 24VAC solenoid: Golf Course Sprinkler Wire - #14 to #10 AWG UL approved direct burial solid conductor copper wiring with polyethylene insulation 0.045-inch thickness.
 - b. Electrical Common Wire: Golf Course Sprinkler Wire - #12 AWG UL approved direct burial solid conductor copper wiring with polyethylene insulation 0.045-inch thickness.
 - c. Wire Colors: Consistent color system throughout.
 - 1) Control Wires – Black.
 - 2) Common Wires – White.
 - 3) Spare Control Wires – Red.
 - 4) Spare Common Wires – Purple.
 - 5) Master Valve Wires – Green and Blue.
 - 6) Tracer Wire – Yellow.
- C. Miscellaneous control wiring materials:
 - 1. Materials for both standard and two wire systems.
 - a. Data Wires: Paige 7171D-A direct burial shielded and armored signal cable with polyethylene jacket (NO SUBSTITUTIONS)
 - 1) Data Wire connections and splices shall be made with Ranger Servi-Seal.
 - b. Control Wire and Two-Wire Decoder Cable connections and splices shall be made with 3M DBR/Y-6M direct bury splice, or similar UL listed dry splice methods.
 - c. Spare Wire and wire ends shall be capped with 3M DBR/Y-6Y or DBR direct bury splice, or similar UL listed dry splice methods to prevent wire corrosion.
 - d. Mainline Tracer Wire: Install one continuous AWG UL No. 10 (#10) tracer wire as detailed above all mainline. Loop wire into each valve cluster valve, gate valve and drain valve control boxes. Color shall be yellow.
 - e. Splice Box: Carson Brooks 10-inch round box, branded "SB."
 - f. High Voltage: Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

2.6 MISCELLANEOUS MATERIALS

- A. Rain Sensor: Hunter wireless Rain Klik with by-pass approved equal. Rain sensor shall be installed per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Utility Locates: Contact Utility Notification Center of Colorado at or 8-1-1 or 1-800-922-1987 prior to any excavation, for the marking of underground member utilities. The indication of utilities on the Contract Drawings does not relieve the Contractor of the responsibility for utility location. Contractor is responsible for potholing all utility locations to verify the depth and locations. Potholing related to irrigation installation shall be considered incidental to irrigation installation and will not be paid for separately. Route trenches to avoid existing utilities. Verify with the Project Manager any required relocation prior to installation.
- B. Landscape Plan Review and Coordination: Contractor will be held responsible for coordination between landscape and irrigation system installation. Landscape material locations shown on the Landscape Plan shall take precedence over the irrigation system equipment locations. If irrigation equipment is installed in conflict with the landscape material locations shown on the landscape plan, the Contractor will be required to relocate the irrigation equipment, as necessary, at Contractor's expense.
- C. Pressure Verification: Contractor shall field verify the tap size, static pressure and verify Gallons Per Minute flow at the project site, prior to commencing Work or ordering irrigation materials, and submit findings in writing to the Project Manager. If Contractor fails to verify tap size, static water pressure and flow prior to commencing Work or ordering irrigation materials, Contractor shall assume responsibility for all costs required to make system operational and the costs required to replace any damaged landscape material. Damage shall include all required material costs, design costs, labor costs and plant replacement costs.
- D. Inspection: Examine areas and conditions under which Work of this Section is to be performed. Do not proceed with Work until unsatisfactory conditions have been corrected.
 - 1. Grading operations, with the exception of fine grading, shall be completed and approved by Project Manager before staking or installation of any irrigation system begins.
- E. Layout: Layout and stake system before beginning installation. Staking shall occur as follows:
 - 1. Mark, with paint, routing of pressure supply line and flag heads for all new zones. Contact the Project Manager forty eight (48) hours in advance and request review of staking. The Project Manager will review staking and direct changes if required. Review does not relieve installer from coverage problems due to improper placement of heads after staking.
 - 2. Valve boxes and mainline will not be located in ball fields, and multi-use sport fields, recovery zones, or below playground equipment.
 - 3. If project has significant topography, free form planting beds, or other amenities which could require alteration of irrigation equipment layout as deemed necessary by the Project Manager, do not install irrigation equipment in these areas until the Project Manager has reviewed equipment staking.
 - 4. The Project Manager may request the City Foresters approval of proposed trenching prior to start of trenching.
 - 5. Review backflow prevention device location and operation with the Project Manager prior to mainline installation.

3.2 EXCAVATION AND BACKFILL

- A. Install mainline pipe and wire sleeving under existing asphalt paving, concrete walks and critical root zones by directional boring. Pot-hole existing utilities for location and depth in advance of boring operations. When pot-holing in cross streets: include all permits, traffic control, backfill, compaction and surface restoration as required by the City and County of Denver Transportation Engineering Standards and Specifications. Compact backfill at bore pits around the end of sleeves to ninety five percent (95%) compaction in landscape areas.
- B. Excavation:
1. Trenching:
 - a. Trench excavation shall follow, as much as possible, the layout shown on Drawing. Dig trenches straight and support pipe continuously on bottom of trench. Trench bottom shall be clean and smooth with all rock and organic debris removed. Comply with OSHA standards for all trenching and excavation.
 - b. Trenching under limb spread of existing trees: Accomplish by hand or other method that will not damage limbs or branches. Refer to Division 01 "Tree Retention and Protection" for additional precautions.
 2. Clearances and Depths:
 - a. Main pressure line: Make trenches of sufficient width to properly assemble and position pipe in trench. Clearances:
 - 1) Piping three inches (3") and larger: Minimum clearance of piping three inches (3") or larger shall be five inches (5") horizontally on both sides of the trench.
 - 2) Piping two and one-half (2-1/2") and smaller: Trenches shall have a minimum width of four inches (4").
 - 3) Line Clearance: Provide minimum six inches (6") of clearance between each line, and minimum twelve inches (12") of clearance between lines of other trades.
 - 4) Lateral Pipe: Trenches shall have a minimum width of four inches (4").
 - 5) Line Clearance: Provide not less than six inches (6") of horizontal clearance between each line, and not less than twelve inches (12") of clearance between lines of other trades.
 - 6) Installation of multiple runs of piping in common trench is prohibited. .
 - b. Pipe and Wire Depth to finish grade:
 - 1) Pressure Supply Piping within Parks: thirty inches (30") from the top of pipe, maximum variation two inches (2").
 - 2) Pressure Supply Piping within Right-of-Way: twenty four inches (24") from the top of pipe, maximum variation two inches (2").
 - 3) PVC Sleeving: At specified pipe or wire depth.
 - 4) Non-pressure Piping (gear driven heads): eighteen inches (18") from top of pipe, maximum variation two inches two inches (2").
 - 5) Non-pressure Piping (pop-up heads): turf zones: eighteen inches (18") from top of pipe, native seed zones: twenty four inches (24") from top of pipe, maximum variation two inches (2")
 - 6) Control Wiring and Two-Wire Decoder Cable: Side of pressure main when installed in the same trench; twenty-four (24) inches from the top of wire bundle where installed separately from mainline trench.

3. Vibratory Plow: Not permitted without written authorization of the Project Manager.

3.3 INSTALLATION OF IRRIGATION EQUIPMENT

- A. Locate all equipment as near as possible to locations designated. Deviations shall be reviewed and approved by the Project Manager prior to installation.
- B. Service Line Piping (copper or ductile iron piping from water meter to connection to backflow prevention device) - When pipe installation is not in progress, or at the end of each day, close pipe ends with tight plug or cap.
 1. Ductile Iron Pipe – Provide and install full pipe length protective polyethylene factory-formed sleeves around all piping to be buried. Pipe shall be bedded per Denver Water current standards and specifications.
 2. Copper piping – Installation shall match specifications for copper service line as required by Denver Water and in accordance with City and County of Denver Building Codes.
- C. Sleeving:
 1. Install sleeving under any hard surface prior to surface being installed to accommodate piping and wiring.
 2. Minimum depth to top of pipe shall be determined by depth of mainline and lateral lines.
 3. Provide for a minimum cover of twenty four (24) inches between the top of the sleeve and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete or concrete paving.
 4. Sleeving located under areas where asphalt or concrete paving will be installed shall be bedded with a sand layer six inches (6”) below the pipe and six inches (6”) above the pipe.
 5. Sleeving under existing walks or concrete pavement shall be done by jacking, boring or hydraulic driving. Where cutting of asphalt and/or concrete is necessary, it shall be done per the Contract Drawings and Details and or per the City and County of Denver Right of Way Standards. Where cutting of concrete is necessary remove the entire concrete section or “stone”. Obtain permission to cut walks from the Project Manager.
 6. Compact backfill material in three uniform lifts at ninety five percent (95%) determined in accordance with ASTM D698 using mechanical tamping devices under pavement.
 7. Do not allow sleeves to become filled with soil or other undesirable material. Tape ends of sleeves until commencement of pipe installation.
 8. Mark sleeves on hard surfaces with a three inch (3”) by three inch (3”) “X” as per plans in a manner to ensure easy location in the future.
 9. Sleeve size requirements for wire and pipe, control wire shall be placed in sleeving separate from pipe sleeving:
 - a. 1” to 1-1/4” Pipe: 2” PVC (1)
 - b. 1-1/2” to 2” Pipe: 4” PVC (1)
 - c. 2-1/2” to 3” Pipe: 6” PVC (1)
 - d. 4” Pipe: 8” PVC (1)
 - e. 1 to 25 Control Wires: 2” PVC (1)
- D. Installation of Piping:
 1. PVC Mainlines:
 - a. Ensure that pipe is placed at a consistent depth and on a level base free of rocks and stones. Place manual drain valves at low points and dead ends of pressure supply piping to insure complete drainage of system. When pipe laying is not in

progress, or at end of each day, close pipe ends with tight plug or cap. Perform Work in accordance with good practices prevailing in piping trades.

- b. Install Drain Valves at all low points of the system.
- c. Install mainlines a minimum of twenty four inches (24") off of any hard surface.
- d. Solvent Weld PVC Pipe (required on all pipes two and one-half inches (2-1/2") or less): Lay pipe and make all plastic to plastic joints in accordance with manufacturer's recommendations. Do not install pipe when air temperature is below forty degreeS (40°) F.
- e. Gasketed End Pipes (required on all pipes three inches (3") or larger): Lay pipe and make pipe-to-fitting or pipe-to-pipe joint, following the manufactures installation recommendations. Install joint restraint fittings and pipe restraints on all fittings and adjacent pipe runs per manufacturer's recommendations and per approved plan.

- E. Thrust Blocks on all PVC mainline two and one-half-inches (2-1/2") and smaller: Construct thrust blocks per Contract Drawings and Details.
 - 1. Concrete thrust blocks shall be a minimum of one (1) cubic foot of cast in place concrete in compliance with Division 03 Section "Cast-in-place Concrete". Contact the Project Manager prior to placing thrust blocks for observation of thrust block excavation and initial placement. Install a bond breaker made of a minimum six (6)-mil plastic between the thrust block and fittings being restrained. Size thrust blocks per soil type table below:

Soil Type	lbs./SF
Mulch, Peat, etc.	0
Soft Clay	500
Sand	1,000
Sand and Gravel	1,500
Sand and Gravel with Clay	2,000
Sand and Gravel Cemented with Clay	4,000
Hard Pan	5,000

- F. Joint restraints on all gasketed PVC mainline pipe three inches (3") and larger: Install joint restraints per the plans and or manufactures recommendations.
 - 1. Joint restraints shall be installed as shown on the plans or per the manufacturer's recommendations. Prior to backfilling any joint restraints the Project Manager shall be present to verify that the restraints were installed in the proper locations and that all bolts have been tightened to the manufactures specifications. Any restraints that are buried prior to inspection shall be excavated to allow for review and inspection at no additional cost to the City.

- G. Flexible Plastic (Polyethylene) Pipe: Lay pipe and assemble fittings according to manufacturer's recommendations and per Contract Drawings and details.

- H. Control Wiring - Low Voltage Wiring:

- 1. Bury control wiring between Automatic Irrigation Controller and electric valves in pressure supply line trenches, strung as close as possible to main pipe lines with such wires to be consistently located below and to one side of pipe, or in separate trenches.
 - a. Bundle all 24-volt wires at ten foot (10') intervals and lay with pressure supply line pipe to one side of the trench.
- 2. Install tracer wire per Details.

3. Provide an expansion loop at every mainline change of direction, every electric control valve location (in valve box), and every five hundred feet (500'). Form expansion loop by wrapping twenty four inches (24") of wire around a three quarters inch (3/4") pipe and withdrawing pipe.
4. Make all splices and electric control valve connections using 3M DBR/Y-6 connectors
5. Install all control wire splices not occurring at control valve in a separate Carson Industries Model #910-10 body with 910-4 bolt down T-cover wire splice valve box with branded with WS in 1-inch high letters minimum.
6. Install one control wire for each control valve.
7. Install a total of five spare #14 AWG UFUL control wires and one spare common wire from Automatic Irrigation Controller pedestal to the end of each and every leg of mainline. Label spare wires at Automatic Irrigation Controller and wire stub box.
8. Wire Testing:
 - a. Existing wiring indicated to remain on documents is to be ohm-tested for continuity prior to construction. Contractor to produce report and copy Project Manager of the results of such testing.
 - b. New wiring: All new wiring to be ohm-tested prior to connection to valves and controller(s) for continuity. Contractor to produce report and copy Project Manager of the results of such testing.

I. Installation of Valves:

1. Electric Control Valves: Install electric control valves as detailed on the Contract Drawings.
 - a. Electric Control Valves for two-wire system: Install electric control valves as detailed on the Drawings. Install one valve decoder module (Toro ESB-BDC series) per valve box, sized to operate all valves located within same box.
2. Quick Coupling Valves: Install quick coupling valves as detailed on the Contract Drawings.
3. Drain Valves: Install manual drain valves as detailed on the Contract Drawings.
 - a. Install manual drain valves at all low points in pressure supply line, whether indicated on the drawing or necessitated by actual conditions, to ensure proper drainage of the mainline.
4. Isolation/Gate Valves: Install as detailed in locations shown on Contract Drawings.
5. Valve Boxes: Install one valve box for each type of valve or manifold as detailed. Install compacted gravel leveling bed after compaction of subgrade and prior to setting of valve box.
 - a. Install filter fabric over gravel prior to setting valves boxes. Ensure that filter fabric extends a minimum of six inches (6") from the bottom and no more than 6" from the top of box. Secure the filter fabric to the side of box with grey tape.
 - b. Install valve boxes flush with finish grade and square to adjacent surface features and one another
 - c. When valve boxes are grouped together, allow at least twenty four inches (24") between valve box sides.
 - d. Install valve boxes a minimum of eighteen inches (18") off of any hard surface.
 - e. Cutting of valve box to give clearance for piping or valves is not allowed.

3.4 INSTALLATION OF SPRINKLER HEADS

- A. Install sprinkler heads where designated after the Project Manager has approved staking. Set to finish grade as detailed.
 - 1. Spacing of heads shall not exceed the maximum indicated on Drawing(s) unless re-staked or as directed by the Project Manager. In no case shall the spacing exceed maximum recommended by manufacturer.
 - 2. Install gear driven heads on swing-joint risers as detailed. Swing joints to non-pressure lines shall be set at no more than forty five degrees (45°) or less than ten degrees (10°).
 - 3. Install pop-up heads on swing pipe as detailed.
 - 4. Adjust part circle heads for proper coverage. Adjust heads to correct height after sod is installed. Plant placement shall not interfere with intended sprinkler head coverage, piping, or other equipment. The Project Manager may request nozzle changes or adjustments without additional cost to the City.

3.5 BACKFILLING

- A. Do not begin backfilling operations unless authorized by the Project Manager and all required systems tests have been completed. Backfilling shall not be done in freezing weather unless authorized by the Project Manager. Leave trenches slightly mounded to allow for settlement after backfilling is completed. Trenches shall be finish graded and sodded or seeded prior to walk-through of system by the Project Manager.
 - 1. Materials - Excavated material is generally considered satisfactory for backfill purposes. Backfill material shall be free of trash, organic matter, frozen materials, and stones larger than 2-inches in maximum dimension. Material not suitable for backfill shall be hauled away. Contractor shall be responsible for providing suitable backfill if excavated material is unacceptable or not sufficient to meet backfill, compaction, and final grade requirements.
 - 2. Do not leave trenches open for a period of more than forty eight (48) hours. Open excavations shall be protected in accordance with OSHA regulations.
 - 3. Compact backfill to ninety five percent (95%), determined in accordance with ASTM D698 utilizing the following methods in landscape areas:
 - a. Mainline Pipe: Backfill and mechanically compact in three uniform lifts to a ninety five percent (95%) compaction, utilizing optimum moisture content for the soil type. Hydraulic settling of mainline trenches will not be allowed.
 - b. Secondary Pipe: Backfill in two uniform lifts and hydraulically or mechanically compact each.
 - c. Puddling or ponding and/or jetting is prohibited within twenty feet (20') of building or foundation walls.

3.6 RAIN SENSOR

- A. Rain Sensor: Install in accordance with manufacturer's instructions, and as shown on the Contract Drawings.
 - 1. Install rain sensor(s) prior to starting any irrigation schedules for new sod or seed programs.
 - 2. Install rain sensor(s) a minimum of fifteen (15) feet above grade, mount to a light pole, building or approved structure that is not shielded by tree canopies or structures and not effected by irrigation overspray.
 - 3. All rain sensor(s) to be set at one eighth inch (1/8") inch prior to being installed or irrigation begins.

3.7 ADJUSTING

- A. Upon completion of installation, “fine-tune” entire system by regulating valves, adjusting arcs and radius, and setting pressure reducing valves at proper and similar pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible. Heads of same type shall be operating at same pressure within plus or minus ten percent (10%).
- B. If it is determined by the Project Manager or Consultant that irrigation adjustments will provide improved coverage and water distribution, the Contractor shall make such adjustments prior to Final Acceptance. Adjustments may include but not limited to changes in nozzle sizes, degrees of arc, and control valve flow control regulations. Adjustments shall be completed at no additional costs to the City.
- C. All sprinkler heads shall be set perpendicular to finish grade or within allowable limits shown on Contract Drawings.
- D. Areas that do not conform to designated operation requirements, due to unauthorized changes or poor installation practices, shall be immediately corrected at no additional cost to the City.

3.8 CLEANING

- A. Maintain continuous cleaning operation throughout duration of Work. Dispose of, all trash, waste materials, debris and excess soil generated by installation of irrigation system off-site at no additional cost to the City. Contractor shall clear all debris, including, soil, from all paths, walks, roads, and other hard surface areas.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Irrigation Systems. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, trenching, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 80 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for the preparation of soil for the purpose of seeding, sodding, or planting operations.
 - 1. Soil preparation consists of ripping, fertilizing, soil conditioning and fine grading the topsoil. Soil preparation as specified herein **MUST** precede all seeding, sodding, and planting.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Clearing and Grubbing".
 - 3. Division 31 Section "Earth Moving"
 - 4. Division 32 Section "Topsoil".
 - 5. Division 32 Section "Turfgrass Seeding".
 - 6. Division 32 Section "Native Seeding".
 - 7. Division 32 Section "Sodding".
 - 8. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 DEFINITIONS

- A. Fertilizer: A substance that is added to soil to help the growth of plants.
- B. Soil Amendment: Any substance which is intended to improve the physical, chemical, or other characteristics of the soil
- C. Soil Conditioner: Combination of slow-release fertilizer, hummate, and Mycorrhiza

1.4 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Soils Test Data: See Sections 1.6 through 1.11 of this specification.
- C. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Material Certificates: For each type of soil conditioner, soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.

- D. Samples: For each bulk-supplied material, one (1) quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.
- E. Quality Control Submittals:
 - 1. Certificates: State, Federal and other inspection certificates shall accompany invoice for materials showing source or origin. Submit to Project Manager prior to acceptance of material.
 - 2. Material Analysis: Provide soil conditioner analysis performed no more than three months prior to delivery to site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, chemical name, trade name, trademark and conformance to state law, bearing name and warranty of producer.
- B. Notify Project Manager of delivery schedule in advance so material can be inspected upon arrival at project site. Immediately remove unacceptable material from project site.

1.6 PROJECT/SITE CONDITIONS

- A. General: Do not perform work when climate and existing site conditions will not provide satisfactory results.
- B. Vehicular site access shall be limited to the area(s) indicated on the Contract Drawings or as defined by the Project Manager.
- C. Damage to turf, natural areas, pavements, irrigation systems, underground utilities, and other improvements shall be repaired by the contractor at no additional cost to the City.

1.7 QUALITY CONTROL

- A. Testing Agency Qualifications: Retain an independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, provide testing of materials in the Section by a qualified testing laboratory approved by the Project Manager. Submit Testing Agency qualifications to Project Manager for approval prior to construction.
 - 2. Multiple Laboratories: Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing. Submit Testing Agency qualifications to Project Manager for approval prior to construction.

1.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Contractor is responsible for specified tests.

- C. Perform the following tests
 - 1. Soil texture
 - 2. Agricultural fertility testing
- D. Soil will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.
- G. Inspection: Provide notice to the Project Manager requesting inspection at least seventy-two (72) hours prior to anticipated date of completion.
- H. Contractor shall be responsible for coordinating soil preparation inspections with Denver Water, call (303) 628-6682 at least seventy-two (72) hours prior to installing sod, seed or plantings.
- I. Deficiencies: The Project Manager will specify deficiencies to Contractor who shall make satisfactory adjustments and shall again notify Project Manager for final inspection.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency, approved by the Project Manager, to perform preconstruction soil analyses on existing, on-site soil, imported topsoil and pre-amended imported soil.
 - 1. Notify Project Manager seventy-two (72) hours in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment, soil-conditioner and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.10 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Project Manager and under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of five (5) samples per acre collected randomly throughout the areas to receive similar soil preparation, including seed/sod, native seeding, planting beds, and gardens. Provide a map to the Project Manager of sampling locations prior to sampling for approval.
 - 2. Procedures and Depth of Samples: Collect samples to a depth of six inches (6") and combine in a clean plastic container.
 - 3. Mixing of Samples: Mix samples together thoroughly, removing plant debris and breaking up clods.

4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.11 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
- C. Fertility Testing: Soil-fertility analysis shall include the following:
 1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).
 4. Buffered acidity or alkalinity.
 5. Lime estimate.
 6. Soil texture estimate.
 7. Nitrogen ppm.
 8. Phosphorous ppm.
 9. Potassium ppm.
 10. Manganese ppm.
 11. Zinc ppm.
 12. Iron ppm.
 13. Boron ppm.
 14. Copper ppm.
 15. Sodium ppm, and sodium absorption ratio.
 16. Soluble-salts ppm.
 17. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 18. Other deleterious materials, including their characteristics and content of each.
- D. Recommendations: Based on the test results, state recommendations for soil treatments, soil amendments, and soil conditioners to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
 1. Fertilizers and Soil Amendment Rates: State recommendations in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil when the pH is near the extreme ends of the acceptable range for the plants indicated.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Do not move or handle materials when they are wet or frozen.
 - 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Shall be as specified under Division 32 Section "Topsoil".
- B. Soil Amendments:
 - 1. For the purpose of bidding the Contractor shall assume all areas to receive soil amendments will be at four (4) cubic yards per one thousand (1,000) square feet. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Amendment.
 - 2. Composted material shall consist of aged organic matter, free of weed or other noxious plant seeds, lumps, stones, or other foreign contaminants harmful to plant life, and having the following characteristics based on a nutrient test performed no longer than 3 months prior to its incorporation into the project:
 - a. Organic matter: twenty five percent (25%) maximum.
 - b. Salt content: Five (5.0) mmhos/cm maximum.
 - c. pH: 7.5, maximum.
 - d. Carbon to nitrogen ratio shall be less than 20:1.
 - 3. Mountain peat, aspen humus, gypsum and sand will not be accepted.
 - 4. Acceptable product: Class I compost, such as Ecogro or Bio-comp, as produced by A1 Organics, Eaton, CO, or approved equal.
- C. Soil Conditioners:
 - 1. For the purpose of bidding the Contractor shall assume all areas to receive Soil Conditioners will be applied at the rate specified by the manufacturer for each specific planting type. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Conditioner.
 - a. Organic slow release fertilizer (6-1-1), acceptable product: "Biosol" or approved equal.

- b. Granular Humic Acid soil conditioner, acceptable product: “Menefee Humate Soil Conditioner”.
- c. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, thirty three percent (33%) hydrogel, and a maximum of five and one half percent (5.5%) inert material.
- d. Mycorrhizal Inoculant: AM-120, as manufactured by Reforestation Technologies International, locally available from Pawnee Buttes Seed, Greeley, CO, (970)356-7002.
- e. Acceptable substitution.

2.2 FERTILIZER

A. General:

- 1. Fertilizer shall conform to applicable State fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer’s guaranteed analysis. Fertilizer that has become caked or damaged will not be accepted.

B. Turf Grass Lawns:

- 1. Diamonium phosphate (18-46-0). Nitrogen shall be composed of sulphur-coated Urea only. Provide in sufficient quantity to apply at the rate of one hundred (100) pounds nitrogen per acre, unless otherwise indicated by the soils tests.

C. Native Grass Areas:

- 1. Fertilizer shall not be applied to areas to receive native grass seeding.

2.3 PESTICIDE

- A. Post Emergent Pesticide: Roundup (Glyphosate) or approved equal as manufactured by Monsanto Company or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Verify that existing site conditions are as specified and indicated on Contract Drawings before beginning work under this Section.

- 1. Grades: Inspect to verify rough grading is within +/-one tenth of one foot (0.1’) of grades indicated and specified.
- 2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
- 3. Damaged Earth: If, upon inspection, the soil is found to be unfit to support planting as described in article 2. above, it is to be removed and replaced with clean soil from a source approved by the Project Manager.

- B. Unsatisfactory Conditions: Report in writing to General Contractor with copy to Project Manager.

- C. Acceptance: Beginning of installation means acceptance of existing conditions by installer.

3.2 PREPARATION

A. Areas of Newly Placed or Existing Topsoil:

1. Protection:
 - a. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment prior to commencing work.
 - b. Contractor shall be responsible for proper repair to landscape, utilities, walls, pavements and other site improvements damaged by operations under this section.

B. Weed Control: Perform pesticide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire pesticide treatment process before proceeding with planting. Repeat procedure as needed as weed growth becomes evident throughout the duration of construction.

1. Pesticide treatment must be completed during the growing season.
2. Water surface one half inch (1/2") per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
3. Treat site with pesticide in accordance with manufacturer's recommendations.
 - a. Two days after application water surface one half inch (1/2") per week if natural precipitation does not supply this amount to encourage weed seed germination.
 - b. Ten (10) days after the first Pesticide application, review surface for evidence of plant growth.
 - c. Repeat steps 2, 3, 4, and 5, up to three (3) applications, until there is no evidence of plant growth after a ten (10) day period.
 - d. Obtain Project Manager approval of surface conditions fourteen (14) days after last pesticide application.
 - e. Pesticide treatments beyond the three (3) applications shall be considered additional to the contract and will be performed at the directed of Project Manager after the City has approved the cost. Additional pesticide treatments required for imported topsoil shall be borne solely by the Contractor.
 - f. Remove plant debris from treated area.
 - g. Contact Project Manager forty eight (48) hours in advance to review the site after each pesticide treatment. Do not proceed with additional planting until the results are approved and accepted by the Project Manager.

4. Surface Grade: Establish grades as indicated on Contract Drawings, and as required in Division 31 Section "Earth Moving".
5. Remove weeds, debris, clods and rocks larger than one inch (1"). Remove and dispose of accumulated materials at direction of Project Manager.
6. Erosion Control: Take measures and furnish equipment and labor necessary to control the flow, drainage and accumulation of water, and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site throughout duration of work. Insure that all excess water will run off the grades or will percolate within twelve (12) hours.
7. Soil Testing: Soil Amendments, Soil Conditioners and Fertilizers shall meet the minimum amounts as specified in Article 3.3, "Installation", below. Unless determined by the Project Manager the Contractor shall be responsible for performing horticultural soil tests on a minimum of four (4) current soil samples for each source of topsoil to be used in the project. Reference Division 32 Section "Topsoil", Article 1.4, "Quality Control" for soil analysis report information. Soil test will be used to determine the type

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and amount of Soil Amendment, Soil Conditioner, and Fertilizer to be applied prior to seeding, sodding and planting. Locations for testing shall be approved by the Project Manager.

8. Timing: Perform soil preparation just prior to planting operations and in accordance with final planting schedule. Coordinate with irrigation system installation to avoid damage.
- C. Areas of Compacted Topsoil: Areas within the work limits or as defined on Contract Drawings or by the Project Manager that have vegetation that is sparse, stunted, anemic, weedy or was used as a construction staging, parking area and/or subjected to heavy use will require ripping to prepare the soil for revegetation. Scarify compacted soil to a 8-inch depth minimum to loosen topsoil.
- D. Areas of Disturbed Topsoil: Areas disturbed but not severely compacted as determined by the Parks Project Manager, shall be deep tine aerated or shattered to prepare the soil for revegetation.
- E. Areas of Undisturbed Natural Topsoil: Undisturbed sites that are or were supporting healthy plant growth need only surface seedbed preparation prior to sowing seed.

3.3 INSTALLATION

- A. Install topsoil as required in Division 31 section "Earth Moving" and Division 32 Section "Topsoil".
- B. Soil Preparation in Turf Grass and Planting Bed Areas:
 1. Apply Soil Amendments at the following rates:
 - a. Soil Amendments: Bid quantity to be four (4) cubic yards per one thousand (1,000) square feet, or per soil test recommendations.
 - b. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 - c. Fertilizer: Diamonium phosphate, Bid quantity to be two (2) pounds of nitrogen per one thousand (1,000) square feet. Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 - d. Mycorrhizal inoculants: Apply per manufacturer's instructions and quantities appropriate to the planting type.
 2. After applying Soil Amendments, thoroughly till area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. Soil Conditioners and Fertilizer shall be applied topically once final grade has been established and just prior to sodding or seeding.
- C. Soil Preparation in Native Grass Areas:
 1. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 2. Mycorrhizal inoculants: Apply per manufacturer's instructions and quantities appropriate to the planting type.
 3. Thoroughly till the area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. If a soil conditioner is to be applied ensure that the product is spread evenly over the surface of the soil and not tilled into the soil.
 4. Soil Conditioner Installation:

- a. Apply Soil Conditioner only as directed by per soils tests performed for the areas to be seeded. Apply topically once fine grade has been established and just prior to seeding per the manufactures recommendations for native seed areas.
- D. Fine Grading in all Landscape Areas:
 - 1. Complete fine grading for all areas prior to seeding or planting. Allow for natural settlement.
 - 2. For ground surface areas surrounding buildings to be landscaped, maintain required positive drainage away from buildings.
 - 3. Establish finish grades to within plus or minus one tenth (0.10') foot of grades indicated, in order to prevent "bird-baths" or ponding.
 - 4. Finish grade shall be below edge of pavement prior to sodding, seeding or planting.
 - a. Sodded Areas: Allow one and one half inches (1-1/2") for sod.
 - b. Seeding Areas: Allow one inch (1") for seed.
 - c. Planting Beds: Allow four inches (4") for mulch.
 - 5. Noxious weeds or parts thereof shall not be present in the surface grade prior to seeding.
 - 6. Compaction of Surface Grade Prior to Landscape Installation: Firm, but not hard, eighty five percent (85%) standard Proctor density within two percent (2%) optimum moisture.
 - 7. Hand Raking:
 - a. Turfgrass Lawn Areas: Prior to acceptance of grades, hand rake to smooth, even surface, free of debris, clods, rocks and organic matter greater than one inch(1").
 - b. Native Seed Areas: Area shall not be raked smooth but left in a uniform condition after tilling. Rough raking may occur parallel to the contours only.
 - 8. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.4 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove debris and excess materials from site. Clean out drainage inlet structures. Clean paved and finished surfaces soiled as a result of work under this Section, in accordance with Section 208 of the General Specifications or as directed by the Project Manager.

3.5 PROTECTION

- A. Provide and install barriers as required and as directed by Project Manager to protect completed areas against damage from pedestrian and vehicular traffic until acceptance by City.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.

7. Excavation or other digging unless otherwise indicated.

- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Project Manager and replace contaminated planting soil with new planting soil.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price.

END OF SECTION 32 91 13

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing, stockpiling, and placing topsoil on a previously prepared subgrade.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Earth Moving"
 - 3. Division 32 Section "Soil Preparation".
 - 4. Division 32 Section "Turfgrass Seeding".
 - 5. Division 32 Section "Native Seeding".
 - 6. Division 32 Section "Sodding".
 - 7. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Planting Area: Areas to be planted.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Soil Analysis Report: As indicated in Article 1.5 “Quality Control”, below.

1.5 QUALITY CONTROL

A. Existing On-Site Topsoil:

- 1. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
- 2. A minimum of five (5) sample locations per acre are required, with individual tests completed for each sample.
- 3. A map of the site illustrating the locations of each sample location is to be submitted to Project Manager for approval prior to collecting samples.
- 4. Follow instructions from soil testing laboratory when collecting samples.
- 5. Testing will be at the expense of the Contractor.
- 6. Submit a one (1) quart sample along with analysis results.

B. Imported Topsoil:

- 1. Submit source location for topsoil to be imported to site for approval by Project Manager.
- 2. Submit soil analysis report for topsoil imported to site, from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
 - a. One 1-quart sample per five hundred (500) cubic yards of imported soil is required, with individual tests completed for each sample.
 - b. Follow instructions from soil testing laboratory when collecting samples.
- 3. Testing will be at the expense of the Contractor.
- 4. Submit a one (1) quart sample along with analysis results.

C. Manufactured Topsoil:

- 1. Submit source of manufactured topsoil to be imported to site for approval by Project Manager.
- 2. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).
 - a. Test is to be completed within sixty (60) days preceding delivery to site. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).

- b. Submit a one (1) quart sample along with analysis results.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver or place topsoil in a frozen, wet, or muddy condition.
- B. Protect stored and placed topsoil from vehicular traffic, equipment storage, material storage, or from contaminants or pollution sources. Topsoil that is compacted or tainted during construction is to be removed from site and disposed of at a licensed landfill at no additional cost to the City.

PART 2 - PRODUCTS

2.1 ON-SITE TOPSOIL

- A. Topsoil previously stripped and stockpiled prior to earthwork operations. See Division 31 Section "Earth Moving".

2.2 IMPORTED TOPSOIL

- A. All topsoil shall be a loam or sandy loam conforming to ASTM D 5268. At least ten (10) days prior to topsoil delivery, notify Project Manager of the source(s) from which topsoil is to be furnished. Topsoil shall be furnished by the Contractor and shall be a natural, friable soil representative of productive soils and shall meet the following conditions.
- B. It shall be obtained from the top six-inches (6") of well drained areas.
- C. Fertile, friable, loamy soil, reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than one-inch (1"), coarse sand, noxious seeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 6.5 and 7.5.
- D. Soil Texture:
 - 1. Sand: thirty percent (30%) – fifty percent (50%)
 - 2. Silt: thirty percent (30%) – fifty percent (50%)
 - 3. Clay: five percent (5%) – thirty percent (30%)
- E. Additives: As determined by soil fertility tests.
- F. Percent Organic Content:
 - 1. Turf grass shall be three percent (3%) maximum after amending or conditioning.
 - 2. Native grass shall be one percent (1%) maximum after amending or conditioning.
- G. Soluble Salts: Electric conductivity (EC) shall be less than two (2.0) mmhos/cm for turfgrass areas, dryland areas, and planting beds.

2.3 MANUFACTURED TOPSOIL

- A. "Amended Topsoil" as manufactured by A1 Organics, 16350 WCR 76, Eaton, CO 80615 Ph: (970) 454-3492, (800) 776-1644 Fax: (970) 454-3232 www.a1organics.com, or substitution as approved by Project Manager.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 2. Verify that final grades are completed in accordance with the Contract Drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

3.2 PLACING TOPSOIL

- A. Scarify compacted subgrade to a six-inch (6") depth to bond topsoil to subsoil. Place topsoil to a minimum depth of six-inches (6") after settlement. Topsoil shall be free from weeds, sod, and material larger than 1-inch (1"), toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown on Contract Drawings. Hand rake areas inaccessible to machine grading.
- B. Utilize salvaged topsoil as the top layer to the extent available. If sufficient on-site material is not available, the Contractor shall furnish and install imported topsoil in the manner described above. Topsoil shall mixed thoroughly with the salvaged topsoil prior to placement.

3.3 PROTECTION AND REPAIR

- A. Protect completed areas where topsoil has been spread from traffic which will compact the soil volume. Any areas that, as determined by Project Manager, become compacted due to Contractor's construction traffic shall be reconstructed to specified requirements and approved by Project Manager.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. On-Site Stockpiled Topsoil: Measurement will be made by the contract unit specified for Topsoil. Measurement shall include the actual number of units of specified material(s) placed

and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, stripping, stockpiling and placing of topsoil, loading, transporting, re-transporting to new locations (from onsite or off site stockpiles) spreading to specified depth disposing of unusable materials, hauling off, watering, dust control, erosion and sediment control, finish grading required to bring the site to the required lines and grades as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 91 20

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing and installation of bluegrass sod, and maintenance of sodded areas as outlined in Maintenance Section 1.8.B. until Final Acceptance.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Earth Moving".
 - 3. Division 31 Section "Watering".
 - 4. Division 32 Section "Irrigation System".
 - 5. Division 32 Section "Automatic Irrigation Controllers".
 - 6. Division 32 Section "Soil Preparation".
 - 7. Division 32 Section "Topsoil".
 - 8. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, pesticides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, herbicide, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. Weeds: Including but not limited to Goathead, Bindweed, Twitch, Dandelion, Jimsonweed, Knapweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Weed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broom Grass.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product indicated.
 - 1. Pesticides: Include product label and manufacturer's application instructions specific to this Project.
- C. Sod Certificates:
 - 1. State, Federal and other inspection certificates for sod shall be provided to the Project Manager a minimum of 10 working days prior to anticipated date of sod delivery.
 - 2. Submit a list of varieties contained in the sod, and include the source and origin for approval by the Project Manager.
- D. Qualification Data: For qualified landscape Installer.
- E. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- F. Material Test Reports: For existing-in-place surface soil.
 - 1. Soil analysis for each topsoil to be used.
 - 2. Analysis for manufactured topsoil.
 - 3. Analysis for each soil amendment.
 - 4. Analysis for each amended planting soil.
- G. Analysis and standards: Wherever applicable, for non-packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
- H. Planting schedule: Submit in writing two copies of proposed planting schedule, indicating dates for topsoil placing, site preparation, pesticide treatments, soil preparation, sodding, seeding, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- I. Maintenance Instructions: Recommended procedures for maintenance of turf and dryland grasses during a calendar year. Submit before expiration of required initial maintenance periods.
- J. Contract Closeout Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit one digital copy and two hard copies to the Project Manager in accordance with Division 01 Section “Contract

Closeout'. Include directions for irrigation, aeration, mowing, fertilizing and spraying as required for continued and proper maintenance through full growing season and dormant period.

2. Warranty for Bluegrass Turf Sod: At completion of work, furnish written warranty to Project Manager based upon specified requirements.

- K. The Project Manager reserves the right to reject the sod at any time prior to acceptance and that fails to meet specification requirements.

1.5 QUALITY CONTROL

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and dryland grass establishment.
 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Control."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years' experience, and certified by the State of Colorado Department of Agriculture.
 5. Personnel Certifications: Installers shall have certification the following categories from the Professional Landcare Network:
 - a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
 6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
 7. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: See Division 32 Section "Soil Preparation".
- D. Preinstallation Conference: Conduct conference at Project site to coordinate the process with other trades, to coordinate equipment movement within planting areas and to avoid soil compaction, to review proposed methods of installation, performance criteria, and maintenance procedures. Review underground utility location maps and plans. This meeting shall be coordinated by the Contractor, and comply with requirements in Division 1.
- E. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All sod shall be free from insects and disease. Species shall be true to their scientific name as specified.
- F. Materials: The Contractor shall submit to the Project Manager for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be

construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Project Manager.

G. Source Quality Control:

1. Sod Materials: Subject to inspection and acceptance. The Project Manager reserves the right to reject at any time or place prior to acceptance, any work and sod which in the Project Manager's opinion fails to meet these specification requirements.
2. Inspection will be made periodically during sodding, at completion and at end of warranty period by the Project Manager. Primarily for quality; however, other requirements are not waived even though visual inspection results in acceptance.
3. Promptly remove rejected sod from site.

H. Sod Standards:

1. Sod shall consist of healthy, thick turf having undergone a program of regular fertilization, mowing and weed control; free of weeds; uniform in green color, leaf texture and density; healthy, vigorous root system; inspected and found free of disease, nematodes, pests and pest larvae by the State Department of Agriculture.
2. Each piece of Sod shall consist of a sandy-loam soil base that will not break, crumble or tear during sod installation.
3. Sod thickness shall be a minimum three quarters inch (3/4") thick, excluding top growth and thatch.
4. Thatch layer shall not exceed one half inch (1/2"), uncompressed.
5. Sod shall be delivered and installed within twenty four (24) hours of being cut.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver on pallets properly loaded on vehicles with root system protected from exposure to sun, wind, and heat in accordance with standard practice. Sod that has been damaged by poor handling or improper storage is subject to rejection by the Project Manager.

1. Protect from dehydration, contamination, freezing and heating at all times. Keep stored sod moist and under shade or covered with moistened burlap.
2. Do not drop sod rolls from carts, trucks or pallets.
3. Do not deliver more sod than can be installed within twenty four (24) hours.

B. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, warranty and conformance to state law.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

4. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.

D. Material will be inspected upon arrival at project site. Project Manager will reject any opened or unacceptable materials as described above.

E. Immediately remove unacceptable material from job site.

1.7 PROJECT/SITE CONDITIONS

A. Work scheduling: Proceed with and complete landscape work as rapidly as portions of the site become available, working within the specified planting season and approved schedule.

B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.

C. Install sod between April 15 and October 1 or when irrigation is available for twenty one (21) days per Denver Water's guidelines for sod establishment.

D. Schedule work for periods of favorable weather. Do not install sod on saturated or frozen soil. The Project Manager reserves the right to deny sod installation on days that are deemed to be unfavorable for installation.

E. Existing conditions:

1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Project Manager.
2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Project Manager before planting.
4. If weeds are present on site, treat with pesticide prior to preparing soil for installing sod as specified in this or other Sections.

F. Coordination:

1. Coordinate with construction of utilities on site. Do not begin placing topsoil and sod until underground work is completed in the area.
2. Coordinate sodding with Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed if placement is completed more than 3 days prior to commencement of landscaping in the area. Limit fine grading to areas that can be prepared for planting within twenty four (24) hours after fine grading.
3. Coordinate with Contractors work requiring access to site over sodded areas.
4. Coordinate with installation of underground irrigation system.

1.8 WARRANTY

A. Warranty for Bluegrass Sod Areas: Warrant areas to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of one year from date of

Substantial Completion as a full stand of grass. Re-sod any spots larger than 12” square where sod has failed to establish, as defined in this Section. Continue this procedure until a successful stand of grass is growing and accepted by the Project Manager.

1. During the original warranty period, re-sod at once with comparable blend/mix, those areas that have failed to achieve a stand of grass or which in the Project Manager’s opinion are unhealthy.
 2. Re-sodding will not be allowed in any season considerable unfavorable for sodding by the Project Manager.
- B. Re-sod in a manner to achieve quality as originally specified per the Project Manager’s direction

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: See Division 32 Section “Topsoil”.
- B. Soil Preparation: See Division 32 Section “Soil Preparation.”
- C. Bluegrass Sod Turf:
1. Colorado grown Kentucky Bluegrass blend having a healthy, vigorous root system. Blend shall contain a minimum of three (3) improved varieties, specific for parks and sports fields of which at least one variety is an aggressive type.
 2. Sod to be produced in accordance with requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding."
 3. Harvesting: Sod shall be fertilized 2–3 weeks prior to harvesting. Mow sod to a height of one and one-half inches (1-1/2”) before the sod is lifted. Sod shall be harvested in rolls, and shall not be cut more than 24 hours prior to planting.
 4. Size: Machine cut to a minimum pad thickness of three quarters inch (3/4), excluding top growth and thatch. Provide sod of uniform pad sizes eighteen inches (18”) maximum width by twenty four (24”) minimum length, with maximum five percent (5%) deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically from upper ten percent (10%) of pad will be rejected. Sod which has dried out, sod with adhering soil which breaks, tears, or crumbles away will not be accepted. Sod cut for more than twenty-four (24) hours will not be accepted.
 5. Plastic netting: Sod to be free of plastic netting used during establishment by sod grower.
- D. Fertilizer: Inorganic mixture with following chemical composition: (20-5-10) with fifty percent (50%) sulfur coated urea (no iron), or as recommended by testing lab based on soil sample results.
- E. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for watering. Refer to Division 31 Section “Watering”. Water shall be free of substances that may be harmful to sod growth. Hoses and other watering equipment necessary to water the sod to be furnished by Contractor.

2.2 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by Project Manager and authorities having jurisdiction.
 - 1. Pre-Emergent Pesticide (Selective and Non-Selective): Use only with approval by Project Manager. Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 - 2. Post-Emergent Pesticide "Round-up" by Monsanto, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that finish grades are consistent with the slopes and grades indicated on the Contract Drawings. Verify grades are in conformance with Division 31 Section "Earth Moving".
 - 2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 3. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 4. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 5. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by the Project Manager.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.
- D. Acceptance: Beginning of installation means acceptance of existing conditions by the Contractor.

3.2 PREPARATION

- A. Work notification: Notify the Project Manager at least seven (7) working days prior to start of sodding operations.
- B. Limit turf subgrade preparation to areas that can be sodded within twenty four (24) hours.
- C. Newly Graded Subgrades: Prepare soil as required by Division 32 Section "Soil Preparation".

- D. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top six inches (6") of soil. Till soil to a homogeneous mixture of fine texture.
 - 3. Remove stones larger than one-half (1/2") inch in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4. Legally dispose of waste material, including grass, vegetation, and turf, off City property.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Verify that all areas are graded to drain at a minimum of two percent (2%) or as indicated on the Contract Drawings. Verify that subsurface drainage system and drain inlets if any, are operative.
- G. Verify that irrigation system is operable and provides adequate coverage prior to planting.
- H. Adjustment: Adjust irrigation heads to proper watering height according to depth of sod material but lower than compacted blade height to enable lawn mowers to cut grass freely without damage to the sprinkler system.
- I. When completed, the soil shall be firmed by float dragging, followed by steel raking, to provide for the proper sodded subgrade. The sod bed shall be totally free from rock or clay clods over one-half inch (1/2") inch in diameter.
- J. Repair: Re-establish grade and specified conditions to damaged sod areas prior to placing sod.

3.3 INSTALLATION

- A. Sodding:
 - 1. Sod within twenty-four (24) hours after preparation of bed.
 - 2. If plastic netting is present within sod, remove all netting during sod installation and discard from site.
 - 3. Subgrade on which sod is laid shall be slightly moist during installation.
 - 4. Lay sod with longest dimension parallel to contours and in continuous rows.
 - 5. Tightly butt ends and sides of sod together. Stagger and compact vertical joints between sod strips.
 - 6. Sod shall not be overlapped or stretched during placement. Exposed joints due to shrinkage will require replacement of sod in affected areas.
- B. Topsoil: Where new sod abuts an existing turf area topsoil shall be placed along seams and or joints to provide a smooth transition.
- C. Rolling: Sod shall be rolled after installation to ensure proper contact with the subgrade, and to ensure tight joints between adjacent pieces. Sod shall be moist prior to rolling. Once rolling is complete additional watering shall occur. Roller shall weigh one-hundred (100) pounds.
- D. Drainage: Contractor shall ensure that finished areas are graded so that positive drainage of storm and irrigation water is achieved.

- E. Water thoroughly with a fine spray as laying progresses and immediately after planting. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (1-1/2 ") below sod.
- F. After sod and soil have dried, roll sodded areas to ensure a good bond between sod and soil and to remove minor depressions and irregularities. Roller shall not exceed one hundred (100) pounds.

3.4 FERTILIZING

- A. Distribute (20-5-10) fertilizer uniformly at the rate of five (5) pounds of material per one-thousand (1,000) square feet, one (1) pound of actual nitrogen per thousand (1,000) square feet or sixty (60) days after initial sodding operations and every sixty (60) days thereafter until Final Acceptance of project by the Project Manager.

3.5 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by sodding operations, Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from sodded areas until grass is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during sodding operations. Repair irrigation system components damaged during sodding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.6 MAINTENANCE

- A. General: The maintenance period shall begin immediately after each area is sodded and continue until Final Acceptance of entire project. Final Acceptance of sodded areas will not be given until Project Manager is satisfied with establishment and a full stand of grass, in a vigorous growing condition, and thoroughly rooted to the soil and absence of visible joints. During this time, the Contractor is responsible for watering, mowing, spraying, weeding, fertilizing and all related work as necessary to ensure that sodded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to develop and maintain sodded areas from time of installation, then for a period of two (2) years from Substantial Completion. After Final Acceptance, maintenance shall become the responsibility of the City.
- B. The sodded areas shall be accepted on the basis of having a healthy, uniform stand of turf over the entire sodded area. Forty five (45) days after sodding, the sodded areas shall be reviewed by the Project Manager and the Contractor. Any areas as determined by the Project Manager where the sod has failed to establish shall be re-sodded. Acceptable sod establishment shall be defined healthy uniform turf that does not contain any stressed or bare spots greater than one square foot.

- C. Mowing and Trimming: When turfgrasses reach three and one-half inches (3-1/2") in height, begin weekly mowing program to maintain turf at two and one-half inches (2-1/2") to three inches (3") in height. Do not remove more than 1/3 the height of the grass blade in single mowing. Do not mow when grass is wet. All clippings from adjacent paved areas shall be removed and clippings from mowed turf areas shall be removed to the satisfaction of Project Manager.
- D. Fertilizing: Within thirty (30) days of sodding and every sixty (60) days thereafter until Final Acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.
- E. Weed Control: Control annual weeds by mowing. Do not use pesticides unless approved by the Project Manager and Denver Parks Operations Supervisor.
- F. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the Project Manager and the Parks Operations Supervisor.

3.7 CLEANING

- A. General: Provide and install barriers as required and as directed by Project Manager to protect sodded areas against damage from pedestrian and vehicular traffic until Final Acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Sodding. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, loading, transporting, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, temporary protection by fencing or other means, watering and all maintenance required until Final Acceptance of the work as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 92 23

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing, installing, and maintaining live woody plant material.
- B. Related Sections:
 - 1. Division 01 Section "Tree Retention and Protection".
 - 2. Division 31 Section "Clearing and Grubbing".
 - 3. Division 31 Section "Earth Moving"
 - 4. Division 32 Section "Watering".
 - 5. Division 32 Section "Irrigation System".
 - 6. Division 32 Section "Automatic Irrigation Controllers"
 - 7. Division 32 Section "Soil Preparation".
 - 8. Division 32 Section "Topsoil".
 - 9. Division 32 Section "Landscape Maintenance".

1.3 DEFINITIONS

- A. ANSI: American National Standards Institute. Z60.1 is the national standard for nursery stock.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- C. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Caliper: Trunk diameter is measured six-inches (6") from the ground; if the caliper is greater than four-inches (4"), the measurement is taken at twelve-inches (12") from the ground.
- F. Cane: A cane shall be considered a primary stem which starts from the ground or at a point close to the ground at a point not higher than one-fourth (1/4) the height of the plant, and which reaches the minimum height stated in the plant size specification.
- G. Central leader: Also referred to as leader or the dominant leader. A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main scaffold branch and extending to the top of the tree.

- H. Circling root(s): One or more roots whose diameter is greater than ten percent (10%) of the trunk caliper circling more than one-third of the trunk. Circling roots are unacceptable.
- I. Clear Trunk: The portion of the trunk below the main crown which may include shortened temporary branches.
- J. Co-dominant: Two or more vigorous, upright branches or stems of relatively equal diameter that originate from a common point, usually where the leader was lost or removed. Co-dominant stems are unacceptable.
- K. Container-Grown: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- L. Critical Root Zone (CRZ): Shall be defined as the tree protection area encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every-inch diameter of the trunk, whichever is greater.. Review the extent of the CRZ for impacted trees with Project Manager prior to start of work.
- M. Crown: The portion of a tree beginning at the lowest main scaffold branch extending to the top of the tree. On younger trees, the crown may be comprised of temporary branches.
- N. Cultivar: A named plant selection from which identical or nearly identical plants can be produced, usually by vegetative propagation or cloning.
- O. Drip Zone: The outermost edge of the tree's canopy or branch spread. The area within a tree's drip line is all the ground under the total branch spread.
- P. Finish Grade: Elevation of finished surface of planting soil.
- Q. Included Bark: Bark embedded in the union between a branch and the trunk or between two or more stems that prevents the formation of a normal branch bark ridge. Included bark is unacceptable.
- R. Kinked Root: A main root that is sharply bent. Kinked roots are unacceptable.
- S. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- T. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- U. Root Collar: Also referred to as the root flare. The base of a tree where the main roots and trunk meet.
- V. Scaffold Branches: Large main branches that form the main structure of the crown.

- W. Stem-girdling Root: A circling, bent, or straight root that touches or rests on the trunk or root flare that can become a permanent root. Stem-girdling roots are unacceptable.
- X. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- Y. Temporary Branch: A small branch that is temporarily retained along the lower trunk of young trees.
- Z. Trunk: The main stem of a tree, beginning at the root collar and ending at the lowest main scaffold branch.
- AA. Taper: The thickening of a trunk or branch toward its base.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
- C. Product Samples: At a minimum provide the following samples for approval by the Project Manager, additional product samples may be required at the direction of the Project Manager.
 - 1. Mulch: one(1) gallon bag minimum of each type of mulch.
 - 2. Tree Stakes: one(1) of each type.
 - 3. Tree Straps: one(1) each.
 - 4. Guy Material: one(1) linear foot.
 - 5. Guy Signal: one(1) linear foot.
 - 6. Tree Wrap: one(1) linear foot.
- D. Pesticides: Product label, Safety Data Sheet (SDS) labels and manufacturer's application instructions specific to Project.
- E. Proper Identification: All plants shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by species and cultivar (as appropriate).
- F. Contractor shall provide a complete list of all plant material for approval by the Project Manager a minimum of ten (10) days prior to delivery. Any substitutions of plant material, including but not limited to size, type, species and variety shall be listed and submitted to the Project Manager for approval.
- G. Contractor shall provide the following certificates:
 - 1. State Inspection Certificate from the origin nursery.
 - 2. Certificate from origin state.
 - 3. Quarantine Certificate from origin state.
 - 4. Any Certificates required by the USDA Animal and Plant Health Inspection Service (APHIS) and ANSI-Z-160 and accompanying Rules and Regulations.
- H. Analysis of existing soil shall be per Division 32 Sections “Topsoil” and “Soil Preparation”.
- I. Contract Close Out Submittals:

1. Operating and Maintenance Data: At completion of work, submit One (1) digital copy and two (2) hard copies to the Project Manager in accordance with Division 01 Section "Contract Closeout". Include recommended procedures for continued and proper maintenance during a full calendar year.
2. Warranty for Trees, Plants, and Groundcovers: At completion of work, furnish written warranty to the Project Manager based upon specified requirements.

1.5 QUALITY CONTROL

- A. The Project Manager reserves the right to reject, at any time or place prior to final acceptance, all plant materials that fail to meet these specifications in the Project Manager's opinion. Inspection of materials is primarily for quality, size, and variety, but other requirements are not waived even though visual inspection results in approval. Plants are to be inspected where available; however, inspection at the places of supply shall not preclude the right of rejection at the site or at a later time prior to final acceptance. Rejected material shall be removed from the site within twenty-four (24) hours.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Materials: Deliver materials in original containers with tags showing genus, species and size. Protect materials from damage during delivery and while stored at site. The Project Manager reserves the right to inspect containers before or after installation to verify compliance with Specifications.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants or critical root zone.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Trees: Nursery stock shall be harvested and planted during the same growing season. Do not prune, except as approved by the City Forester and Project Manager. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or tie trees in such a manner as to destroy natural shape. Provide protective covering during delivery. Plant materials delivered without protective covering may be rejected. Do not drop trees during delivery. All trees shall be labeled with a securely attached waterproof tag bearing a legible plant name. Remove all tags and flagging as directed by the Project Manager.
- D. Deliver bare-root stock plants within twenty-four (24) hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- E. Store bulbs, corms, and tubers in a dry place at sixty degrees to sixty-five degrees (60° to 65°) F until planting.

- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again (2) two weeks after planting.
- G. Handle planting stock by the root ball only.
- H. Deliver trees after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with wood chips, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before planting.
 - 3. Water root systems of trees stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Utilities: Contractor shall be responsible locating utilities and, repair of utilities damaged during the work. Determine location of overhead and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain markings until their removal is mutually agreed upon by the Contractor and Project Manager.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Project Manager before planting.
- E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- F. Protection: Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site from exposed excavations.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required. Planting materials should be planted between April 15 and October 1, or at the direction of the Project Manager. If irrigation is not available at the time of planting then the Contractor is responsible for watering of all plant material and no additional cost to the City, refer to Division 32 Section "Watering".

- B. Plant trees after final grades have been accepted and prior to seeding or sodding, unless otherwise authorized by Project Manager.

1.9 WARRANTY

- A. Warranty: The warranty specified in this Article shall not deprive the City of other rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Trees, Plants, and Groundcovers shall be warranted for a period of one (1) year after date of Substantial Completion, against defects including death, structural failures, dieback as determined by the City Forester and or Project Manager. Warranty shall not cover defects resulting from lack of adequate maintenance, neglect or abuse by City staff, hail, or incidents that are beyond Contractor's control.
- C. The warranty shall not be enforced should any plant die due to vandalism after Final Acceptance.
- D. Remedial Actions:
 - 1. Replace any plant materials that have been excessively pruned, more than twenty percent (20%) percent dead, or in an unhealthy or declining condition immediately upon notice from the Project Manager during warranty period.
 - 2. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
- E. All plants shall be true to name and meet all conditions of these specifications. Any plant that is not true to name as indicated by form, leaf, flower, or fruiting characteristics shall be replaced at the Contractor's expense.

1.10 TREE MAINTENANCE DURING CONSTRUCTION PERIOD

- A. Maintain trees by pruning, cultivating, watering, mulching, winter watering, weeding, wrapping, unwrapping, restoring planting saucers, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Control as required to keep trees free of insects and disease. Restore or replace damaged tree wrappings, stakes, guying. Trees shall be maintained by the Contractor through the Warranty period of the project.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

- A. General: Furnish and install nursery-grown trees and shrubs conforming to the requirements of ANSI-Z-160, with healthy root systems developed by transplanting or root pruning. Provide well shaped, symmetrical, fully branched, healthy, and vigorous stock free of disease, insects, eggs, larvae, girdling, and defects such as sun scald, injuries, abrasions, and disfigurement. Trees of a larger size than that specified in the plant list may be used with a proportionate increase in size of roots and balls, if acceptable to the Project Manager. The use of larger plants shall be covered by the Contractor at no additional cost to the City.

- B. Label all plants of each size, caliper and variety and caliper with a securely attached waterproof tag bearing legible designation of botanical and common name.
- C. All plants shall be the genus, species, and variety designated on the Contract Drawings. No substitutions will be accepted without the prior written approval of the City Forester and or the Project Manager. Contractor must provide proof of non-availability.

2.2 TREES

- A. These specifications shall apply to deciduous, broadleaf evergreen and coniferous species. Note that leaf characteristics will not be evident on deciduous trees during the dormant season.
- B. Crown: The form and density of the crown shall be typical for a young specimen of the species/cultivar. Changes in form caused by wind, pruning practices, pests, or other factors shall not substantially alter the form for the species/cultivar. These crown specifications do not apply to plants that have been specifically trained in the nursery to be: topiary, espalier, multi-stem, or clump; or unique selections such as contorted or weeping cultivars.
 - 1. Trees shall have a single, relatively straight trunk, and central leader, unless noted on plans to be "Multi-trunk" or "Clump". They shall be free of co-dominant stems and vigorous, upright branches that compete with the central leader. If the original leader has been headed, a new leader at least one-half of the diameter of the original leader shall be present.
 - 2. Main branches shall be evenly distributed along the central leader, not clustered together. They shall form a balanced crown appropriate for the age of the species/cultivar.
 - 3. Branch diameter shall be no larger than one-half the diameter of the central leader measured one-inch (1") above where the branch is attached.
 - 4. The attachment of the largest scaffold branches shall be free of included bark.
 - 5. Temporary branches, unless otherwise specified, should be present along the lower trunk below the lowest scaffold branch, particularly for trees less than one-inch (1") in caliper. These branches should be no greater than three-eighths-inch (3/8") diameter. Clear trunk shall be no more than thirty percent (30%) of the total height of the tree, unless otherwise noted
- C. Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds, except properly made pruning cuts, which shall be closed over or less than three-quarters-inch (3/4") diameter open, sunburned areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers, stem-girdling ties, or lesions (mechanical injury).
 - 1. Trunk caliper and taper shall be sufficient so that the tree will remain vertical without a stake. Trunk caliper at six-inches (6") above the soil media (substrate) surface shall be within the diameter range shown for each container size below and as specified in current edition of ANSI Z60.1.
 - 2. The cut made when re-growing the top should be just above the major structural roots. The "shank" that results from this procedure should be at a consistent height above the structural roots and no longer than five-inches (5"), to ensure that the trees are consistently planted at the correct depth. The base of the trunk should not have a large pruning cut from re-growing the top.
- D. Roots: The root system shall be substantially free of injury from biotic (e. g., insects and pathogens) and abiotic (e. g., pesticide toxicity and salt injury) agents.
 - 1. The uppermost roots or root collar shall be within the upper two-inches (2") of the soil media (substrate). Depth of the root-ball shall be measured from the top of the ball,

which in all cases shall begin at the root flare. Soil above the root flare shall not be included in the root-ball depth measurement, and shall be removed.

2. The root collar and the inside portion of the root-ball shall be free of defects, including circling, kinked, and stem-girdling roots. Soil removal or root washing near the root collar may be necessary to inspect for the aforementioned root defects.
3. Roots on the periphery and bottom of the root-ball shall be less than one-eighth-inch (1/8") diameter.
4. The tree shall be well rooted in the soil media (substrate). Root distribution shall be uniform throughout the soil or media. Structure and growth shall be appropriate for the species/cultivar. When the burlap or container is removed, the root-ball shall remain intact. Trees should have several lateral roots or many fibrous roots spaced evenly around the trunk to provide support so the trees are stable when planted. Trees should have as many small roots as possible. These roots are key to the uptake of sufficient water and nutrients. Fibrous roots can be achieved by root-pruning, using air-pruning containers, or under-cutting or root pruning and transplanting at any stage of production.
5. As a general rule for young nursery-grown trees, there should be two or more structural roots within one- to three-inches (1" – 3") of the soil surface. "First order lateral roots" is another term that has been used for these roots. If the roots are deeper than three-inches (3") , the stock shall be rejected.
6. Root-balls that are undersized as specified in current edition of ANSI Z60.1. shall be rejected. Field grown trees for balled and burlap delivery shall have the roots pruned at least six-inches (6") inside the final root-ball size performed within adequate time for the tree to develop fibrous roots at the outer edge of the root-ball prior to harvest and delivery.

- E. Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of prolonged moisture stress or extended drought as indicated by wilted, shriveled, or dead leaves.
- F. Branches: Shoot growth (length and diameter) throughout the crown shall be appropriate for the age and size of the species/cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.
- G. All deciduous trees of one species used in formal rows or groupings shall exhibit cultural uniformity, i.e. "matched" in height, crown width and shape, height to first branch, and trunk taper. For this reason it is desired that these trees be produced by a single grower.
- H. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated, and only if approved by the City Forester and or the Project Manager.

2.3 SHRUBS

- A. Container Grown Shrubs: All specifications for container grown plants shall include both plant size and container size. Plant size intervals and reference to height or spread shall be in accordance with the guidelines for the appropriate plant type set forth in ANSI Z60.1; Section 2.2 - Types of Deciduous Shrubs.
- B. Container size shall be by container classification (i.e., not by container volume) as set forth in the ANSI Z60.1 Container Class Table.

- C. In all cases, container grown nursery stock shall meet the following general requirement:
1. All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.
- D. The container shall be sufficiently rigid to hold the ball shape and to protect the root mass during shipping.
- E. Minimum shrub sizes shall conform to the following standards:
1. Tender shrubs (Type 0) that do not produce top growth that is winter hardy:

Height or Spread	Minimum number of canes	Minimum spread of roots
fifteen-inches (15")	three (3) canes	Nine-inches (9")

2. Small shrubs (Type 1) that grow to a mature height of not more than three feet (3'):

Height or Spread	Minimum number of canes	Minimum spread of roots
fifteen-inches (15")	four (4) canes	Nine-inches (9")

3. Intermediate shrubs (Type 2) that grow to a mature height between three feet (3') and seven feet (7'):

Height or Spread	Minimum number of canes	Minimum spread of roots
Two feet (2')	four (4) canes	twelve-inches (12")

4. Large shrubs (Type 3) that grow to a mature height exceeding seven feet (7'):

Height or Spread	Minimum number of canes	Minimum spread of roots
four feet (4')	six canes (6)	twenty-inches (20")

2.4 PERENNIALS, GRASSES, GROUNDCOVERS, AND VINES

- A. All container grown plants shall be healthy, vigorous, well rooted, and established in the container in which they are growing, and be in conformance with ANSI Z60.1. A container grown plant shall have a well-established root system reaching the sides of the container to maintain a firm root ball, but shall not have excessive root growth encircling the inside of the container. Top growth is to be in conformance with established nursery standards.

2.5 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
1. Deciduous Tree Stakes: Rough-sawn, sound, new softwood with specified wood preservative treatment by pressure process, free of knots, holes, cross grain, and other defects, two-inch (2") diameter by six feet (6'), pointed at one end.
 2. Evergreen Tree Stakes: Two foot (2') steel T-posts; green color.
 3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, #14 galvanized-steel wire, two-strand, twisted.
 4. Tree-Tie Webbing: UV-resistant nylon webbing with brass grommets, size as indicated.

5. Safety signals for guy and staking wire: one-half-inch (1/2") diameter PVC pipe, length as indicated.

B. Tree-Wrap:

1. Two layers of crinkled paper cemented together with bituminous material, four-inches (4") wide minimum, with stretch factor of thirty-three percent (33%).
2. Tree wrap tape: Tape as approved by the City Forester and or the Project Manager.

2.6 MULCH

- A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of chipped wood material not larger than four-inches (4") in length. Submit a one (1) gallon bag sample to Project Manager for approval. Mulch is to be weed-free.

2.7 PLANT PIT BACKFILL MATERIAL

- A. Unless otherwise directed by the Project Manager, the plant pit backfill material shall consist of the following, thoroughly mixed:
1. Soil originally excavated from the pit: two thirds (2/3) proportion of total mix.
 2. Soil Amendment as specified in Division 32 Section "Soil Preparation"; one-third (1/3) proportion of total mix.
- B. If imported topsoil is required, it shall meet the requirements specified in Division 32 Section "Topsoil", Article 2.2.

2.8 WATER

- A. During the irrigation season (generally May through September), water will be available from on-site quick couplers. When the system is not charged, it shall be the Contractor's responsibility to supply adequate amounts of water from a water truck or other approved source. Hoses and other watering equipment shall be supplied by Contractor.
1. Watering Amount: Ten (10) gallons per caliper-inch.
- B. Watering: Refer to Division 32 Section "Watering".
- C. Maintenance: Refer to Division 32 Section "Landscape Maintenance".

2.9 MISCELLANEOUS MATERIALS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees, as approved by the City Forester and or the Project Manager. Deliver in original, sealed, and fully labeled containers. Mix and apply according to manufacturer's instructions.
- B. Pre-Emergent Pesticide: As approved by the City Forester and or the Project Manager.
- C. Pesticides: EPA registered and approved, and as approved by the City Forester and the Project Manager.
- D. Subdrainage: See Division 33 Section "Subdrainage Systems".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 2. Verify that adequate overhead clearance exists to planting locations.
 - 3. Suspend planting operations during periods of excessive moisture until acceptable planting conditions exist.
 - 4. Uniformly moisten excessively dry soil that is not workable.
- B. If contamination is present in the soil within a planting area, notify Project Manager immediately.
 - 1. If contamination is discovered during Construction the Project Manager will determine the best course of action to remediate the contamination, which may include requesting the Contractor perform the removal of contamination and replacement of clean material.
 - 2. If contamination is determined to be the result of construction operations, Contractor is to remove contaminated material and replace with clean material at the direction of the Project Manager.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.
- D. Cooperate with any other contractors and trades, who may be working in and adjacent to the landscape work areas. Examine Contract Drawings which show the development of the entire site and become familiar with the scope of all work required.

3.2 FINISH AND FINE GRADING

- A. See Division 31, Sections "Earth Moving and 32 Sections "Soil Preparation" and "Topsoil".

3.3 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas and existing plants from damage caused by planting operations. Repair damage to surrounding areas and site elements noted above resulting from planting operations at no additional cost to the City.
- B. Layout, stake and label all individual tree locations for approval by the Project Manager prior to installing trees.
- C. Outline planting beds and mark plant locations within the bed(s) for approval by the Project Manager prior to installing any plant material or mow bands. Make adjustments as directed at no additional cost to the City.

1. If formal arrangements or consecutive order of plants is indicated on Contract Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- D. Prepare planting area for soil placement and mix planting soil according to Division 32 Section "Soil Preparation".

3.4 WEED CONTROL

- A. Do not proceed with landscape work until weed growth has been controlled and eliminated, per Division 32 Section "Soil Preparation".
- B. See Division 32 Section "Soil Preparation" for detailed weed control measures.
- C. Use pesticides only with the written approval of Project Manager, and in strict accordance with manufacturer's instructions.

3.5 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits: Excavate by hand or with a backhoe. Scarify sides of tree pit. Tree spade may not be used to dig tree pits.
1. Balled and Burlapped Trees: Excavate a minimum two times (2X) as wide as ball diameter at base of pit. The base of the root collar shall be three-inches (3") higher than the grade at which the tree originally grew and finished grade. Slope sides of the pit as shown on the detail.
 2. Container-Grown Trees and Shrubs: Excavate approximately two times (2X) times as wide as container diameter. Plants shall be set one-inch (1") higher than finished grade.
 3. Do not excavate deeper than depth of the root ball, measured from the base of the root flare to the bottom of the root ball.
 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly compact the added soil to prevent settling.
- B. Obstructions:
1. Utilities: Notify Project Manager immediately of utilities that conflict or may potentially conflict with proposed plant locations. In such cases, alternative plant locations will be determined by Project Manager.
 2. Notify the Project Manager prior to planting if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavation.
- C. Drainage: Notify the Project Manager if subsoil conditions show evidence of water seepage or retention in tree or shrub pits.
1. Fill the pit with water and allow it to completely drain before planting occurs.
 2. If water does not drain out of pit within twenty-four (24) hours, notify Project Manager.

3.6 PLANTING TREES AND SHRUBS

- A. Balled and Burlapped Stock:
1. Set balled and burlapped stock plumb and in center of pit with base of root flare three-inches (3") above adjacent finish grades as indicated.
 2. Remove burlap from top two-thirds (2/3) of balls and partially from sides, but do not remove from under balls. Remove wire baskets and all twine entirely. Remove pallets, if

any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.

3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

B. Container Grown Stock:

1. Carefully remove containers so as not to damage root balls.
2. Lightly scratch sides of exposed root ball to loosen surface roots.
3. Set plants plumb and in center of pit with top of ball raised one-inch (1") above adjacent finish grades or as indicated.
4. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly, then place remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

C. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare two-inches (2") above adjacent finish grade.

1. Backfill: As specified in Part 2 of this Section.
2. Spread roots laterally without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
3. Carefully work backfill in layers around roots by hand eliminating air pockets. Bring roots into close contact with the soil.
4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Tree Staking: Stake trees as shown on the Contract Drawings.

E. Wrapping tree trunks: Wrap trees with tree wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Use specified tape to secure. Do not use staples. Inspect tree trunks for injury, improper pruning, and insect infestation and take corrective measures required before wrapping.

1. All deciduous trees shall be wrapped between November 1st and November 15th or per the direction of the City Forester and or the Project Manager. All tree wrap shall be removed by May 15.
2. Contractor shall be responsible for wrapping and unwrapping trees during the warranty period.

3.7 PRUNING OF PLANTS

- A. Prune only damaged or dead branches as directed by the City Forester and or the Project Manager.

3.8 TREE STABILIZATION

- A. Trunk Stabilization by Staking: Install trunk stabilization as follows unless otherwise indicated on Contract Drawings.

1. Site-Fabricated Staking Method: Stake trees as indicated on Contract Drawings.

- a. Drive stakes into undisturbed grade outside tree pit as indicated. Avoid penetrating root balls or root masses.
- b. Securely attach specified wire to stakes.
- c. Support trees with specified wire and tree tie webbing at contact points with tree trunk, reaching to specified stake. Allow enough slack to avoid rigid restraint of tree.
- d. For guyed trees: Attach thirty-six-inch (36") long x one-half-inch (1/2") diameter PVC pipe flagging to each wire.
- e. For staked trees: Attach twenty four-inch (24") long x one-half-inch (1/2") diameter PVC pipe flagging to each wire.

3.9 MULCHING

- A. Trees: Create a forty-eight-inch (48") diameter formed soil berm around tree and fill with three-inch (3") deep specified wood mulch. Mulch shall be kept four to six-inches (4"-6") away from tree trunk.
- B. Shrubs:
 - 1. Mulch backfilled surfaces of pits, planting beds areas, and other areas indicated or as directed by the Project Manager.
 - 2. Mulch in shrub bed areas: Apply three-inch (3")thick layer of mulch and finish level with adjacent finish grades. Do not place mulch against stems of plants.

3.10 INSTALLATION OF MISCELLANEOUS MATERIALS

- A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.
- B. When deciduous plants are moved in full-leaf, Project Manager may direct the use of an antidesiccant at nursery before moving and again two (2) weeks after planting. Antidesiccant to be supplied and applied by Contractor at no additional cost to the City.

3.11 QUALITY CONTROL

- A. Provide quantity, size, genus, species, and variety of trees indicated, complying with current applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock", and all applicable state and local rules and regulations.
- B. Inspection: Contractor shall arrange for the Project Manager to select and/or inspect plant material at the nursery/./grow site or upon delivery to the site, for compliance with requirements for genus, species, variety, cultivar, size, and quality. Selection and approval of plant material shall be at the discretion of the Project Manager and/or Forestry.
 - 1. The Contractor shall schedule inspection of the plants, at either the supplier or on-site, to be completed in one visit. Any further inspection required due to plants being unavailable, rejected, and or not meeting specifications shall be charged to the Contractor at the current hourly rate for the City personnel performing the inspection.
 - 2. The Contractor shall pay all expenses for the Project Manager and City Forester to visit the source for plants including airfare, taxi, hotels and meals.

- C. Measurements: Measure trees according to the requirements of the ANSI Z-160, with branches and trunks in their normal position. Do not prune to obtain required sizes. Measure main body of tree for height and spread; do not measure branches or roots tip-to-tip.

3.12 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations, Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from planted areas. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during seeding operations. Repair irrigation system components damaged during seeding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.13 CLEANING

- A. General: Provide and install barriers as required and as directed by Project Manager to protect sodded areas against damage from pedestrian and vehicular traffic until Final Acceptance.

3.14 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil including excess subsoil and unsuitable soil, waste material, including, trash, and debris generated during installation off site at no additional cost to the City.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be made by the contract unit specified for Trees, Plants, and Groundcovers. Measurement shall include the actual number of units of specified material(s) placed and accepted at the locations shown on the Contract Drawings, or as directed by the Project Manager, and in accordance with the Specifications.

4.2 PAYMENT

- A. Payment will be made at the contract unit price, and shall include required materials, transportation, equipment, labor, earthwork, loading, transporting, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, fine grading, maintenance of temporary protection by fencing or other means, watering and all maintenance required until

Final Acceptance of the work as required in accordance with the Contract Drawings and Specifications.

B. Plants are to be paid for:

Item #	Item Description	Size	Unit	Quantity
32 93 00-1	English Oak	2" cal.	EA	3
32 93 00-2	Kentucky Coffeetree	2" cal.	EA	3
32 93 00-3	Pacific Maple	2" cal	EA	2
32 93 00-4	Coral Beauty Cotoneaster	#5	EA	44
32 93 00-5	Emerald and Gold Euonymus	#5	EA	49
32 93 00-6	English Ivy	#1	EA	21

END OF SECTION 32 93 00

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for furnishing of all supervision, labor, materials, equipment and transportation required to maintain the landscape areas called for under this contract for the time period specified. The work includes but is not limited to: weed control, re-seeding, re-sodding, mowing, weed control, watering of plant material and pruning, irrigation system repair and maintenance, fence installation and maintenance, maintenance of erosion control measures (BMP's) including storm water features and coordination with City staff.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Watering".
 - 3. Division 32 Section "Irrigation Systems".
 - 4. Division 32 Section "Automatic Irrigation Controllers".
 - 5. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 INSPECTION AND ACCEPTANCE

- A. Formal Inspections: The project will be inspected during the Maintenance and Guarantee Period at the following points:
 - 1. Substantial Completion Inspection
 - 2. Establishment Inspection
 - 3. Quarterly Inspections
 - 4. Final Inspection
- B. Additional inspections and observations to monitor maintenance and landscape conditions will be done throughout the Maintenance and Guarantee Period by the Project Manager, City Forester, and City Naturalist.
- C. Substantial Completion Inspection: At the completion of operations under this contract, and prior to the beginning of the maintenance and guarantee period, the substantial completion inspection will be performed. At the time of this inspection, the Contractor shall have all planted and landscape areas complete and irrigation system operational. All fencing and protection shall be in place. All debris and litter shall be cleaned up and all walkways and curbs shall be cleaned of soil and debris left from installation operations. The inspection will not occur until these conditions are met. Also see Division 01 Section "Contract Closeout".
- D. Establishment Inspection: Shall occur approximately ninety (90) days after Substantial Completion. The review will consist of a review of sodded and seeded areas and plant material. The inspection will be to review proper rooting of sod, germination of seed areas and to check for signs of stress in plant materials.

- E. Quarterly Inspections: Shall occur quarterly from the date of Substantial Completion. The review will consist of a review of all maintenance contract responsibilities. The Contractor shall keep a quarterly report to be turned in at inspections to review work done to date, including any subcontracting, frequency of schedule, notifications made, materials list, equipment list etc.
- F. Final Inspection and Acceptance: The Contractor must give seven (7) days notice to the Project Manager requesting a Final Inspection in conformance of Division 1 requirements. During the inspection the Project Manager shall prepare a list of any defects discovered during such final inspection (“Punch List”) and submit the punch list to the Contractor. If in the opinion of the Project Manager that all work has been completed or performed per the contract documents the Project Manager will provide the Contractor with written notice of Final Acceptance. Final acceptance by the Project Manager will not be given until all deficiencies are corrected.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Maintenance Reports: Submit detailed maintenance quarterly reports and schedules for the Maintenance and Guarantee Period for review and approval by the Project Manager, Denver City Forester, and Denver City Naturalist.
- C. Material List: Submit a detailed list of materials, to be used for seeding, fertilization, pesticides, pesticides that are to be used for seeding, weed control, plant health and mulching.
- D. Equipment List: submit a detailed list of equipment and chemical controls to be used for weed control, seeding and mulching operations. Include brand and model number of all equipment to be used for soil preparation and seeding activities.
- E. Work Examples: submit list of three projects completed in the last two years of similar complexity to this project with name and location of project, Project Manager’s name and telephone number, name of project landscape architect and telephone number. Include certifications held by contractor and subcontractor employees who will oversee the work during the maintenance period.

1.5 CONTRACTUAL REQUIREMENTS

- A. Maintenance and Warranty Period: The maintenance and Warranty period shall commence from the date of work startup of the contract work in accordance with these Specifications and continue for the period of two (2) years from Date of Substantial Completion.
- B. Limits of Work Area: All improvements and maintenance within the project work area are included unless otherwise indicated on the Contract Drawings or directed by the Project Manager. Areas outside defined areas, as illustrated on the Contract Drawings, will be maintained by the City.
- C. Performance of Work: The Contractor’s work force and equipment shall be accepted by Project Manager prior to the commencement of the maintenance period. The Contractor shall submit to the Project Manager an outline of the equipment and crew sizes to be utilized throughout the maintenance period. Maintenance work shall not be divided among several Contractors but shall be done by one entity. In the event that Project Manager finds any items identified as

unacceptable, Contractor shall make the revisions noted by the Project Manager at no cost to the City.

D. Scheduling / Progress Reports:

1. Scheduling: Prior to the beginning of the Maintenance and Warranty Period, Contractor shall submit for approval to the Project Manager a detailed schedule identifying all activities which are to be performed. Examples of such commitments include the regular intervals for weed control, fertilization, pesticide applications and mowings and other operations and the month and week which are scheduled for other major activities such as reseeding and mulching. It is not the Project Manager's intent to require the Contractor to meet each deadline on a specific day, but merely to identify the general time periods for such activities. The Contractor may modify the schedule due to weather conditions, providing that Project Manager is notified in advance of any changes.
2. Notification: Contractor shall be required to notify the Project Manager a minimum forty-eight (48) hours in advance of all major work so the Project Manager has the option of being present at the time of the work. Examples of such work are: clean cultivation, mowing, spraying, seeding, mulching or other activities relating to the repair of landscape items. In the event that proper notification is not given by the Contractor, the Project Manager shall have the right to require the Contractor to reschedule any such work until such time that the Project Manager is available. The above provision applies only to work which could be perceived as normal or regularly scheduled maintenance, emergency repairs do not apply.
3. Progress Reports: The Contractor shall submit quarterly progress reports during the growing season and quarterly progress reports through the winter. The written progress reports shall be sent to the Project Manager outlining work completed, damage incurred, and problems encountered. Progress reports shall contain digital photo documentation of work.
4. Site Meetings: Contractor shall meet, on site, with the Project Manager and City staff on a quarterly basis to review the project status.
5. After Hours Contact: Contractor shall provide one afterhours contact and telephone number.

E. Maintenance Coordination: Contractor shall coordinate maintenance operations and activities with Project Manager. Failure to Perform: In the event that, in the Project Manager's opinion, action has not been taken on the part of the Contractor to properly maintain the project, the Project Manager may take whatever action that is deemed necessary to affect such repairs and any costs incurred will be deducted from the Contract amount.

F. Licenses, Taxes, and Insurance:

1. Licenses: Contractor agrees to obtain and pay for all licenses required by the City, State and Federal governments that are necessary for legally conducting business. Contractor shall maintain all licenses and permits required for maintenance activities (e.g. pesticide application).
2. Taxes: Contractor shall pay all applicable taxes, including sales taxes on materials supplied.
3. Insurance: Contractor shall maintain all insurance policies in accordance with the General Conditions of the contract through the entire term of the maintenance and guarantee period.

G. Payment Schedule: Payments shall be made as indicated in Measurement and Payment section.

PART 2 - PRODUCTS

2.1 Pesticides:

- A. For Native Grass areas: "Milestone", as manufactured by Dow AgroSciences.
- B. For cultivated landscape areas: As approved by Project Manager.

PART 3 - EXECUTION

3.1 IRRIGATED TURF CARE (Bluegrass Sod and Seed)

- A. Watering: All watering shall be done in such a way as to encourage establishment, deep root growth and drought tolerance. See "Irrigation & Water Management", Section 3.5 below.
- B. Fertilization: Turf areas shall be fertilized with accepted material (20-5-10) two (2) times per growing season at a rate of 1 pound of nitrogen per 1,000 square feet, once between April 15 and June 1 and once again between August 1st and September 15th.
- C. IPM (Integrated Pest Management): Apply approved pesticides as needed to control establishment and growth of annual and perennial weeds. Spot applications shall be required in areas of excessive growth. Contractor is responsible for ensuring turf establishment and that turf is not adversely affected by pesticide applications. No pesticides will be allowed until seedlings are at least three months old. After establishment, pesticide applications shall be done as required and directed by the Project Manager during the maintenance period.
- D. Insect and Disease Control: Insects and disease treatment shall be by application of necessary insecticides and fungicides as plant condition require.
- E. Topdressing.
 - 1. Soil used as topdressing material is to be consistent with existing soil texture where it is to be applied. Organic materials used are to meet Denver Park's organic material specifications.
 - 2. Topdressing is to be used in non-athletic fields when soil tests or leveling needs determine the application.
 - 3. Filling Low Spots: Fill low spots with matching existing soil when filling noticeable depressions or holes. Compact per Division 31 Section "Earth Moving".
- F. Repair all bare areas or dead areas of grass greater than 1 square foot. Repairs shall occur within five (5) calendar days of notice to repair the condition. Upon the Project Manager's written approval, the Contractor may repair turf at a later date mutually agreed upon.
 - 1. Seeding: If the original installation was by seed, repairs to such areas are to be reseeded. Replacement products and installation shall comply with specifications for original seeding.
 - 2. Sodding: If the original installation was sodded, repairs to such areas are to be resodded. Replacement products and installation shall comply with specifications for original sodding.
- G. Mowing, Trimming and Edging:

1. Contractor shall be responsible for mowing of all areas defined by the contract and Contract Drawings until final acceptance.
2. When turfgrasses reach three and one-half-inch (3-1/2") height, begin weekly mowing and trimming program to maintain turf at 3-inch (3") height. Do not remove more than thirty-three percent (33%) of grass leaf in single mowing. Do not mow when soil is wet. Remove clippings from adjacent paved areas. Mower blades are to be sharp to avoid tearing grass blades.
3. Areas not accessible to riding mowers shall be string line trimmed each mowing if necessary to match the mowing height. Limit string line trimming as much as possible around trees and objects (i.e., posts, utility boxes), by using Roundup and/or pre-emergent pesticides six- to twelve-inch (6"-12") radius kept clear, and base of shrubs and trees require twenty-four (24)-inch minimum radius clear of turf (bare soil/mulch).
4. Turf along concrete edges will be removed in cool season turf areas to the edge of the concrete curb or walkway using the appropriate edging equipment. The edge of the concrete surface should be visible after edging.

3.2 NATIVE SEEDING AREAS

- A. Watering: All watering shall be done in such a way as to encourage establishment, deep root growth and drought tolerance. See Article 3.4 "Irrigation & Water Management", below.
 1. Non Irrigated Native: Irrigation in non irrigated native areas shall consist of watering of all existing trees and shrubs as well as any new trees or shrubs that are to be watered for establishment. Refer to Division 31 Section "Watering" for requirements.
- B. Weed Control:
 1. Weed Control Prior to Initial Installation per Division 32 Section "Soil Preparation".
 2. Weed control shall be done for the duration of the Maintenance and Warranty Period and when weed density meets or exceeds twelve (12) plants per square yard. Weed control shall be completed by one of the following methods:
 - a. Clean Cultivation: Prior to finish grading and final soil preparation work all areas to be seeded areas shall be clean cultivated with approved equipment. Clean cultivate using a rod weeder or other approved equipment tilling the ground no more than 2-inches (2") deep. Contractor shall coordinate timing of clean cultivations with the vegetative conditions on the site. Exact timing of cultivations shall be adjusted to control weed germination on the site. It is the responsibility of the Contractor to clean cultivate as necessary to prevent excessive growth of vegetation. Undesirable species shall not be allowed to seed on the site. Bindweed shall not be clean cultivated but removed by pesticide spot applications.
 - b. Mowing: Mowing of annual undesirable species shall be done as a weed control method. Undesirable species shall not be allowed to seed on the site. Existing grass stands to remain shall not be mowed until late fall or early spring to encourage seed drop.
 - c. Chemical Control: Apply approved pesticides as needed to control establishment of annual and perennial weeds. Spot applications may be required. Contractor is responsible for ensuring seed establishment and that seed is not adversely affected by pesticide applications. Contractor shall use pesticides for specific species as recommended by CSU Agricultural Extension Service or City Naturalist.
 - d. Spot Application Chemical Control: Apply pesticide by hand applicator directly to invasive annual and perennial weeds. Allow a minimum two weeks between application and any seeding activities.

- C. Reseeding:
1. Evaluate native grass areas every ninety (90) days during the Maintenance and Warranty Period as to success of germination and coverage. Use the following criteria:
 - a. Reseed all areas that meet the following conditions:
 - 1) Areas of bare or dead grass greater than twenty-four inches (24") by twenty-four inches (24") square.
 - 2) Areas of weed density greater than twelve (12) plants per square foot.
 - 3) Areas with general density of specified grasses less than twelve (12) plants per square foot.
 2. Reseed unacceptable areas as defined above. Reseeding, soil preparation and mulching shall comply with Division 32 Sections "Turfgrass Seeding" and "Soil Preparation". Seed mixes may be revised (% of species) to better suit site conditions. If requested by Project Manager or Denver City Naturalist, mix shall be revised at no additional cost to the Contract. Where drill seeding is not feasible, hand broadcast seed and rake into the soil to achieve 1/4- to 1/2-inch coverage of soil. The seed application rate shall be doubled in all areas where it is mechanically broadcast and quadrupled in areas requiring hand broad casting. Hydroseeding is not allowed.
 3. Timing of reseeding shall be as specified herein. Upon the Project Manager's written approval, the Contractor may reseed at a later date mutually agreed upon.

3.3 TREE, SHRUB, AND PLANT CARE

- A. Pruning: Refer to Division 32 Section "Trees, Shrubs, and Groundcovers" for maintenance requirements.
- B. Replacement of Plants: Remove and replace dead, diseased, dying or damaged plants (including material damaged by vehicles or vandalism) within fourteen (14) calendar days of notification by Project Manager or Denver City Forester. Upon Project Manager's written approval, the Contractor may replace rejected plants at a later date, mutually agreed upon, provided that the Contractor removes all rejected plants within fourteen (14) calendar days of the notice to replace such plants. If the rejected plants are not removed in fourteen (14) calendar days, the City may remove and replace these plants and any costs associated with the removal and replacement shall be deducted from the Contract price. All areas damaged by replacement operations are to be fully restored to their original condition as specified. Plant material damaged by vehicles or vandalism shall be replaced by the Contractor at no cost to the City. Guarantee all plantings to be true to name and to meet all conditions of these specifications. Any plant which is not true to name as indicated by leaf, flower form or fruiting characteristics revealed within maintenance period shall be replaced by Contractor at Contractor's expense.
- C. Transplanted Material: Refer to Division 32 Section "Tree Transplanting".
- D. Non-Irrigated Plant Material (trees): all plant material that not served by an automatic underground irrigation system shall be watered by Contractor for the duration of the maintenance and guarantee period. Water all plant material at a rate of ten (10) gallons per inch of tree caliper (e.g. a two-inch (2") tree requires twenty (20) gallons) to maintain optimum growth. Watering frequency shall be adjusted based on rainfall, season and plant performance. Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering; use a water wand to break the water force. Winter watering is the responsibility of the Contractor throughout the

maintenance period as many times as required to prevent the plant material from desiccation. Watering may be done by water truck, but must not promote or cause erosion or displacement of mulch or erosion control items.

3.4 IRRIGATION SYSTEM AND WATER MANAGEMENT

- A. Contractor shall check all irrigation systems for proper operation after each mowing, and any deficiencies or adjustments shall be repaired prior to the next watering cycle. Any damage to system caused by Contractor's operations shall be repaired without charge to City.
- B. Contractor is responsible for following all Denver Water restrictions and establishment rules for new landscapes per Denver Water, rules and regulations at: <http://www.denverwater.org>.
- C. Contractor shall be responsible for providing an Establishment Watering Schedule, Transition Watering Schedule and a Maintenance Watering Schedule to the Project Manager, Operation Supervisor and the Toro Field Representative (when applicable).
 - 1. All irrigation schedules and zone controller charts shall ensure that there will be no ponding or runoff of water during any of the scheduled times.
 - 2. Prior to any plant material being installed all schedules shall be provided to the Project Manager and Operations Supervisor.
 - 3. The water schedule templates are available from Water Conservation and the Project Manager.
 - 4. Contractor shall make any modifications to the programming as requested by Project Manager.
 - 5. Initial Irrigation (Days 1-21):

Plants shall be adequately watered for the first twenty-one (21) days after installation or until seeds have germinated and emerged or sod has become firmly rooted.

 - a. Exact timing of irrigation cycles will depend on weather conditions, soil conditions, and speed of emergence of grass seed.
 - b. Short, frequent irrigation cycles shall be used.
 - c. Split cycles or the 'cycle and soak' feature must be employed to reduce erosion or run off in seeded areas.
 - d. Do not exceed three inches (3") of total water per week.
 - e. Coordinate with irrigation system schedule and programming with the Project Manager, and City staff. Project Manager may choose to involve other parties from the City or irrigation equipment manufacturer..
 - f. Do not over-water native seeded areas in a manner which adversely impacts germination and growth of any components of the seed mix.
 - g. Contractor shall submit a meter reading before and after establishment to verify water use.
 - 6. Transition Irrigation (Days 21-60):
 - a. Less frequent, but longer watering cycles will provide moisture at depths that will encourage seedlings to continue to develop and sod to develop deeper roots.
 - b. Allow the surface soils to dry slightly between watering to encourage deeper rooting.
 - c. Watering shall be done utilizing historic evapotranspiration rates for the current watering month(s).
 - d. Do not over-water native seeded areas in a manner which adversely impacts germination and growth of any components of the seed mix.

7. Maintenance Irrigation (Days 61 – End of Maintenance Period):
 - a. Irrigate as needed to maintain an optimum stand of turf while minimizing water use.
 - b. Irrigation frequency shall be adjusted at a minimum, based on monthly historical evapotranspiration rates and plant (turf and tree) water requirements.
 - c. It is the responsibility of the Contractor to coordinate with Project Manager, Operations Staff, and local Toro Field Representative the programming of irrigation controllers, to properly irrigate plant materials and turfgrass.
 - d. Do not over-water native seeded areas in a manner which adversely impacts germination and growth of any components of the seed mix.

8. Once sod has been laid, begin watering to build up the sub-soil moisture. This will be the most critical time to apply water.
 - a. Water up to one and one-half inches (1-1/2”) of water per day for the first two (2)-to three (3)-days.
 - b. Probe the soil to determine if the moisture has penetrated down to a minimum of four inches (4”).
 - c. During the next three (3) weeks the amount of water needed will be similar to that of the historical evapotranspiration rates for the season per day.
 - d. Each day may require more than one application depending on wind and temperature in order to keep the root zone and blades moist.

- D. All damage to irrigation system during the landscape and irrigation maintenance period shall be repaired by the Contractor with identical materials.

- E. Time of Irrigation: Watering shall be done during the approved City and Denver Water-allowed water window. Coordinate times with the Project Manager.

- F. Winterization of Irrigation System: Under the maintenance period, the Contractor shall be responsible for winterizing irrigation pumps, if applicable, and draining irrigation system for the full maintenance period.
 1. Remove water from system by use of compressed air.
 2. Remove water from drip lines by opening flushing plugs.
 3. Submit a meter reading after winterization of the system has occurred to Parks Water Conservation.
 4. Winterization shall occur no later than October 15th unless a variance has been granted from the Project Manager.

- G. Spring Start-Up: The Contractor shall be responsible for starting up the irrigation system in the spring (April 15).
 1. Fully activate the system including controller start-up, in order to demonstrate that it is in full working order.
 - a. Any repairs that are needed as a result of improper winterization shall be corrected by the Contractor at no additional cost to the City.
 2. Correct all deficiencies and make any adjustments to ensure proper system function.
 3. Submit a meter reading prior to spring start-up to the Project Manager.

- H. It shall be the responsibility of the Contractor to ensure the satisfactory operation of the entire irrigation system and workmanship within the project area. The entire system, including materials, shall be maintained to be complete and remain operable in every detail by the

Contractor throughout the maintenance period, and the Contractor agrees to make any adjustments or repair any defects occurring within the maintenance period within 7 calendar days of notification by the Project Manager.

1. Contractor shall replace any materials with manufacturer's defects at no additional cost to City.
 2. Replacement of any equipment shall match that installed and designed on the irrigation plans unless a variance is granted from Project Manager.
 3. Problems resulting in leakage or water waste shall be repaired within 12 hours of notification.
 4. Contractor is responsible for emergency repairs and or shut downs.
 - a. If Contractor neglects to perform these duties within the specified time, the City may make such repairs at the Contractor's expense.
 - b. In the case of an emergency, where in the judgment of the City, delay would cause serious loss or damage, repairs or replacement may be made by verbal communication and without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.
- I. Any settling of irrigation trenches/backfill material during the maintenance period shall be repaired by Contractor's at no additional cost to the City.
1. Contract documents shall govern irrigation replacement during maintenance period the same as new work.
 2. Replacements are to be made at no additional cost to the City.
- J. Any vandalism to the irrigation system prior to Final Acceptance shall be repaired and/or replaced at Contractor's expense.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for Landscape Maintenance.

4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include required materials, transportation, equipment, labor, excavation, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, installation of pipes, wires, heads, valves, boxes, soil amendments and fertilizers, weed control, plant materials, disking, raking, spreading, fine grading, mowing, furnishing and installation of seeds, mulch installation and maintenance of temporary protection by fencing or other means, as required in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 97 00



Kumar & Associates, Inc.
Geotechnical and Materials Engineers
and Environmental Scientists

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March 2, 2016
Revised May 3, 2016

Ms. Ilene Marcus Flax
Studio CPG
4309 West 44th Avenue
Denver, Colorado 80212

Subject: Geotechnical Engineering Study, Proposed Rude Park ADA Improvements, West Holden Place and Federal Boulevard, Denver, Colorado

Project No. 16-1-140

Dear Ms. Flax:

This letter report presents the results of a geotechnical engineering study for the proposed ADA Improvements to be constructed at the Rude Park ballfield located northeast of the intersection of Holden Place and Federal Boulevard in Denver, Colorado. The subsurface study was conducted for the purpose of developing geotechnical engineering design recommendations for proposed retaining walls and walkways to be constructed for the ADA improvements. The project site is shown on the attached Fig. 1. The study was conducted in accordance with the scope of work in our Proposal No. P-15-311 to Studio CPG dated April 29, 2015.

Proposed Construction: The proposed improvements consist of constructing a concrete ramp, a series of low concrete retaining walls, and a concrete stairway on the slope currently occupied by the ballfield bleachers. The access ramp will slope down from the top of the slope just south of the existing restroom, to the west, northwest and then southeast to the toe of the slope. The total elevation change along the length of the ramp will be approximately 15 feet. Six cast-in-place (CIP) concrete retaining walls, with lengths ranging from about 30 to 95 feet and ranging to a maximum height of about 2 feet, will be constructed at locations along the ramp and on the slope. We understand the retaining walls will consist of a 16-inch-wide vertical wall (with no separate foundation) bearing at a depth of 3 feet. With the exception of an area in the upper, southern, portions of the slope that will be graded to at 2:1 (H:V), the slopes in the area of the improvements will be graded to slope at 4:1 to 6:1. A concrete stairway will be constructed along the east edge of the existing bleachers, extending from near the top of the ramp to the toe of the slope.

The grading plans and cross sections provided indicate grading in the area of the ADA improvements will require cuts ranging to approximately 4.5 feet deep and negligible fills above existing grades.

If the proposed construction varies from the above description, we should be contacted determine if revision of our recommendations is warranted.

Site Conditions: The proposed site of the ADA improvements is located immediately north of West Holden Place and south of the existing Rude Park ballfield. Federal Boulevard is located about 150 feet west of the site and the Rude Recreation Center is located about 200 feet to the northeast. The site of the proposed improvements is occupied by the existing bleachers and by unpaved slopes adjacent to the west of the bleachers. The bleachers have aluminum seat and foot planks located over a concrete-paved slope. The concrete slope below the bleachers is inclined at about 2:1 and

the adjoining unpaved slopes have inclinations of about 2:1 to 4:1. A small announcer's booth is located at the top of the bleachers. A restroom building is located at the top of the slope immediately east of the proposed improvements. The areas around the bleachers are vegetated with irrigated grass and deciduous trees.

Subsurface Conditions: Information on the subsurface conditions at the site was obtained by drilling four shallow exploratory borings at the approximate locations shown on Fig. 1. Logs of the borings are presented on the attached Fig. 2, and the legend and notes for the logs are presented on Fig. 3. The borings were drilled to depths of 5 to 6.5 feet using hand auger equipment. Samples of the soils encountered were obtained by driving a 2-inch I.D. California sampler with blows of a 70-pound hammer falling 30 inches. In addition to the soil borings, concrete cores were obtained at the locations of Borings 1 and 2, and at three locations below the existing bleachers, as shown on Fig. 1.

The results of laboratory tests performed on selected samples obtained from the borings are shown to the right of the logs on Fig. 1 and on the laboratory test sheets on Figs. 4 through 7, and are summarized in Table I. Laboratory testing included index property tests, such as moisture content, dry unit weight, grain size analysis, and liquid and plastic limits. Swell-consolidation tests were conducted on several samples of the soil to provide information on the soil compressibility or swell characteristics under loading and when submerged in water. The percentage of water soluble sulfates was determined for one sample.

The thickness of the concrete flatwork encountered in Borings 1 and 2 and at the three core locations under the bleachers ranged from about 1.5 to 3 inches. The thicknesses encountered at each location are indicated on Fig. 1.

Beneath the existing concrete flatwork and topsoil, fill predominantly consisting of sandy lean clay was encountered in Borings 1, 3 and 4 to depths ranging from approximately 1.5 to 4 feet. The fill in Boring 1 and the concrete in Boring 2 were underlain by native lean clay with sand to sandy lean clay to the maximum 5-foot depth of these borings. The fill in Borings 3 and 4 was underlain by native clayey sand extending to the maximum 5.5- to 6.5-foot depth of these borings. Sampler penetration blow counts suggest the clays are medium to stiff in consistency and the clayey sands are medium dense. The sampler penetration blow counts and laboratory density test results suggest the fill placement and compaction were not performed under well controlled conditions. The exact lateral and vertical extent, and degree of compaction of the existing fill were not determined by this study, and are anticipated to be variable across the site.

Results of swell-consolidation tests presented on the attached Figs. 4 and 5 indicate the tested samples of native lean clay with sand had a nil to low swell potential when wetted under a 0.5 ksf surcharge. Swell-consolidation test results presented on Figs. 6 and 7 indicate the tested samples of fill had a nil to low swell potential when wetted under a 0.5 ksf surcharge. One of the fill samples was moderately compressible.

Groundwater was not encountered in the borings at the time of drilling or when follow-up measurements were made 13 days after drilling.

Geotechnical Considerations: The results of the laboratory testing indicate the fill density is quite variable and that the fill was probably not placed with a high degree of control. The fill should be assumed to be unsuitable for support of retaining walls and flatwork that is sensitive to movement, and should be completely removed down to native soils and replaced with structural fill. Considering the depth of the cuts shown on the grading plan, it appears that the foundation grade for the retaining walls will likely extend below the existing fill at most locations. Leaving a portion of the fill in place below foundations and concrete flatwork may be considered if some increased risk of distress caused by post-construction settlement is acceptable to the owner.

Retaining Wall Recommendations: Recommendations for design and construction of the proposed retaining walls are presented in the following paragraphs:

1. We recommend the proposed retaining walls be supported on footings bearing on the native soils and/or on new structural fill.
2. We recommend wall foundations bearing on the native soils or new structural fill be designed for an allowable soil bearing pressure of 2,000 psf.
3. Based on experience, we estimate total settlement for footings designed and constructed as discussed in this section will not exceed 1 inch.
4. The wall foundations should have a minimum width of 16 inches.
5. Foundations should be provided with adequate soil cover above their bearing elevation for frost protection. Placement of foundations at least 36 inches below the exterior grade is typically used in this area.
6. Retaining walls should be reinforced top and bottom to span an unsupported length of at least 10 feet.
7. In order to reduce the penetration of water into the structural fill below the wall, we recommend both sides of the walls be backfilled with the on-site lean clay or similar imported soil up to the elevation corresponding to the grade at the front of the wall. Backfill behind the wall above this elevation and extending 4 feet horizontally behind the wall should consist of granular soils.
8. The active earth pressure acting on the back of the walls and passive earth pressure against the front of the wall foundations will be a function of the backfill strength, the inclination of the backfill behind the wall, and whether or not the wall backfill is well drained. We recommend the active earth pressures be calculated using an equivalent fluid unit weight determined, according to the backfill inclination, from the table below. For inclinations between those shown in the table, the equivalent fluid weight should be determined by interpolation.

Backfill Inclination (H:V)	Active Equivalent Fluid Unit Weight (pcf)
6:1 or flatter	40
4:1	45
2:1	55

9. The lateral resistance of the retaining wall foundations will be a combination of the sliding resistance of the footing on the foundation materials and passive earth pressure against the side of the foundation. Resistance to sliding at the bottoms of the footings may be calculated based on an allowable coefficient of friction of 0.25. Passive pressure against the sides of the footings may be calculated using an allowable uniform pressure of 750 psf.
10. Areas of existing fill, or loose or soft material, encountered within the foundation excavation should be removed and replaced with structural fill. If the potential for increased foundation settlements is acceptable to the owner, we believe a portion of the existing fill may be left in place below the retaining wall foundations. As a minimum, we recommend the existing fill be removed to 2 feet below the foundation bearing level. We should observe the condition of any remaining fill to determine if additional overexcavation is warranted. Structural fill should extend down and away from the edges of the footings at a 1 horizontal to 1 vertical projection. We anticipated the risk of post-construction settlements exceeding 1 inch will be relatively low for footings bearing on a minimum 2-foot depth of structural fill.

11. Structural fill placed for support of foundations may consist of the on-site lean clays and clayey sands, or imported granular soils. Imported granular fill placed below the wall foundations and as backfill behind the walls should be a minus 2-inch material containing a maximum of 20% passing the No. 200 sieve and having a maximum plasticity index of 6.
12. Structural fill placed below foundations and wall backfill should be compacted to at least 95% of the standard Proctor (ASTM D698) maximum dry density. Fill consisting of the on-site lean clays or clayey sands should be placed at a moisture content within the range of optimum to 3 percentage points above optimum. Imported granular soils should be placed at a moisture content within plus or minus 2 percentage points of optimum.
13. Granular foundation soils should be densified with a smooth vibratory compactor prior to placement of concrete.
14. A representative of the project geotechnical engineer should observe all footing excavations prior to fill and concrete placement.

Seismic Site Class: The Colorado Front Range is located in an area of low seismic activity. The site is underlain by medium to stiff clays and medium dense granular soils that are expected to extend to bedrock at a depth of about 20 to 30 feet. The bedrock is considered to extend to depths greater than 100 feet below anticipated site finished grades. According to the International Building Code (IBC) 2012, the overburden soils classify as IBC Site Class D, and the bedrock classifies at IBC Site Class C. Based on our experience with similar profiles and on current data and procedures presented in the code, we recommend a design soil profile of IBC Site Class D.

Concrete Flatwork: As previously discussed, the existing fill should be assumed to be unsuitable for support of concrete flatwork and should, therefore, be overexcavated and replaced with new structural fill. A portion of the fill may be left in place if the owner recognizes the risk of post-construction settlement and distress. If this option is chosen, we recommend the flatwork be supported on a minimum 1-foot depth of new structural fill consisting of the on-site lean clays or clayey sands, or imported granular fill. Structural fill placed for support of concrete flatwork should meet the requirements for structural fill presented under "Retaining Wall Recommendations."

Site Grading: The stability of the proposed 2:1 cut slopes was analyzed using published chart solutions for simple slopes. The results of the analysis indicate cut slopes of 2:1 or flatter should have a factor of safety with respect to stability of at least 2. The risk of slope instability will be significantly increased if seepage is encountered in the slopes. However, if it is, we should be retained to evaluate if the seepage will adversely affect the slope stability.

Cut slopes constructed steeper than 3:1 are expected to be susceptible to surface erosion under moderate sheet flows and highly susceptible to erosion under concentrated flows. Susceptibility to erosion can be limited by establishing an appropriate vegetative cover or providing appropriate erosion protection, and by providing good surface drainage to divert runoff away from the slope faces.

Fills placed in slopes should be compacted to at least 95% of the standard Proctor (ASTM D698) maximum dry density. The fills should be placed at a moisture content within 2 percentage points of optimum. Fills should be benched into existing slopes that are steeper than 4:1. Vertical bench heights should be between 2 and 4 feet.

Temporary excavations should meet OSHA requirements. In our opinion, the on-site fills and native soils should be classified as OSHA Type C soils.

Design and Construction Support Services: Kumar & Associates, Inc. should be retained to review the project plans and specifications for conformance with the recommendations provided in our

report. We are also available to assist the design team in preparing specifications for geotechnical aspects of the project, and performing additional studies if necessary to accommodate possible changes in the proposed construction.

We recommend that Kumar & Associates, Inc. be retained to provide construction observation and testing services to document that the intent of this report and the requirements of the plans and specifications are being followed during construction. This will allow us to identify possible variations in subsurface conditions from those encountered during this study and to allow us to re-evaluate our recommendations, if needed. We will not be responsible for implementation of the recommendations presented in this report by others, if we are not retained to provide construction observation and testing services.

Limitations: This study has been conducted in accordance with generally accepted geotechnical engineering practices in this area for exclusive use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory borings at the locations indicated on Fig. 1, and the proposed type of construction. This report may not reflect subsurface variations that occur between the exploratory borings, and the nature and extent of variations across the site may not become evident until site grading and excavations are performed. If during construction, fill, soil, rock or water conditions appear to be different from those described herein, Kumar & Associates, Inc. should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. Kumar & Associates, Inc. is not responsible for liability associated with interpretation of subsurface data by others.


Please call us if you have any questions or require additional information.

Sincerely,

KUMAR & ASSOCIATES, INC.

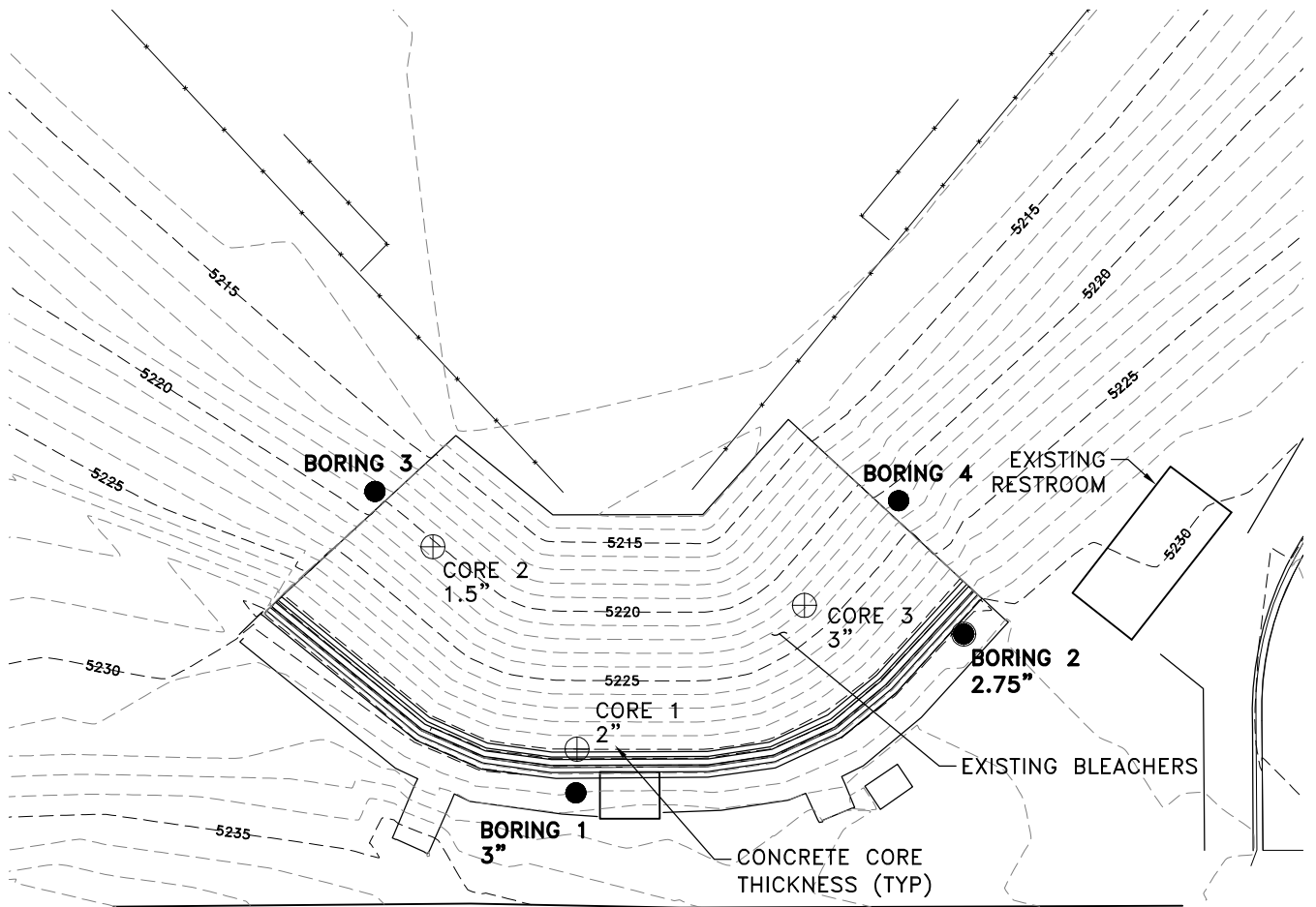
Bruce E. Berends, P.E.

Reviewed by:


Wade Gilbert, P.E.



BEB/jw
Attachments
cc: book



WEST HOLDEN PLACE

← APPROX 150' TO
FEDERAL BLVD.



SCALE—FEET

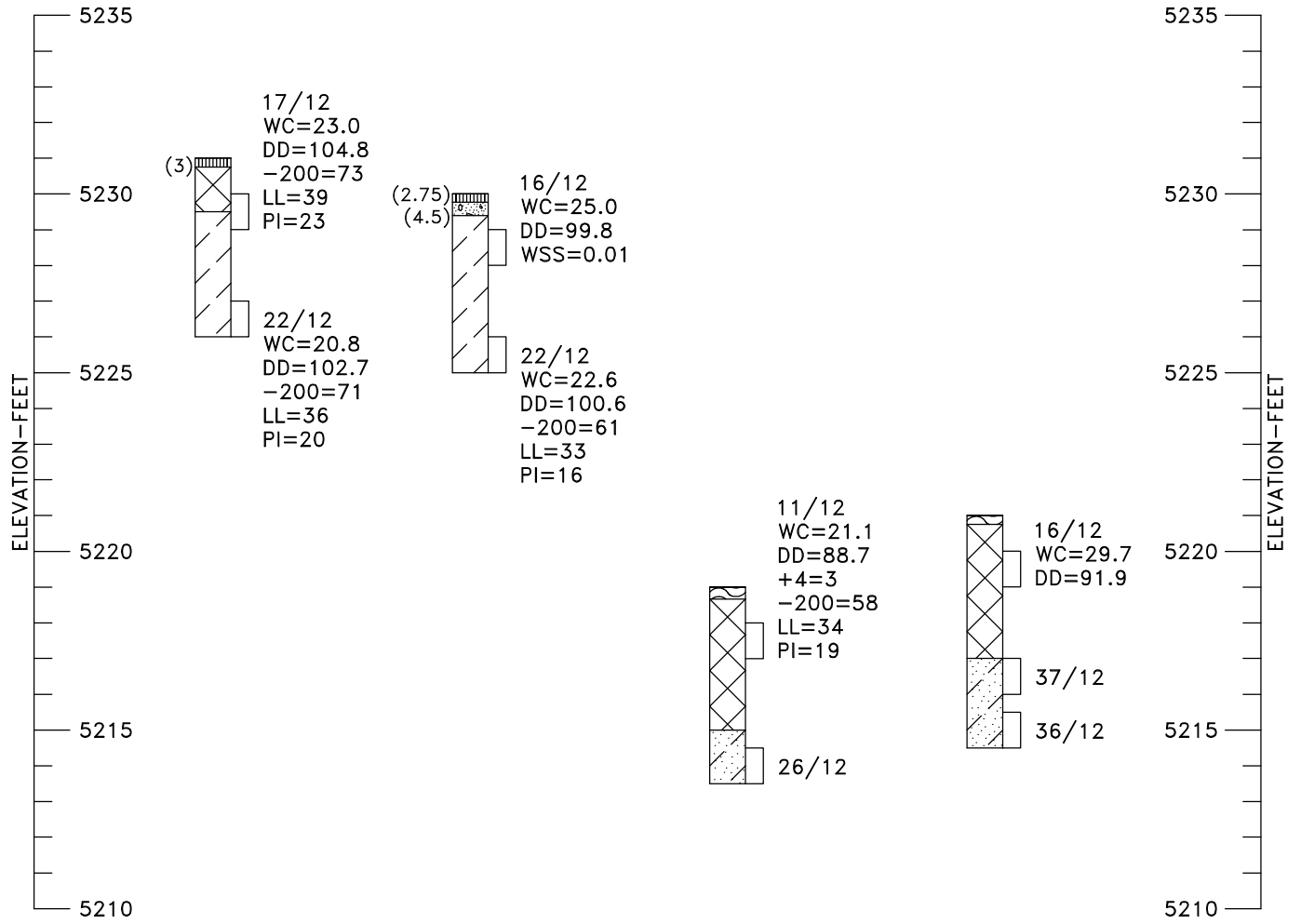
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BORING 1
EL. 5231'

BORING 2
EL. 5230'








BORING 3
EL. 5219'

BORING 4
EL. 5221'



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LEGEND

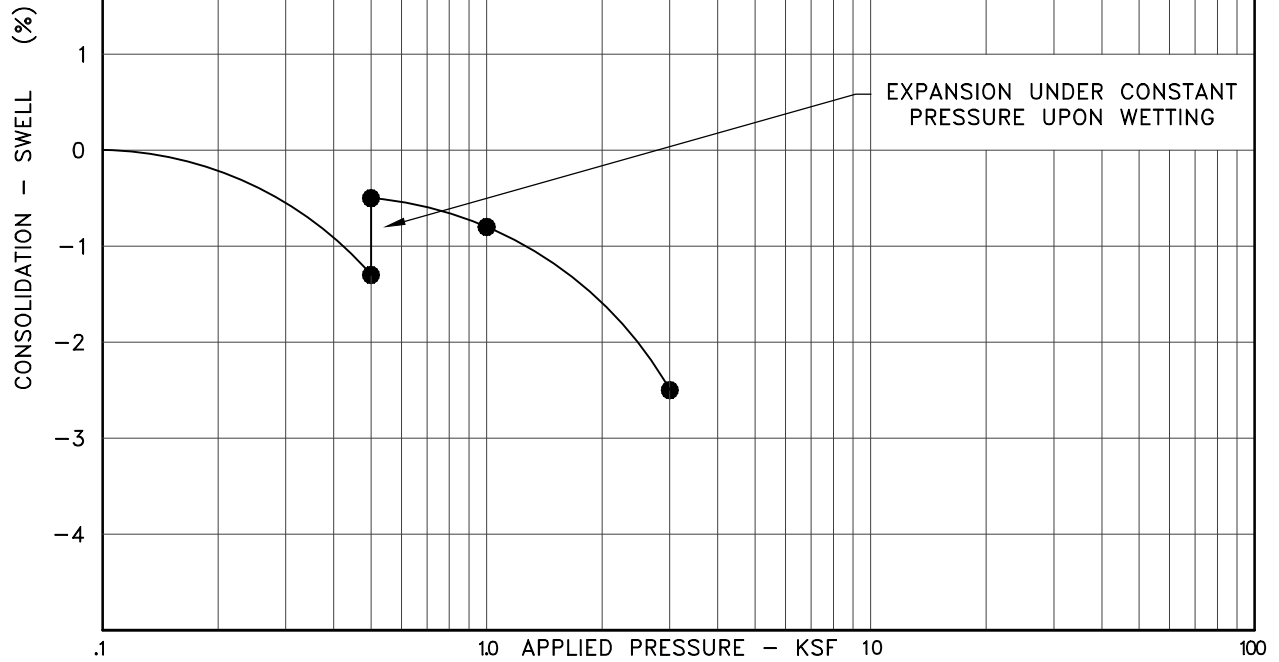
-  TOPSOIL.
- (3)  CONCRETE, THICKNESS IN INCHES SHOWN IN PARENTHESES TO LEFT OF THE LOG.
- (4.5)  BASE COURSE, THICKNESS IN INCHES SHOWN IN PARENTHESES TO LEFT OF THE LOG.
-  FILL: SANDY LEAN CLAY (CL), MOIST, BROWN TO DARK BROWN.
-  LEAN CLAY WITH SAND TO SANDY LEAN CLAY (CL), MEDIUM TO STIFF, MOIST, BROWN.
-  CLAYEY SAND (SC), WITH SANDY LEAN CLAY LAYERS, FINE TO COARSE GRAINED, MEDIUM DENSE, MOIST, BROWN.
-  DRIVE SAMPLE, 2-INCH I.D. CALIFORNIA LINER SAMPLE.
- 17/12 DRIVE SAMPLE BLOW COUNT. INDICATES THAT 17 BLOWS OF A 70-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE THE SAMPLER 12 INCHES.

NOTES

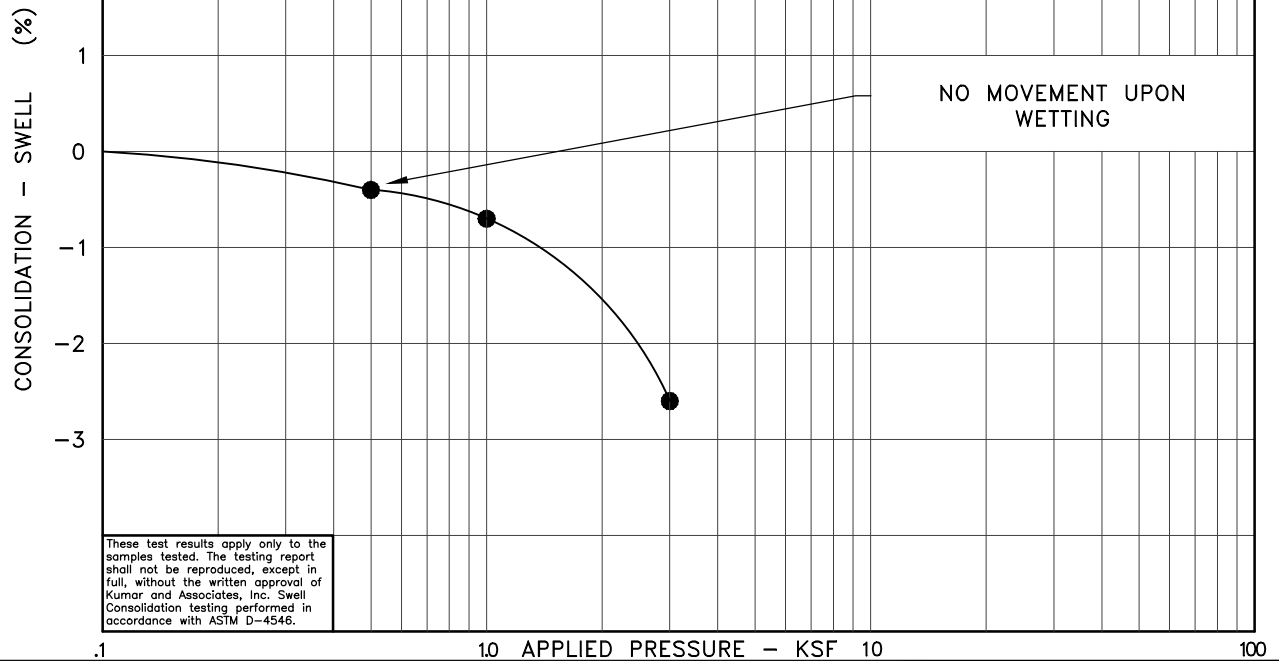
1. THE EXPLORATORY BORINGS WERE DRILLED ON FEBRUARY 18, 2016 WITH A 4-INCH DIAMETER HAND AUGER.
2. THE LOCATIONS OF THE EXPLORATORY BORINGS WERE MEASURED APPROXIMATELY BY TAPING FROM FEATURES SHOWN ON THE SITE PLAN PROVIDED.
3. THE ELEVATIONS OF THE EXPLORATORY BORINGS WERE OBTAINED BY INTERPOLATION BETWEEN CONTOURS ON THE SITE PLAN PROVIDED.
4. THE EXPLORATORY BORING LOCATIONS AND ELEVATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
5. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES.
6. GROUNDWATER WAS NOT ENCOUNTERED IN THE BORINGS AT THE TIME OF DRILLING OR WHEN CHECKED 13 DAYS LATER.
7. LABORATORY TEST RESULTS:
 WC = WATER CONTENT (%) (ASTM D 2216);
 DD = DRY DENSITY (pcf) (ASTM D 2216);
 +4 = PERCENTAGE RETAINED ON NO. 4 SIEVE (ASTM D 422);
 -200= PERCENTAGE PASSING NO. 200 SIEVE (ASTM D 1140);
 LL = LIQUID LIMIT (ASTM D 4318);
 PI = PLASTICITY INDEX (ASTM D 4318);
 WSS = WATER SOLUBLE SULFATES (%) (CP-L 2103).

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SAMPLE OF: Lean Clay with Sand (CL)
 FROM: Boring 1 @ 1'
 WC = 23.0%, DD = 104.8 pcf
 -200 = 73%, LL = 39, PI = 23

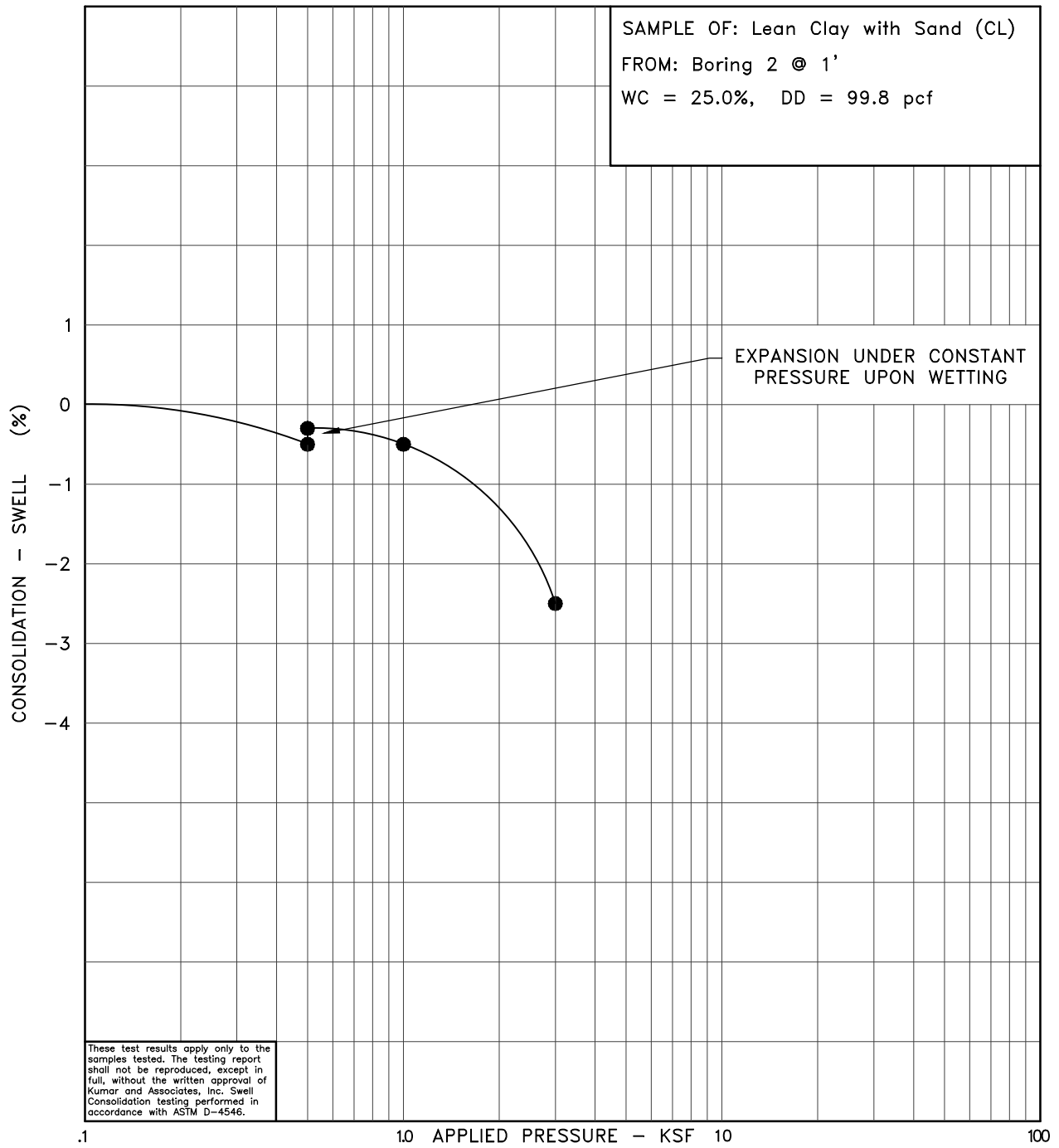


SAMPLE OF: Lean Clay with Sand (CL)
 FROM: Boring 1 @ 4'
 WC = 20.8%, DD = 102.7 pcf
 -200 = 71%, LL = 36, PI = 20

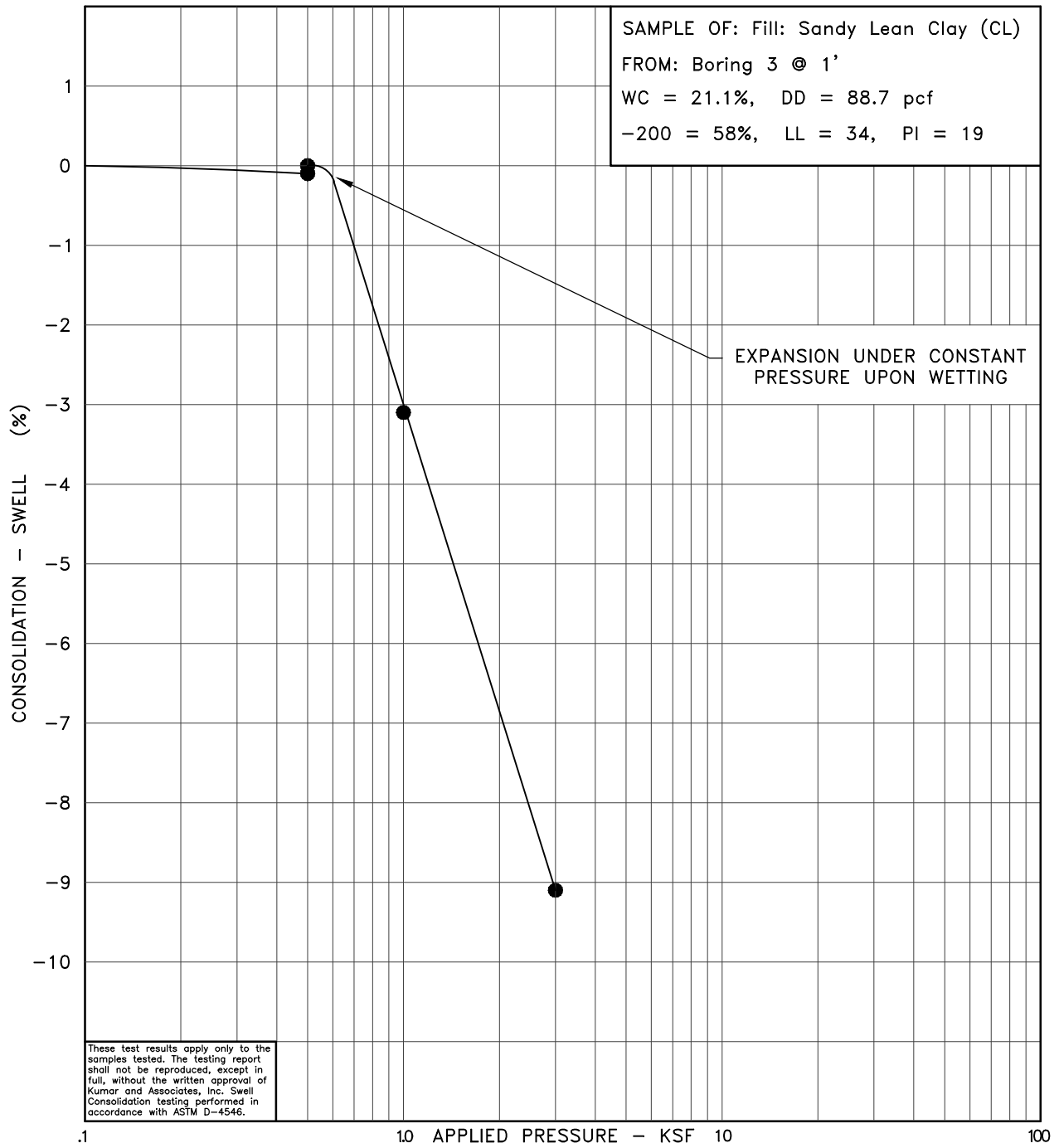


These test results apply only to the samples tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar and Associates, Inc. Swell Consolidation testing performed in accordance with ASTM D-4546.

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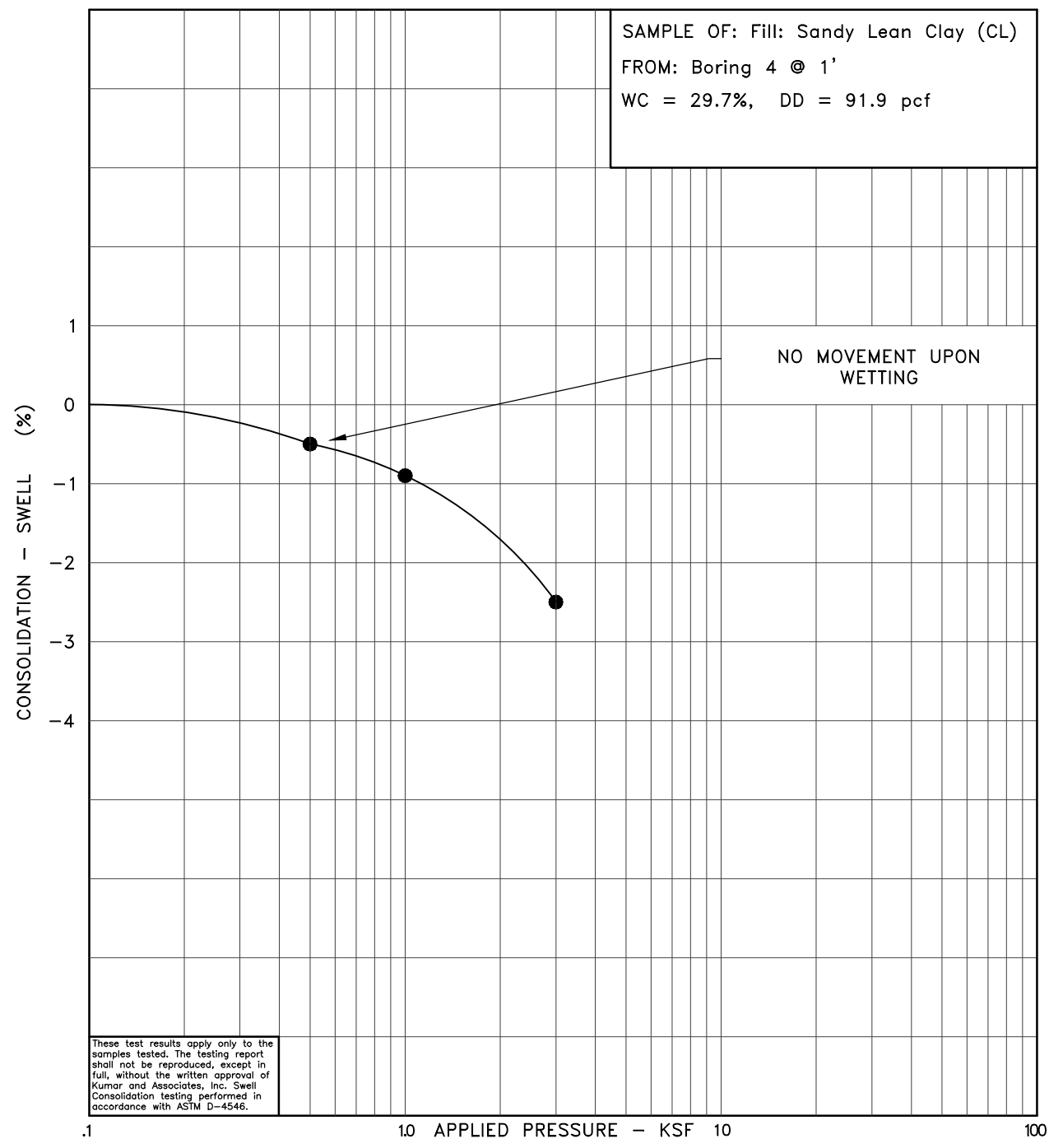


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SAMPLE OF: Fill: Sandy Lean Clay (CL)
 FROM: Boring 4 @ 1'
 WC = 29.7%, DD = 91.9 pcf



These test results apply only to the samples tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar and Associates, Inc. Swell Consolidation testing performed in accordance with ASTM D-4546.

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TABLE I
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 16-1-140
 PROJECT NAME: Rude Park
 DATE SAMPLED:
 DATE RECEIVED: 2-22-16

SAMPLE LOCATION		DATE TESTED	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		WATER SOLUBLE SULFATES (%)	SOIL OR BEDROCK TYPE
BORING	DEPTH (feet)				GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)		
1	1	2-24-16	23.0	104.8			73	39	23		Lean Clay with Sand (CL)
1	4	2-24-16	20.8	102.7			71	36	20		Lean Clay with Sand (CL)
2	1	2-24-16	25.0	99.8						0.01	Lean Clay with Sand (CL)
2	4	2-24-16	22.6	100.6			61	33	16		Sandy Lean Clay (CL)
3	1	2-24-16	21.1	88.7	3	39	58	34	19		Fill: Sandy Lean Clay (CL)
4	1	2-24-16	29.7	91.9							Fill: Sandy Lean Clay (CL)

DRAFT MATERIALS MANAGEMENT PLAN

RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS WEST HOLDEN PLACE AND FEDERAL BOULEVARD DENVER, DENVER COUNTY, COLORADO

FEBRUARY 2018

Prepared for:

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
Denver, Colorado**



Advancing Opportunity

DRAFT MATERIALS MANAGEMENT PLAN

RUDE PARK BALLFIELD AND ACCESS IMPROVEMENTS WEST HOLDEN PLACE AND FEDERAL BOULEVARD DENVER, DENVER COUNTY, COLORADO

FEBRUARY 2018

Prepared for:

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
201 West Colfax Avenue
Denver, Colorado 80202**

Prepared by:

**LT ENVIRONMENTAL, INC.
4600 West 60th Avenue
Arvada, Colorado 80003
(303) 433-9788**



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APPENDIX B GUIDANCE FOR REUSE OF SOIL ON CITY PROJECTS / OCTOBER 2017
APPENDIX C COLORADO DISCHARGE PERMIT SYSTEM GENERAL PERMIT STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES COR0300000
APPENDIX D CDPHE SECTION 5.5 (6 CCR 1007-2, PART 1, REGULATION PERTAINING TO SOLID WASTE SITES AND FACILITIES, SECTION 5.5, SEPTEMBER 30, 2014)
APPENDIX E CCOD CERTIFIED ASBESTOS BUILDING INSPECTOR WORK DAY DOCUMENTATION



1.0 INTRODUCTION

LT Environmental, Inc. (LTE) has prepared this Draft Materials Management Plan (MMP) for the City and County of Denver (CCoD) Parks and Recreation Department for use during the Rude Park Ballfield and Americans with Disabilities Act (ADA) improvement project located at the northeast corner of West Holden Place and Federal Boulevard, in Denver, Denver County, Colorado (Project, Figure 1). The proposed Project extends from the intersection of West Holden Place and Federal Boulevard and continues north approximately 280 feet toward Lakewood Gulch and extends east along the existing pedestrian pathway approximately 450 feet northeast of the Rude Recreation Center. (Figure 2).

It is the intent that this Draft MMP will be attached to the Project plans and specifications and that bidding contractors will have an opportunity to review this document as they prepare bids for construction. It will be the responsibility of the future-selected General Contractor to customize, finalize, and implement this Draft MMP; follow all appropriate regulations; obtain the proper permits, and have adequately trained field personnel to identify and manage potential contamination.

1.1 BACKGROUND

According to *Historically Jeffco, Flooding in Jefferson County*, Issue 35 dated 2014, a 1909 flood scoured Lakewood Gulch in the area that is now Rude Park. Review of a 1933 aerial photograph depicts a flood-scoured area along much of the southern boundary of Lakewood Gulch in the location associated with the Rude Park Ballfield and the Project area. A 1948 aerial photograph indicates that fill material of an unknown nature and source was used to bring the ground surface up to the approximate present-day grades. By 1969, the baseball field and one of the recreation center buildings were present on and adjacent to the Project area.

1.2 PREVIOUS STUDIES AND SURROUNDING KNOWN ENVIRONMENTAL CONCERNS

As part of construction preplanning, the CCoD retained LTE to conduct a Limited Subsurface Investigation (LSI) for Rude Park. Results were detailed in *Limited Subsurface Investigation, Rude Park Ballfield ADA Access Improvements, West Holden Place and South Federal Boulevard, Denver, Colorado*, dated February 8, 2018 (2017 LSI, Appendix A). The 2017 LSI included installing eighteen (18) exploratory trenches, ranging in depth from 4 feet to 10 feet below ground surface (bgs). LTE observed suspect construction debris mixed with black ash-like material in the subsurface that may be considered suspect for asbestos and/or stained non-native fill. LTE observed black ash-like material within Trench 5 from approximately 0.5 feet to 1 feet bgs, Trench 6 from approximately 0.5 feet to 3 feet bgs, and in Trench 8 from approximately 0.5 feet to 4 feet bgs. Additionally, construction debris including red brick, wood, and glassware was encountered in Trench 5 from approximately 0.5 feet to 2 feet bgs, in Trench 6 from approximately 0.5 feet to 3 feet bgs, in Trench 7 from approximately 0.5 feet to 4 feet bgs, and in Trench 8 from



approximately 0.5 feet to 4 feet bgs. LTE observed black stained non-native fill that was not considered to be ash in nature in Trench 7 from 1.5 feet to 4 feet bgs. Suspect materials best identified as plaster were observed in Trench 8. None of the bulk samples submitted for polarized light microscopy (PLM) analysis for asbestos content were found to contain asbestos.

In addition to the 2017 LSI completed for Rude Park, the following previous environmental assessment activities have occurred in the vicinity of the Project:

- *Geotechnical Engineering Study, Proposed Rude Park ADA Improvements, West Holden and Federal Boulevard, Denver, Colorado*, prepared by Kumar and Associates, Inc. dated March 2, 2016.
- *Limited Subsurface Investigation Summary Report, Proposed Stormwater System Construction Existing Right-of-way near 10th Avenue and Grove Street, Denver, Denver County, Colorado*, prepared by LT Environmental, Inc. dated June 2015 (2015 LSI).
- *Phase II Environmental Site Assessment (ESA) for the West Corridor Light Rail Project (West Corridor Project) for the Regional Transportation District (RTD)*, prepared by LT Environmental, Inc. dated 2010.

The previous assessments provided background information on materials and contaminants associated with fill material potentially placed after the 1909 flood and which may be encountered in association with this Project. Figure 3 provides a summary of the previous findings. Analytical results from the 2015 LSI generally indicate that arsenic was the only potential contaminant detected at a concentration exceeding the United States Environmental Protection Agency (EPA) Residential Regional Screening Level (RSL). The arsenic concentration did not exceed 11 milligrams per kilogram (mg/kg); the Colorado Department of Public Health and Environment (CDPHE) has determined that this concentration is consistent with regional background concentrations and no further remedial action is needed as long as the historical data and process knowledge indicate releases of arsenic have occurred.

In general, black, gray, yellow, and orange staining were observed in soil and fill during the 2015 LSI completed within the Paco Sanchez Park. Unusual odors were not associated with these stained intervals. Debris was not noted in the 2015 LSI borings; however, soil samples collected from within Paco Sanchez Park potentially contained ash and as such, were subsequently submitted for asbestos content analysis using PLM analytical method and were found to be non-detect for asbestos content.

Soil and fill samples collected as part of a 2010 Phase II ESA for the West Corridor Project by LTE were analyzed for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH)-gasoline range organics (GRO) by EPA Method 8260C, TPH-diesel range organics (DRO) by EPA Method 8015-Modified, and Resource Conservation and Recovery Act (RCRA) metals by EPA Methods 6010B and 7471A, and polycyclic aromatic hydrocarbons (PAHs) by EPA



Method 8270C. The West Corridor Project is located adjacent to the Project site, just north of the Lakewood Gulch.

The soil sample collected from TP-1 was composited from three locations approximately 10 feet to 30 feet north of Lakewood Gulch had concentrations of several PAHs that exceeded both the EPA Residential and Industrial RSLs and the standards presented on Table 1A of Section 8 of the Solid and Hazardous Waste Materials and Management Division 6 Code of Colorado Regulations (CCR) 1007-2 Part 1: *Regulations Pertaining to Solid Waste Facilities, Beneficial Reuse*. Specifically, the following PAHs exceeded the standards: benzo(a)anthracene at 0.747 mg/kg, benzo(a)pyrene at 0.743 mg/kg, benzo(b)fluoranthene at 0.648 mg/kg, dibenz(a,h)anthracene at 0.209 mg/kg, and indeno(1,2,3-cd)pyrene at 0.495 mg/kg.

1.3 PROPOSED CONSTRUCTION ACTIVITIES

The proposed improvements consist of constructing a concrete ramp, a series of low concrete retaining walls, and a concrete stairway on the slope currently occupied by the ballfield bleachers. The access ramp will extend down from the top of the slope just south of the existing restroom to the west-northwest, and then southeast to the toe of the slope. The total elevation change along the length of the ramp will be approximately 15 feet. An approximately 200-foot-long cast-in-place (CIP) retaining wall, ranging to a maximum height of 2.5 feet, will be constructed at the uphill side of the ramp. A 2:1 (H:V) slope will be located above this retaining wall. A concrete stairway will be constructed along the eastern edge of the existing bleachers, extending from near the top of the ramp to the toe of the slope. A series of nine 20- to 105-foot long 1.5- to 2-foot-high CIP retaining walls (seat walls) will step down the slope between the ramp and the ballfield. The grading plans and cross-sections indicate grading in the area of the ADA improvements will require cuts ranging to approximately 7 feet deep and negligible fills above existing grades. Additional improvements include installing concrete footers for the installation of a chain-link fence and foul poles. The concrete footers may be as deep as 8 feet bgs.

1.4 LIKELY ENVIRONMENTAL CONCERNS

Based on the 2017 LSI completed at Rude Park, evidence of environmental contamination has been documented within the limits of the Project area. The areas of environmental contamination were observed generally within the outfield of the ballfield extending from centerfield to the first base line. Fill observed in this area of the Project generally consisted of construction debris (i.e., wood, brick, and glass, etc.), mixed with an ash-like material that contained heavy metals. Based on these findings from the LSI completed at Rude Park in 2017 the likely environmental concerns associated with the Project include the following:

- Fill material from unknown sources placed after flooding in 1909 scoured areas within the limits of the Project area;
- Fill materials disposed within the Project area include solid wastes (wood, brick, concrete, glass, and potentially household trash), although suspect materials and ash-



like material tested as part of the 2017 LSI completed at Rude Park were non-detect for asbestos content, there remains a concern that regulated special wastes (such as regulated asbestos contaminated soil (RACS)), and hazardous wastes could be present;

- Fill associated with select areas of the Project area may contain heavy metals at concentrations that exceed the EPA Residential RSLs; and
- Landfill gases, particularly methane, may be generated in historical landfills and may be present at the Project site as it has been detected at CCoD parks adjacent to the west and south of Rude Park, and therefore it remains a concern during construction.

1.5 PURPOSE AND GOALS

The purpose of this Draft MMP is to provide a guidance document to manage contaminated materials, if encountered, during Project construction. The MMP is designed to minimize worker exposure to potentially contaminated material, to minimize the potential of releases to the environment, and to facilitate proper disposal of materials generated during construction activities. The General Contractor is responsible for following all appropriate regulations, obtaining the proper permits, and incorporating environmental information from this MMP into their Health and Safety Plan (HASP). The General Contractor is also responsible for providing this MMP to its staff and subcontractors and for full compliance with the MMP. Throughout implementation of this MMP, the Parks and Recreation Manager will be immediately notified of potential environmental-related findings pertaining to construction activities at the Project site.



2.0 PROJECT CONTACTS

The Project contact information, including when notification to specific Project personnel should be made, is outlined below.

Contact	Organization	Contact Information	When To Call
Public Works Manager - TBD	City and County of Denver Department of Public Works Capitol Project Management	TBD	First to be contacted if suspected contamination is encountered.
Project Inspector - TBD	City and County of Denver Department of Public Works Capitol Project Management	TBD	If the Project Manager is not available, the Project Inspector should be contacted.
Ms. Agatha Linger Environmental Analyst	Denver Department of Public Health and Environment	720-865- 5356 Agatha.Linger@denvergov.org After hours – 720-460-1706	Releases that could immediately threaten human health, safety, or the environment. Identification of RACS.
General Contractor - TBD	TBD	TBD	NA
Environmental Professional- TBD	TBD	TBD	NA
Certified Asbestos Building Inspector – TBD	TBD	TBD	Required on site when working in area identified on Figure 4. To make RACS determination with any other suspect materials are identified outside area indicated on Figure 4.

Note:

TBD – To be determined

NA – Not applicable



3.0 ENVIRONMENTAL RESPONSIBILITIES

The General Contractor will hire an environmental firm to ensure a trained Environmental Professional (EP) is on site at all times to implement this MMP. Responsibilities of the EP, Certified Asbestos Building Inspector (CABI), and the General Contractor are listed below:

Environmental Professional Responsibilities:

- The EP will have at a minimum meet one of the qualifications outlined in the EPA All Appropriate Inquiries (AAI), which as follows:
 - A state or tribal issued certification or license and three years of relevant full-time work experience; or
 - A Baccalaureate degree or higher in science or engineering and five years of relevant full-time work experience; or
 - Ten years of relevant full-time work experience.
- Provide a competent individual experienced with field identification of potentially contaminated material and potential environmental concerns (e.g., abandoned underground storage tanks, asbestos awareness), and with materials characterization, management, and disposal;
- Be on site at all times;
- Complete and/or compile the required Project documentation summarized in Section 6.2;
- Track and obtain signatures for tickets and manifests for material hauled off-site for either reuse or disposal;
- Ensure adherence to this MMP;
- Provide daily updates to the Public Works Project Manager; and
- Notify the appropriate personnel (Section 2.0) immediately of any environmental conditions.

Certified Asbestos Building Inspector Responsibilities:

- Be on site during soil disturbing and soil loading operations in the area of environmental concern depicted on Figure 4 of this MMP;
- Identify suspect debris in soil the Contractors have excavated. Note all work must immediately cease in the immediate area of the excavation if suspect debris is observed by the Contractors;



- Complete necessary sampling of suspect RACS or asbestos-containing material (ACM);
- Complete daily logs on CCoD Certified Asbestos Building Inspector Work Day Documentation forms detailing site activities, as needed;
- Maintain pertinent documentation related to adherence with CDPHE Section 5.5 (6 *CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*), including sampling results, waste manifests, photographs, etc.;
- Verify implementation and adherence with CDPHE Air Quality Control Commission Regulation No. 8, CCR 1001-10, Part B; if ACM is identified during excavation of soil at the Project site;
- Implement all requirements outlined in CDPHE Section 5.5 (6 *CCR 1007-2, Part 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*); and
- Provide a 2-hour asbestos awareness training to all personnel involved in soil disturbing activities.

General Contractor Responsibilities:

- Provide all necessary equipment and personnel (i.e., health and safety officer, foreman, laborers, etc.) to implement this MMP;
- Provide an EP who meets one of the qualifications presented above;
- Make notification to the CDPHE regarding any discovery of RACS as required in CDPHE Section 5.5 (6 *CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*);
- Verify all personnel involved in earthmoving activities complete a 2-hour asbestos awareness training prior to start of work on the Project site;
- Ensure all permits or notifications are made to the CDPHE Air Pollution Control Division should ACM abatement be warranted;
- Provide a CABI trained and certified in accordance with CDPHE Air Quality Control Commission Regulation No. 8, CCR 1001-10, Part B;
- Coordinate with the Public Works Project Manager, CCoD Denver Department of Public Health and the Environment (DDPHE), and General Contractor's EP prior to beginning work to review the implementation of MMP requirements;
- Adhere to the MMP;



- Ensure that their contractors adhere to the MMP;
- Ensure that disposed material goes to the Denver-Arapahoe Disposal Site (DADS) landfill;
- If significant groundwater requires discharge, the General Contractor will dispose of the collected water offsite or make application for a *Construction Dewatering* under General Permit COG07000 or *Remediation Activities Discharging to Surface Water* under General Permit COG315000; and
- Ensure that waste material is not disposed on site, in storm drains, sanitary sewers, streams, or other waterways.



4.0 LIKELY ENVIRONMENTAL CONCERNS

4.1 AREA OF ENVIRONMENTAL CONCERN

During the 2017 LSI conducted by LTE at Rude Park, indications of potential environmental impacts such as non-native fill and ash-like material, or debris and/or suspect debris were observed, and as a result ten samples were collected for laboratory analytical analysis. In general, non-native fill and ash-like material or debris and/or suspect debris were observed in four trenches, which generally were located from the center outfield portion of the ballfield toward the first base line. Work in this area generally will consist of grubbing of sod, installation of irrigation lines, and structural features for a new fence, scoreboards, and foul poles (Figure 4). None of the bulk samples submitted for PLM) analysis for asbestos content were found to contain asbestos.

Additionally, arsenic concentrations in each of the collected samples exceeded the EPA Residential RSL of 0.68 mg/kg. However, published evaluation of arsenic concentrations in Denver-area soil (e.g., *Assessment of Geochemical Variability and a Listing of Geochemical Data for Surface Soils of the Front Range Urban Corridor, Colorado*, Servers and Tourtelot, 1994) has identified background concentrations at levels exceeding the EPA Residential RSL. Consequently, in June 2010, CDPHE issued the policy document, *Arsenic Concentrations in Soil, risk management guidance for evaluating*. The purpose of the guidance document is to assist in the evaluation of arsenic data when arsenic is not a suspected contaminant. The guidance includes a decision flow path to determine if arsenic is a contaminant requiring special management and establishes a regional background concentration of 11 mg/kg. None of the laboratory analytical results exceeded 11 mg/kg.

4.2 FILL MATERIAL OF UNKNOWN ORIGIN

Fill material imported to the Project area between 1933 and 1948 was from unknown sources, and LSIs completed at Rude Park indicate that there is generally one area, located from centerfield toward the first base line where debris and an ash-like material was encountered (Figure 4). Based on the discovery of impacted fill and debris, potential RACS is likely present in this area and potentially in other areas where trenching was not completed. In the event that debris or impacted material (stained or odor observed fill or soil) are encountered during Project construction, Sections 5.4.1 and 5.4.2 provide protocols and procedures for the management of impacted soil and fill.

4.3 PROJECT GROUNDWATER

The current Project plans indicate that site grading will reach a depth of less than 8 feet below current grade and will likely not encounter groundwater. If groundwater is encountered within the limits of the Project excavations, it should be managed as detailed in Sections 5.5.2 and 5.9 which include protocols and procedures for the management of groundwater in accordance with the existing statute(s).



4.4 LANDFILL SOIL GAS

Due to the Project proximity along Lakewood Gulch and evidence of placement of historical fill, there remains a potential for landfill gases to be present. Landfill gases, including methane, carbon monoxide, sulfur dioxide, oxygen, and VOCs maybe encountered.

Section 5.4.3 includes the practices and protocols that will be used during Project construction to monitor for landfill gases.

4.5 ASBESTOS-CONTAINING MATERIALS ASSOCIATED WITH BUILDING COMPONENTS

Underground utilities (i.e., irrigation, gas, electrical, etc.) are buried throughout the Project area. During construction activities if these utilities are to be disturbed and or require removal and replacement, they should be evaluated for suspect ACM associated with the lines (i.e., pipe wrap, transite, etc.).



5.0 MATERIALS MANAGEMENT

5.1 HEALTH AND SAFETY

All contractors working at the Project area will develop Project-specific HASPs adequate to protect the health and safety of their workers in compliance with United States Occupational Safety and Health Association (OSHA) requirements. Subcontractors working for the General Contractor may rely on the General Contractor's HASP. All work completed for this Project will be conducted in accordance with the HASP(s).

The HASP(s) will be reviewed and signed by a Certified Industrial Hygienist (CIH). Following review and certification by the CIH, and prior to beginning work, the HASP(s) will be submitted to the Public Works Project Manager for review and comment. In addition to all other applicable worker protection practices and protocols, the CIH-approved HASP(s) must specify that:

- All personnel entering the work area(s) will be trained in appropriate safety procedures. All personnel potentially involved in the handling of impacted soil, fill, groundwater, or waste material will be trained in appropriate safety procedures as set forth in Title 29 of the Code of Federal Regulations (CFR); specifically, 29 CFR 1910, also known as the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard;
- All personnel entering the work area(s) will be informed of the possible dangers and hazards present at the Project site. The HASP(s) will provide additional information regarding Project control zones, excavation safety, confined space entry, heat and cold stress, and all other safety concerns deemed by the CIH to be particular to the work to be completed as part of the Project;
- All personnel will be dressed in personal protective equipment (PPE) appropriate to the work being performed and in accordance with guidelines of the HASP(s). If changing Project conditions or the results of field monitoring warrant a higher level of protection, field personnel will withdraw from the work area and wait for further instructions from the competent person as defined by 29 CFR 1926.32(f);
- Since evidence of suspect construction debris was encountered as part of the 2017 LSI completed at Rude Park, RACS may be encountered and therefore all personnel completing work at the Project site will have awareness training. Contractors working on the Project where RACS is identified must have any other additional certifications and safety training as specified in CDPHE Section 5.5 RACS (*6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*);
- Infectious waste may be encountered at the Project site. Contractors working where infectious waste is encountered, must follow worker safety procedures as established in CCR 25-15-401 and CCR 25-14-403.



- If potential infectious wastes are encountered, the contractor will not touch, move, or otherwise disturb the material. Activities will stop in the immediate vicinity of the infectious waste until an infectious waste management program can be developed;
- Contractors will use dust control methods to control worker exposure to airborne contaminant such as naturally-occurring metals in fill and soil and RACS as defined by a CABI. In addition, contact with impacted materials and wastes will be minimized by designing work practices that will act to prevent dust creation in and around the work area(s). Contractors will avoid areas immediately downwind of excavation areas unless the area has been monitored and declared safe;
- Contractors will conduct air monitoring during all Project activities to ensure that landfill gases are not accumulating to explosive levels and that workers are not at risk of oxygen deprivation. Minimum methane and oxygen concentration action levels prescribing when Project work must cease are included in Table 1 of this MMP. Work will stop if air monitoring measurements indicate long-term, continuous methane production until appropriate engineering controls specific to Project work can be implemented;
- The HASPs will include Permissible Exposure Limits (PELs) for the protection of Project workers. PELs will include acceptable ceiling concentration PELs as well as 8-hour time-weighted average PELs for VOCs, semi-volatile organic compounds (SVOCs), and metals as they may be encountered during the Project. The breathing zones will be monitored by the Contractor through CIH-approved methods during Project activities to ensure that the PELs are not exceeded; and
- Contractors will have site-specific training related to this MMP and provided an understanding of what constitutes impacted soil (visual staining and/or odor, etc.).

5.2 NOISE

Project work must adhere to the CCoD's noise ordinance. Exempted hours for construction in the City and County of Denver are from 7 a.m. to 9 p.m., Monday through Friday, and from 8 a.m. to 5 p.m. on Saturdays and Sundays (Sections 36-6. (B)(7) and 36-7.(5)A., B. and C. of Chapter 36 *Noise Control, Denver Revised Municipal Code* (DRMC)). If there is an anticipated need to work outside of the exempted hours for construction, then:

- The General Contractor will be required to request a nighttime noise variance as allowed for in Section 36-7. (5)C. of the DRMC; and
- The General Contractor will begin the variance process a minimum of two to three months prior to the desired start date of any work needing to be performed outside of exempted hours.



All noise variance questions should be directed to Mr. Paul Riedesel, DDPHE Denver Community Noise Program (Phone: 720-865-5410; FAX: 720-865-5532), a minimum of three months prior to the start of the Project.

5.3 PROJECT SECURITY

The General Contractor will be responsible for maintaining effective Project access control to prevent the public from gaining access to the potentially contaminated materials exposed during construction.

5.4 FIELD MONITORING

The EP will be on site at all times to observe disturbed soil. A CABI must be on site for all work activities completed within the area in purple as presented on Figure 4. A CABI will be on site to oversee the ongoing excavation and earthmoving in the purple area; at least one CABI will be observing for each earthmoving machine in operation. Beyond work in the purple area identified on Figure 4, the General Contractor will maintain a CABI on an on-call basis to be able to respond to the Project site should ACM or potential RACS be encountered in other areas of the Project site.

The General Contractor will take reasonable measures to prevent particulate matter from becoming airborne and to prevent the visible discharge of fugitive particulate emissions beyond the Project area. The measures taken must be effective in the control of fugitive emissions at all times on the Project site, including periods of inactivity such as evenings, weekends, and holidays as well as any other period of inactivity.

Additionally, the General Contractor will determine if the minimum requirements for an Air Pollution Emissions Notice (APEN) in accordance with 5 CCR 1001-Air Quality Control Commission are met and obtain the permit if required. Such requirements may be governed by whether the Project area is less than 25 contiguous acres and whether Project work will be less than six months in duration.

5.4.1 Soil and Fill

Soil and fill material excavated during Project construction will be visually inspected for staining and debris and by olfactory means for odor. If debris is observed, all work in the immediate area of discovery will cease until a CABI can evaluate the debris as a potential RACS.

If evidence of staining or odor are present, the soil or fill material will be field screened for organic vapors using a photo-ionization detector (PID). Samples for PID field screening will be collected at a rate of one grab sample per 100 cubic yards of soil or fill material disturbed when staining and/or odor are observed. If one or more of the following screening criteria are observed:

- Staining and/or odor; or



- PID measurements are greater than 50 parts per million (ppm) or greater than 5 times background conditions.

Excavated soil or fill will be temporarily stockpiled on plastic sheeting pending receipt of laboratory analytical results. Samples of the stockpiled material will be collected for laboratory analysis for VOCs by EPA Method 8260C, PAHs by EPA Method 8270SIM, polychlorinated biphenyls (PCBs) by EPA Method 8080/8081, and RCRA metals by EPA Methods 6010B and 7471A. Toxicity Characterization Leaching Potential (TCLP) analysis will be required if analytical results indicate a concentration of a contaminate is greater than 20 times the EPA regulated level. Temporary soil and fill stockpiles will not be mixed and will be wetted and covered by additional plastic sheeting if the temporary stockpile is to remain overnight or over a weekend. In addition, temporary stockpiles that will remain at the Project site unsupervised for any length of time will be protected from disturbance with secured plastic sheeting laid on top of the stockpile. The unsupervised stockpile will be additionally protected with construction fencing and warning labels indicating that hazards to human health may exist.

The reuse of any soil at the Project site or at other locations must meet the requirements discussed in Section 5.5 of this MMP.

Figure 5 depicts a flowchart for the monitoring and subsequent management of soil and fill excavated or disturbed as part of Project construction.

5.4.2 Debris in Soil and Fill

Debris may be encountered during Project construction. It is important to note that debris encountered may or may not contain asbestos, and therefore may or may not be RACS as defined by CDPHE Section 5.5 (6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014). Due to the historical placement of fill at the Project site and known specific areas of environmental concern, the entire Project site has been classified as “Reason to Believe” where one could reasonably expect to encounter RACS. Because of this classification, a CABI will be required to be on site during all soil disturbing activities occurring within the limits of the known area of environmental concern depicted on Figure 4 and be on call to further evaluate and identify potential RACS which may be encountered in other portion of the Project site.

Contractors conducting RACS disturbing activities will be responsible for the following.

- Provide the CABI and the CCoD with documentation that all individuals conducting any soil disturbance as well as RACS disturbing activities have completed asbestos awareness training that provides information necessary to perform their duties in a way that ensures compliance with the requirements of Section 5.5 of the Solid Waste Regulations and asbestos awareness training per OSHA standards set forth at 29 CFR 1926.1101 (k) (9) (vii). All records that document the training, experience, or certification requirements required in Section 5.5 of the Solid Waste Regulations will be available for review throughout the duration of RACS disturbing activities;



- Maintain all necessary site control measures to prevent unauthorized entry into any regulated work area;
- Verify that RACS disturbance-related waste material is not disposed on the site, disposed into storm drains, sanitary sewers, streams, irrigation facilities or waterways;
- Remove non-salvageable, non-hazardous materials and equipment from the Project site and disposing of at DADS in accordance with local, state, and federal laws; and
- Ensure that all special personnel and required equipment are provided to haul construction debris to DADS.

For more information of these requirements, please contact the DDPHE, Steve Gonzales at 720-865-5447.

5.4.3 Soil Gas

Whenever soil or fill materials are disturbed within in the area of known environmental concern or in other areas of the Project site where construction debris is observed, the excavation area will be continuously monitored for soil gases, in particular soil gases potentially generated from historical landfilling that may indicate explosive levels of methane. In addition, the excavation areas that exceed a depth of three feet bgs will be monitored to ensure that workers are not at risk of oxygen deprivation. Field monitoring will include the use of a portable gas detection meter. Screening will be conducted whenever Project construction is ongoing.

In addition to the air monitoring requirements outlined in the General Contractor's CIH-approved HASP, the following field-screening procedures will be followed in accordance with the action levels identified in Table 1 of this MMP:

- If air monitoring action levels are exceeded at any time, activities in the work area will cease for a period of 15 minutes. After 15 minutes, the air will be monitored again, and work will restart only if concentrations are below action levels.
- If action levels are exceeded after 15 minutes, work will be suspended. The competent person, as authorized by the CIH, will determine when it is safe to return to the work area or if additional steps are necessary to address Project-related safety concerns.

5.4.4 Asbestos-Containing Materials Associated with Building Components

ACM may be encountered associated with building components, specifically utilities installed within the limits of the Project site. Should suspect ACM be encountered during excavation activities, work should cease in the immediate area of discovery, and a CABI should determine if the suspect material is ACM. As needed, bulk samples of the suspect material should be collected by a CABI. All confirmed ACM should be removed in accordance with CDPHE Air Quality Control Commission Regulation No. 8, CCR 1001-10, Part B.

Contractors conducting ACM abatement activities will be responsible of the following.



- They are a Certified General Abatement Contractor with the CDPHE Air Pollution Control Division;
- Obtain all appropriate permits or make notification to the CDPHE Air Pollution Control Division.
- Maintain all necessary site control measures to prevent unauthorized entry into any regulated work area;
- Verify that ACM waste material is not disposed on site or into storm drains, sanitary sewers, streams, irrigation facilities, or waterways;
- Remove non-salvageable, non-hazardous materials and equipment from the Project site and disposing of at DADS in accordance with local, state, and federal laws; and
- Ensure that all special personnel and required equipment are provided to haul ACM to DADS.

For more information of these requirements, please contact the DDPHE, Steve Gonzales at 720-865-5447.

5.5 MATERIAL REUSE

5.5.1 Soil

If not previously profiled, stockpiled soil and fill will be analyzed at rate of one bulk sample per 500 cubic yards of material. The samples will be submitted to a state certified laboratory for analysis for VOCs by EPA Method 8260C, PAHs by EPA Method 8270SIM, PCBs by EPA Method 8080/8081, and RCRA metals by EPA Methods 6010B and 7471A. Results of the laboratory analysis will be compared to the soil screening levels reuse criteria identified in Table 2 of this MMP.

Soil or fill material generated from the Project that meet these criteria may be reused at the Project site. The reuse of soil or fill from on the Project site or other sites must follow the CCoD *Guidance for Reuse of Soil on City Projects* (October 5, 2017, Appendix B). If excavated Project soil or fill do not meet these criteria, then the soil or fill will be disposed of at the DADS landfill as coordinated with the Public Works Project Manager, unless the soil or fill do not meet DADS profiling requirements.

5.5.2 Groundwater

The 2015 LSI completed west of the Project site indicated the depth to groundwater across the Project area from could range from approximately 7 feet to 27 feet bgs depending on location across the Project site. LTE did not encounter groundwater in any of the trenches completed as part of the 2017 LSI completed at Rude Park. It is expected that shallow groundwater will be adjacent to Lakewood Gulch. The deepest depth of construction is reportedly 8 feet bgs based on



supplied design drawings. It is not expected that dewatering of groundwater will be required as no planned work will be adjacent to Lakewood Gulch. Should groundwater or stormwater be encountered during construction activities, it must be managed in accordance with CDPHE Water Quality Control Division, Colorado Discharge Permit Systems (CDPS) *General Permit COR0300000 Stormwater Discharges Associated with Construction Activities* and *Certificate of Discharge COR03XXXX* (Appendix C) to be obtained by the General Contractor. It is the responsibility of the General Contractor to obtain a discharge certificate for a *Construction Dewatering* under General Permit COG07000 or *Remediation Activities Discharging to Surface Water* under General Permit COG315000.

The Project is located in an area of potential groundwater impacts from industrial chemicals (including releases from nearby closed Leaking Underground Storage Tank (LUST) site), and releases from documented and undocumented historical landfills. If groundwater is generated as part of Project dewatering activities, it must be managed in accordance with applicable state regulations and for meeting all requirements of relevant permit(s).

5.6 SOIL AND FILL TRANSPORTATION AND DISPOSAL

The General Contractor is responsible for coordinating with the Public Works Project Manager when obtaining all necessary soil and fill material waste profiles and manifests from DADS. The Public Works Project Manager and the General Contractor are able to sign manifests related to the Project. As practical, the materials to be disposed of will be profiled, and manifests will be generated, prior to beginning work.

DADS accepts solid material where concentrations are less than 20 times the hazardous listing for characteristic waste (20 Times Rule), except for PCBs. DADS will accept materials where PCB concentrations are less than 50 ppm. If concentrations of any other contaminant exceed the 20 Times Rule by totals analysis, then analysis for TCLP is required. If the TCLP results exceed the toxicity characteristic maximum concentration, then the material will require disposal at a hazardous waste disposal site in accordance with CDPHE requirements.

If excavated material is to be disposed and analytical results are below the 20 Times Rule concentrations, the material must be transported to DADS for disposal as non-hazardous solid waste. If the material exceeds regulatory levels, then hazardous waste disposal will be required, in accordance with all applicable regulations.

RACS will be transported and disposed of at DADS in accordance with all applicable federal and state regulations.

5.7 REGULATED ASBESTOS CONTAINING SOIL

Based on the findings of the 2015 LSI for Rude Park there is the potential for RACS to be encountered. Should RACS be encountered it should be managed in accordance with CDPHE Section 5.5 (6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities,



Section 5.5, September 30, 2014). During the Project, a CABI is required to be on site for all excavation activities that will be completed in the area of concern presented in purple on Figure 4. The CABI will be on call during all other excavation activities so to make determination of suspect RACS potentially uncovered.

Excavation activities that expose RACS without previously approved Project Specific RACS Management Plans (PSRMP), work will cease in the immediate area of the RACS. The General Contractor and CABI (with the CCoD's Project Manager approval) will submit a completed *Notification of RACS Disturbance* form to the CDPHE, Hazardous Materials and Waste Management Division within 24 hours of identifying RACS. The CDPHE-HMWMD will also immediately be notified and a copy of the RACS Disturbance form will be submitted to CDPHE-HMWMD. Within five working days of the discovery, the General Contractor will submit a PSRMP, Standard Operating Procedures (SOPs), or indicate the standard requirements of Section 5.5.7 of 6 CCR 1007-2, PART 1, *Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014* that will be followed on the *Notification of RACS Disturbance* form submitted to CDPHE-HMWMD. By following Section 5.5.7 of 6 CCR 1007-2, PART 1, *Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014* in its entirety, constitutes a default RACS management plan, eliminating the need to submit a PSRMP or SOP,

5.7.1 Work Practice for Management of RACS Using Hand Methods on Surface or Subsurface

The following presents hand methods for the management of RACS as presented in Section 5.5.7 of 6 CCR 1007-2, PART 1, *Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*. Additional requirements related to the management of RACS are detailed in in CDPHE Section 5.5. (6 CCR 1007-2, PART 1, *Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*) included as Appendix D. Should RACS be exposed the following hand methods may be used.

- All work will be completed within a regulated work area (RWA).
- Wet and remove the RACS and six inches, in all directions, of surrounding soil or other material from the last occurrence of visible ACM.
- A CABI will confirm that the visible extent of ACM and surrounding soil, or other material, have been removed (or extent of excavation has been reached). If RACS remains, it will be managed for stabilization or future removal. Since there is no documented evidence of non-visible RACS at the Project site, visual inspection and clearance will be sufficient to determine the removal of RACS.
- If RACS remains in the RWA, it will be managed for stabilization or future removal.
- In lieu of stabilization or full removal, sampling may be performed.



- Dispose of RACS in accordance with CDPHE Section 5.5. (*6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*).

5.7.2 Work Practices for Management of RACS Using Mechanical Methods

The following presents mechanical methods for the management of RACS as presented in Section 5.5.7 of *6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*. Additional requirements related to the management of RACS are detailed in CDPHE Section 5.5. (*6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*) included as Appendix D. Should RACS be exposed the following mechanical methods may be used.

- All work will be completed in a RWA.
- For surface occurrence of RACS – Wet and remove all RACS and a minimum of six inches of soil, and/or other matrix material, in all directions from the last occurrence of visible ACM, with CABI confirmation that the visible extent of RACS has been removed.
- For subsurface occurrence of RACS – Wet and remove all RACS and a minimum of three linear feet of soil or other matrix material, in the direction(s) of planned excavation, with CABI confirmation that the visible extent of RACS has been removed. Since there is no documented evidence of non-visible RACS at the Project site, a visual inspection and clearance will be sufficient to determine the removal of RACS.
- If RACS remains in the RWA, it will be managed for stabilization or future removal.
- In lieu of stabilization or full removal, sampling may be performed.
- Dispose of RACS in accordance with CDPHE Section 5.5. (*6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*).

5.8 ASBESTOS-CONTAINING MATERIALS

If during the excavation activities at the Project site disturb a building component (i.e., subsurface utilities) which contains ACM and requires removal, all work will be completed in accordance with CDPHE Air Quality Control Commission Regulation No. 8, CCR 1001-10, Part B. If the amount of ACM to be removed is greater than the trigger level, the General Contractor will retain a General Abatement Contractor certified by CDPHE Air Pollution Control Division.

5.9 CONSTRUCTION WATER MANAGEMENT

Based on the Project scope of work it is not expected that groundwater will need to be dewatered from excavations, however management of construction water must be conducted in accordance



with the provisions presented in *General Permit COR0300000* and *Certificate of Discharge COR03XXXX* to be obtained by the General Contractor. The General Contractor is encouraged to minimize generating construction water wherever applicable (Section 5.7.3).

If surface water or stormwater is to enter the excavation at any time, the water may be considered impacted until tested and will be the responsibility of the General Contractor to remove and dispose or discharge of the additional water. It will be the responsibility of the General Contractor to protect the work area from intrusion of surface water or stormwater.

Outlined below is general guidance and best practices for dewatering and groundwater management during excavation activities, if applicable.

- Minimize areas of open excavations and ensure that they are stabilized and closed up the same day;
- Protect open excavations against flooding and surface run-off infiltrations;
- Keep excavations and stockpiled material free of water while work is in progress; and
- Minimize contact with water that has accumulated in the excavation and manholes.

5.10 INFECTIOUS WASTE HANDLING PROCEDURES

The Public Works Project Manager will be notified if infectious waste is encountered during Project construction. The EPA, the Center for Disease Control (CDC), and OSHA all have recommended classifications to deal with potentially infectious waste matter, with the primary emphasis being medical wastes. Based on EPA's classification, materials that should be treated as infectious wastes include:

- Isolation waste;
- Cultures, stocks, and associated biologicals;
- Human blood and blood products;
- Pathological wastes like body parts, tissues, organs, and fluids removed during surgery, pathology, or biopsy;
- Sharps (edged or pointed metal, glass, or plastic medical equipment) such as hypodermic needles, syringes, intravenous needles, scalpel blades, lances, disposable pipettes, capillary tubes, laboratory equipment, glass slides, test tubes, and broken glass;
- Animal carcasses, body parts, and bedding;
- PPE, swabs, pipettes, spreaders, gloves, specimen and culture containers, cups, petri dishes, and flasks;



- Laboratory waste such as intravenous tubing, drainage tubing, pouches, dressings, disposable filters, towels, aprons, gowns, bedding, and pads; and
- Dialysis unit wastes.

If field monitoring during Project construction uncovers any of the aforementioned materials, they will be managed as infectious waste. Following identification of waste materials, the work in the immediate area will be suspended in order to properly profile the waste for disposal per CCR 25-15-403.

- Restrict access to the infectious waste with fencing or other material;
- Wet the waste to reduce potential for airborne migration of materials;
- The infectious waste will be excavated, logged, and containerized. Once placed in appropriate containers, the infectious waste will be labeled and placed in a secured storage area until removal by a registered infectious waste management company; and
- Individuals involved in excavating, identifying, and segregating infectious waste will wear PPE appropriate to the type of infectious waste encountered. At a minimum, all workers involved in the identifying and segregation of infectious waste will wear disposable overalls and booties, disposable gloves, work boots, and clear plastic full face mask.

5.11 SPECIAL WASTE HANDLING PROCEDURES

Special waste could include items such as drums, chemical or fuel containers, batteries, tar, sludge, slag/coal/ash, materials that are hazardous waste, and PCB-containing equipment (transformers, light ballasts, voltage regulators, capacitors, and circuit breakers). These materials may be present in small quantities and can be difficult to characterize. Upon identification of special wastes, excavation at that immediate location will cease until additional assessment by the General Contractor's EP can be completed as coordinated with CCoD. The EP will attempt to assess special wastes, including prudent and safe observation for the following.

- Markings and or labels on containers/drums, condition of the containers/drums (i.e., rust, holes, damage, corrosion), and other indications of contents;
- Indications of unsafe conditions, including swelling drums, leaking, fumes, and odors, etc.;
- Conditions of materials associated with the special wastes; and
- Assessment for evidence of release, obtained by using field instruments (i.e., PID, lower explosive level [LEL]), and professional judgment.



Only under the direction of the EP, and after discussions with the Public Works Project Manager, will handling of any special waste be completed. When handling is required, the following precautions will be taken.

- Handling will be minimized whenever possible;
- When necessary, handling will be employed by mechanical means including the use of Project excavation equipment;
- Pressurized/swelling drums, suspected explosives, potential shock-sensitive materials, or other potentially dangerous items will not be handled until a person with appropriate experience with these situations has been consulted;
- All special waste will be placed on 10-millimeter plastic sheeting and covered until additional assessment has been completed by the EP (the time frame will allow for laboratory testing and obtaining a profile and manifest for disposal);
- All stockpiles of special waste will be covered immediately or containerized and will remain covered or containerized until final removal;
- Suspicious materials will be further evaluated by the EP. When additional assessment of this material indicates that the material does not meet applicable regulatory requirements for disposal as a non-hazardous waste, the EP will arrange for off-site disposal at a licensed facility; and
- Where suspicious material is determined to be non-hazardous by the EP through additional assessment, the material may be disposed as non-hazardous solid waste.

Waste may be hazardous if it contains a listed hazardous waste or enough hazardous constituents to exhibit a hazardous waste characteristic. Listed wastes are discussed in 6 CCR 1007-3 Part 261 Subpart D. Testing and disposal will be coordinated with DDPHE.

5.12 MONITORING WELLS

If groundwater monitoring wells are encountered during excavation and construction activities, then work will be conducted around monitor wells so as not to disturb their construction. If this is not possible, the General Contractor will properly abandon the well, and then replace it after construction in accordance with requirements set forth by the Colorado Division of Water Resources, Department of Natural Resources.

5.13 DECONTAMINATION

Equipment that has come into contact with environmentally-impacted material, such as soil, fill, and/or groundwater, will be decontaminated prior to leaving the Project site to minimize the potential of contaminating off-site properties. Decontamination procedures will include using hand tools such as shovels, brooms, and brushes to remove the material from the equipment. If the EP



finds it necessary, the equipment will be further decontaminated with a pressure washer. The spent decontamination water will be collected in plastic-lined basins and pumped into water-tight containers. The General Contractor will be responsible for analyzing the wastewater and coordinating the disposal of the decontamination water.

Equipment that has come into contact with RACS will be decontaminated in accordance with the CDPHE Section 5.5 (6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014).



6.0 NOTIFICATION, DOCUMENTATION, AND FINAL REPORTING

6.1 NOTIFICATIONS

In the event that debris is encountered and a CABI determines that the debris is RACS, the CABI will immediately notify Public Works and DDPHE per the contact information provided in Section 2.0. In addition, if laboratory reports of stockpiled materials indicate that impacts are present in concentrations indicating hazardous waste, Public Works and DDPHE will be notified immediately per the contact information provided in Section 2.0.

If RACS or other contaminant releases occur that could immediately threaten human health, safety, or the environment outside the Project site, the General Contractor will immediately notify the Public Works Project Manager and DDPHE.

All complaints received by the General Contractor will be immediately reported to the Public Works Project Manager. Additionally, any environmentally-related complaint, such as noise, odor, or dust, will be immediately reported to 311. General Contractor should notify the Public Works Project Manager within 24 hours of receipt.

6.2 DOCUMENTATION

All data obtained during implementation of the General Contractor's finalized MMP will be maintained by the General Contractor and submitted to the Parks and Recreation and DDPHE in a summary report at the conclusion of the Project. Documentation obtained and submitted will include:

- CABI field notes, completed on the CCoD CABI Work Day Documentation form included as Appendix E and as defined by CDPHE Section 5.5;
- EP field notes;
- Field-screening data;
- Laboratory reports;
- Air monitoring readings and all actions taken if air monitoring action levels are exceeded;
- Copies of waste profiles; and
- Generator's Initial Copy of the signed waste manifests.

All Project field work completed as part of the General Contractor's finalized MMP will be documented on the CCoD CABI Work Day Documentation form and other forms or logbooks



completed by the EP. The completed form and logbooks will be retained by the General Contractor for a period of three years.

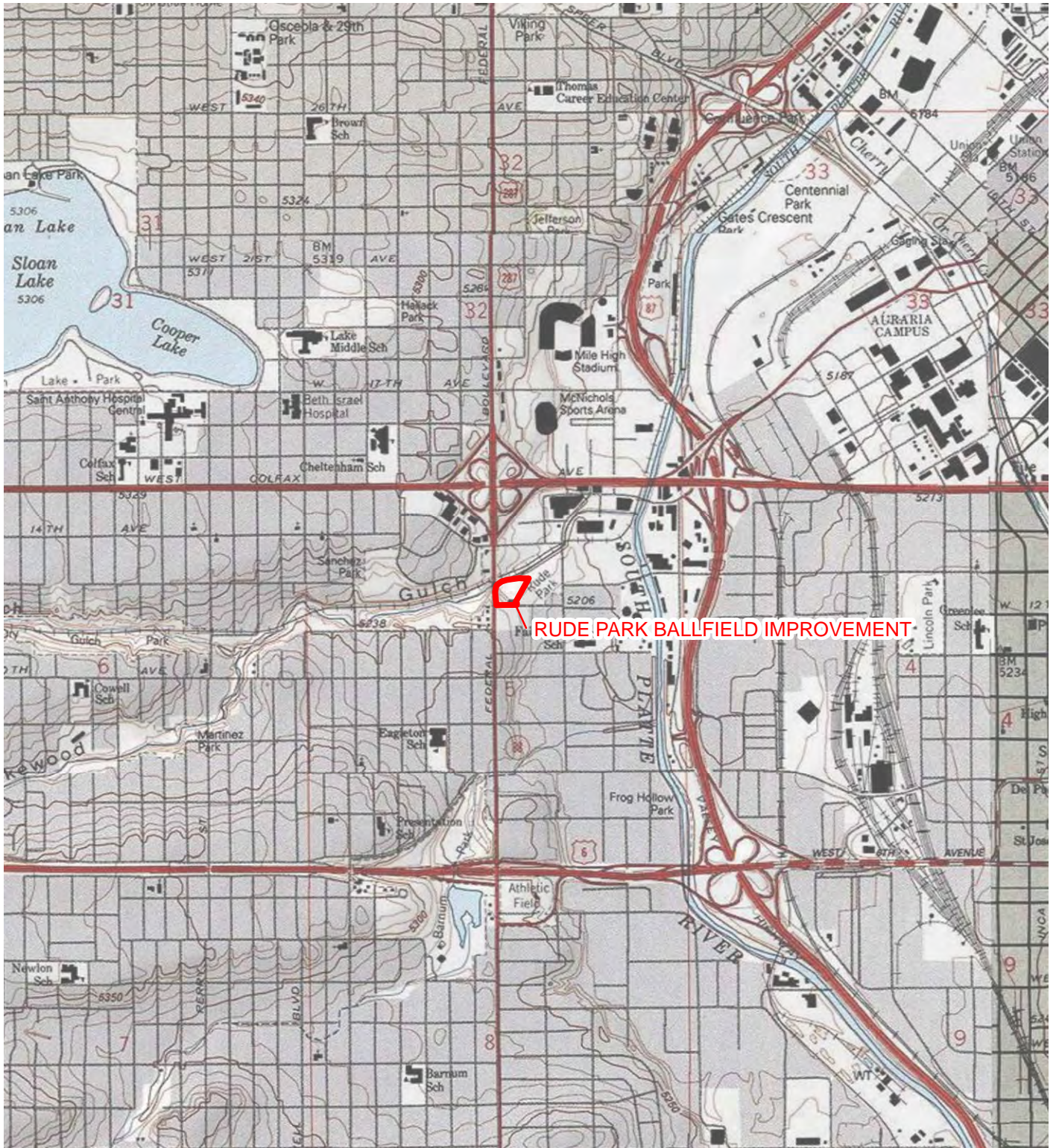
6.3 FINAL REPORTING

Within 60 days of completing the Project, the General Contractor will submit a summary report to the Public Works Project Manager and DDPHE. The summary report will include those items noted in Section 6.2, as well as:

- A summary of the work completed;
- A summary of materials that were managed and the procedures used;
- Quantities and disposition of materials managed;
- A map depicting the location of RACS identification (if any);
- A map depicting the location of other impacts to soil or fill (if any);
- Copies of the CDPHE certification(s) of the CABI(s) monitoring the excavations for RACS;
- Copies of the CDPHE certifications of any other asbestos professionals retained by the General Contractor to manage RACS per CDPHE Section 5.5 (*6 CCR 1007-2, PART 1, Regulation Pertaining to Solid Waste Sites and Facilities, Section 5.5, September 30, 2014*).; and
- Labeled Project photographs; and
- Any other applicable information or data generated as part of the implementation of this MMP.



FIGURES



RUDE PARK BALLFIELD IMPROVEMENT

IMAGE COURTESY OF ESRI/USGS

LEGEND

 APPROXIMATE PROJECT BOUNDARY

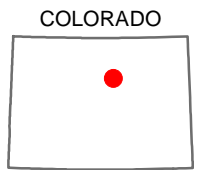
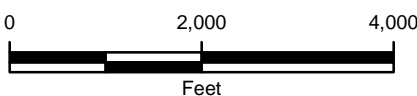


FIGURE 1
PROJECT LOCATION MAP
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO



CITY AND COUNTY OF DENVER

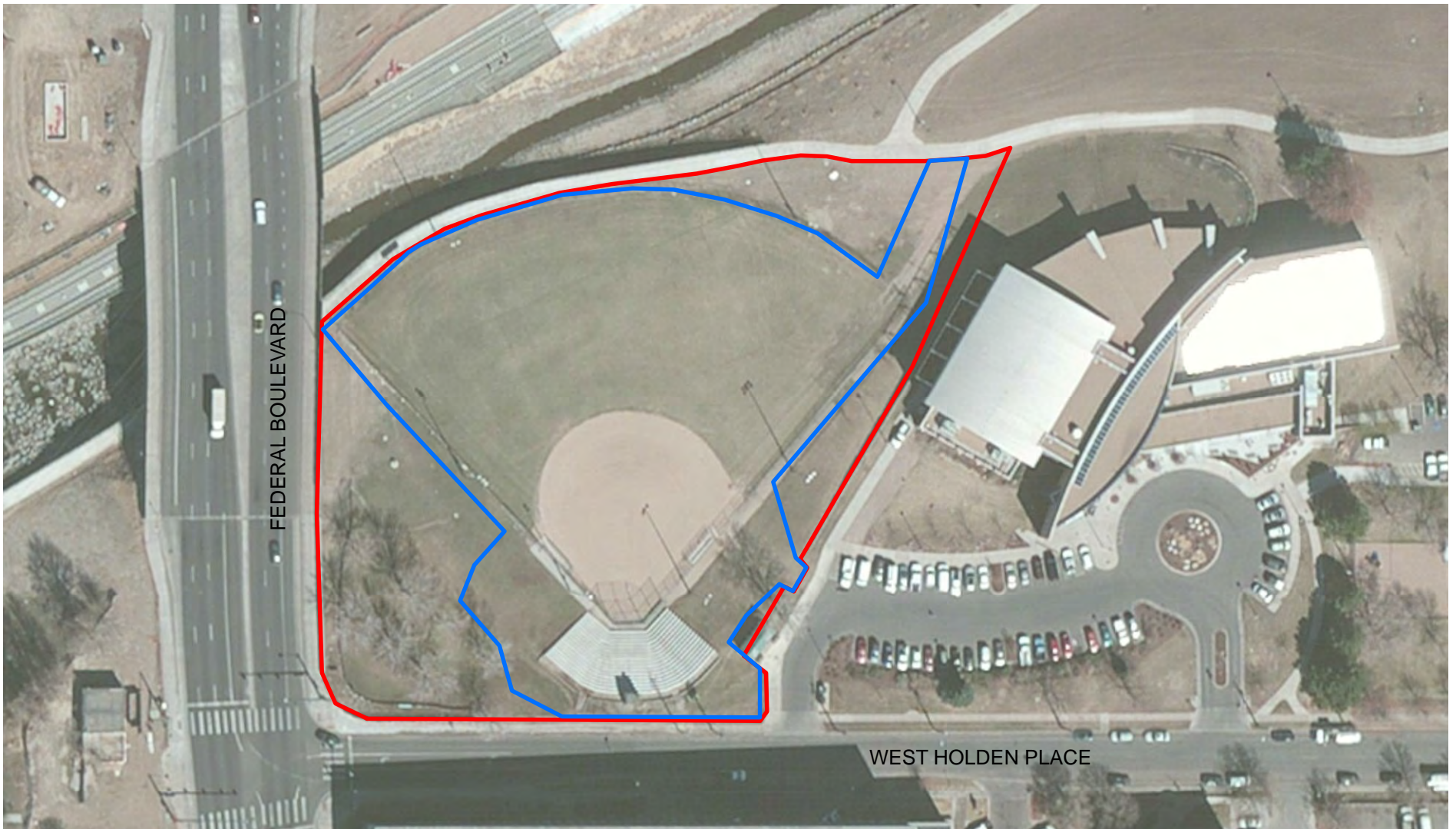


IMAGE COURTESY OF ESRI

LEGEND

- PROJECT BOUNDARY
- LIMITS OF PROPOSED SOIL REMOVAL/POTENTIAL EARTHWORK

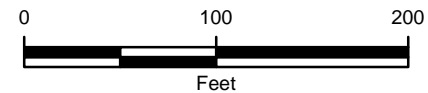
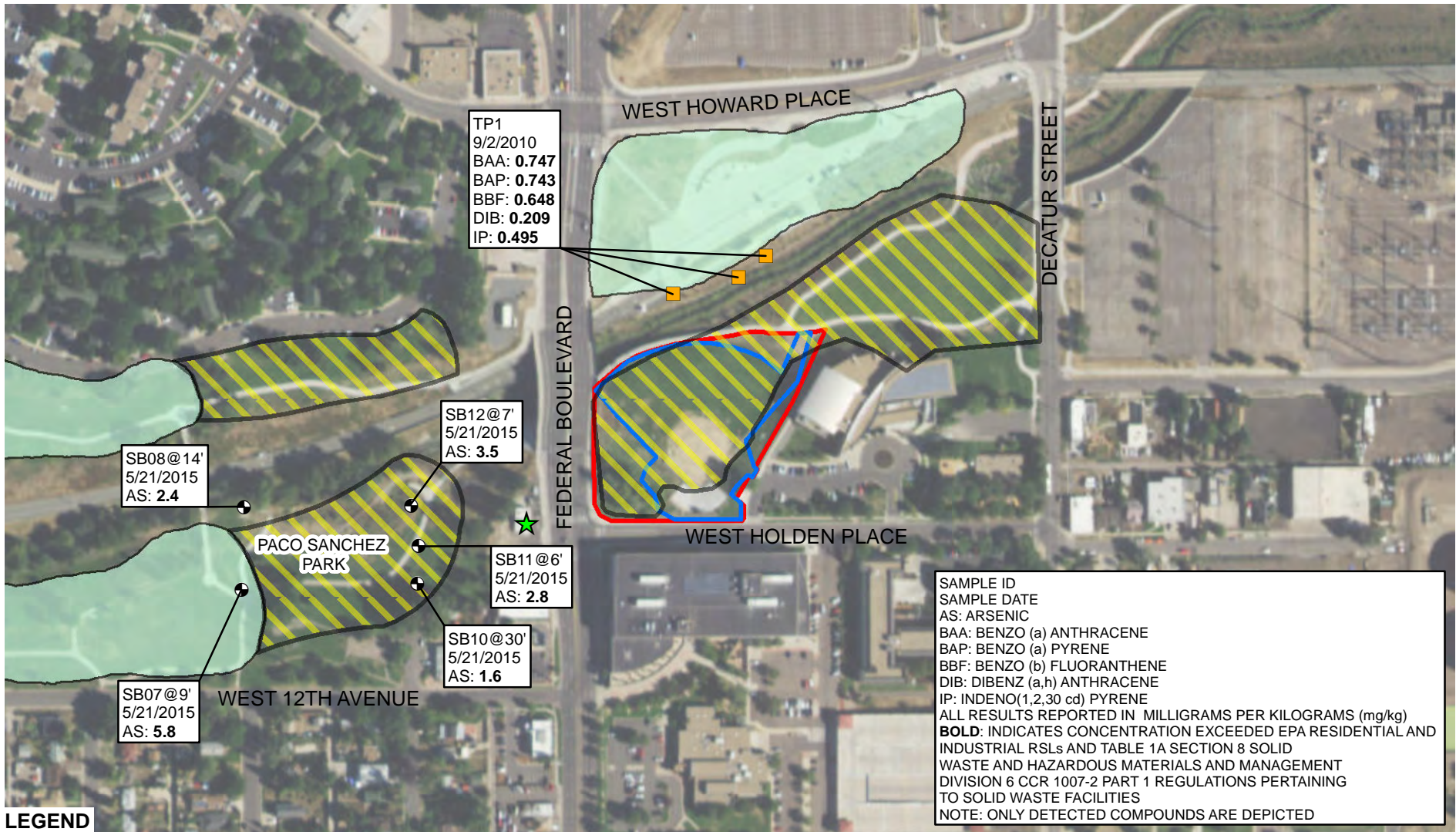


FIGURE 2
SOIL REMOVAL/POTENTIAL EARTHWORK MAP
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO

CITY AND COUNTY OF DENVER





LEGEND

- SOIL BORINGS COMPLETED AS PART OF LIMITED SUBSURFACE INVESTIGATION EXISTING ROW NEAR 10TH AND GROVE STREET
- ★ CLOSED LUST SITE
- TEST PIT COMPLETED AS PART OF VCUP COMPLETION REPORT - RTD WEST CORRIDOR LIGHT RAIL PROJECT DATED NOVEMBER 2013
- ▭ SITE BOUNDARY
- ▭ SOIL REMOVAL/POTENTIAL EARTHWORK

- ▭ APPROXIMATE LIMITS OF KNOWN HISTORIC LAND FILLS
- ▭ APPROXIMATE LIMITS OF UNKNOWN FILL (BASED ON AERIAL PHOTOS)

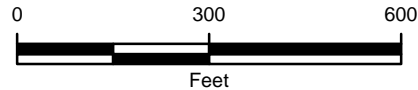


IMAGE COURTESY OF ESRI



FIGURE 3
SURROUNDING AREAS OF POTENTIAL CONCERN MAP
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO

CITY AND COUNTY OF DENVER



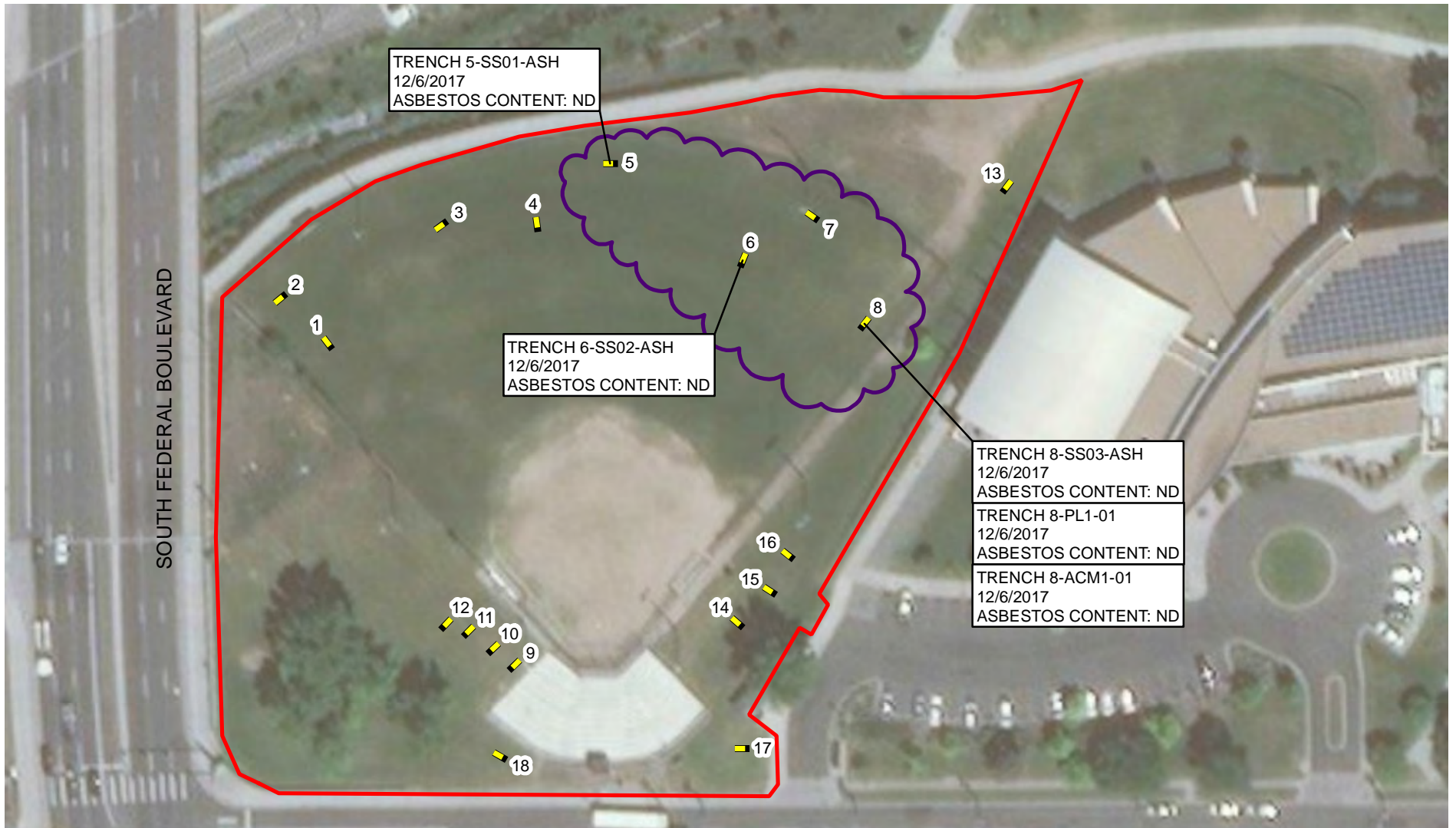


IMAGE COURTESY OF ESRI

LEGEND

4' X 8' TRENCH

SITE BOUNDARY (EP OVERSIGHT IS REQUIRED IN THIS AREA)

AREA OF ENVIRONMENTAL CONCERN (CABI OVERSIGHT IS REQUIRED IN THIS AREA)

SAMPLE ID
SAMPLE DATE
ND: NONE DETECTED

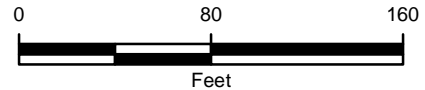
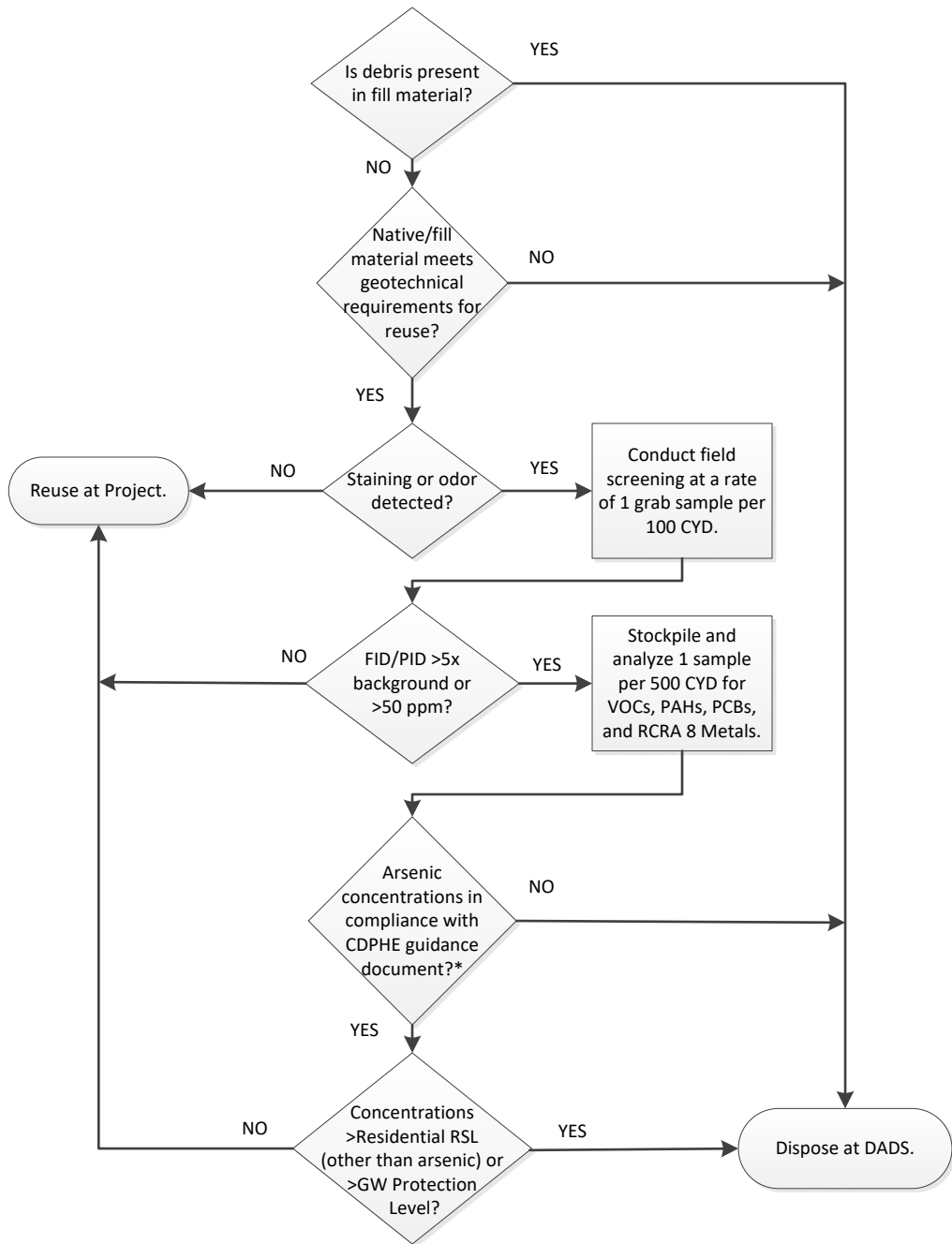


FIGURE 4
AREA OF ENVIRONMENTAL CONCERN
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO

CITY AND COUNTY OF DENVER



**FIGURE 5
SOIL AND FILL MANAGEMENT**



VOCs – Volatile Organic Compounds by EPA Method 8260B
 SVOCs – Semi-Volatile Organic Compounds by EPA Method 8270C
 RCRA 8 Metals – Resource Conservation and Recovery Act Metals by EPA Method 6010B and 7471
 EPA RSLs – Environmental Protection Agency Regional Screening Levels
 GW Protection Levels - Colorado Department of Public Health and the Environment Groundwater Protection Levels
 CYD – cubic yards
 PID/FID – Photoionization Detector/Flame Ionization Detector
 DADS – Denver Arapahoe Disposal Site
 CDPHE - Colorado Department of Public Health and Environment
 *Arsenic Concentrations in Soil (CDPHE, July 2014)

TABLES

TABLE 1

**AIR MONITORING ACTION LEVELS
DENVER PARKS AND RECREATION PROJECT
DRAFT MATERIALS MANAGEMENT PLAN
2017-ESA-JOB-0028
RUDE PARK BALLFIELD ACCESS IMPROVEMENT
CITY AND COUNTY OF DENVER**

AIR MONITORING ACTION LEVELS			
HAZARD	MONITORING EQUIPMENT	MEASURED LEVEL	ACTION
Oxygen	Oxygen Meter	20-22%	No restrictions. Continuously monitor and use personal protective equipment (PPE) as required in Contractor HASP.
		19.5-20% or 22-25%	Continuously monitor while workers are in the area. Egress plan and pack must be available. For confined spaces, workers are required to wear a self-contained breathing apparatus (SCBA) escape pack and lifeline.
		Less than 19.5% or Greater than 25%	Evacuate area. Competent person will determine when it is safe to return to the work area and if additional steps are necessary to address Project-related safety concerns.
Explosive Gases (Methane)	LEL Sensor	Less than 10% LEL	Monitor continuously and use PPE as required in Contractor HASP.
		15%-25% LEL	Monitor continuously, limit access to essential personnel, control ignition sources, and ventilate the area.
		Greater than 25% LEL	Evacuate area. Competent person will determine when it is safe to return to the work area and if additional steps are necessary to address Project-related safety concerns.

HASP = Health and Safety Plan
LEL= Lower Explosive Limit

Oxygen:

- Measured level of 20 -22%; No restrictions, however, the work area will be continuously monitored and workers will use workers will use PPE as specified in the HASP.
- Measured level of 19.5 – 20% or 22 – 25%: The work area will be continuously monitored while work is ongoing. An egress plan and pack must be available.
- Measured level of less than 19.5% or greater than 25%: The work area will be evacuated. A competent person will determine when it is safe to return to the work area and if additional steps are necessary to address safety concerns.

Methane:

- Less than 10% LEL: The work area will be continuously monitored, and workers will use PPE as specified in the HASP.
- 15%-25% LEL: The work area will be continuously monitored, and will be limited to access to essential personnel. In addition, all control ignition sources will be removed and the work area will be ventilated.

Greater than 25% LEL: The work area will be evacuated. A competent person will determine when it is safe to return to the work area and if additional steps are necessary to address safety concerns.

TABLE 2

**SOIL SCREENING LEVELS
REUSE CRITERIA
DENVER PARKS AND RECREATION PROJECT
DRAFT MATERIALS MANAGEMENT PLAN
2017-ESA-JOB-0028
RUDE PARK BALLFIELD ACCESS IMPROVEMENT
CITY AND COUNTY OF DENVER**

	EPA RSL Residential (mg/kg)	Beneficial Use Standard (mg/kg)	GW Protection Level (mg/kg)		EPA RSL Residential (mg/kg)	Beneficial Use Standard (mg/kg)	GW Protection Level (mg/kg)		
RCRA Metals				Volatile Organic Compounds					
Arsenic	mg/kg	0.68*	0.68	NPS	1,2-Dibromoethane	mg/kg	0.036	NPS	0.00018
Barium	mg/kg	1500	15000	NPS	1,2-Dichlorobenzene	mg/kg	180	NPS	57
Cadmium	mg/kg	71	71	NPS	1,2-Dichloroethane	mg/kg	0.46	NPS	0.0036
Chromium	mg/kg	NPS	120000	NPS	1,2-Dichloropropane	mg/kg	0.28	NPS	0.0087
Lead	mg/kg	400	400	NPS	1,3,5-Trimethylbenzene	mg/kg	27	NPS	23
Selenium	mg/kg	39	390	NPS	1,3-Dichlorobenzene	mg/kg	NPS	NPS	8.5
Silver	mg/kg	39	390	NPS	1,3-Dichloropropane	mg/kg	160	NPS	0.084
Mercury	mg/kg	1.1	11	NPS	1,4-Dichlorobenzene	mg/kg	2.6	NPS	7.8
Volatile Organic Compounds				Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	mg/kg	2	NPS	0.16	1-Chlorohexane	mg/kg	NPS	NPS	NPS
1,1,1-Trichloroethane	mg/kg	8100	NPS	62	2,2-Dichloropropane	mg/kg	NPS	NPS	NPS
1,1,2,2-Tetrachloroethane	mg/kg	0.6	NPS	0.0024	2-Butanone	mg/kg	27000	NPS	18
1,1,2-Trichloro-1,2,2-Trifluoroethane	mg/kg	40000	NPS	NPS	2-Chlorotoluene	mg/kg	160	NPS	NPS
1,1,2-Trichloroethane	mg/kg	0.15	NPS	0.038	2-Hexanone	mg/kg	20	NPS	0.21
1,1-Dichloroethane	mg/kg	3.6	NPS	1.8	4-Chlorotoluene	mg/kg	160	NPS	NPS
1,1-Dichloroethene	mg/kg	23	NPS	12	4-Methyl-2-Pentanone	mg/kg	3300	NPS	3.3
1,1-Dichloropropene	mg/kg	NPS	NPS	NPS	Acetone	mg/kg	6100	NPS	32
1,2,3-Trichlorobenzene	mg/kg	6.3	NPS	NPS	Benzene	mg/kg	1.2	NPS	0.17
1,2,3-Trichloropropane	mg/kg	0.0051	NPS	0.00048	Bromobenzene	mg/kg	29	NPS	3
1,2,4-Trichlorobenzene	mg/kg	5.8	NPS	13	Bromochloromethane	mg/kg	150	NPS	NPS
1,2,4-Trimethylbenzene	mg/kg	30	NPS	NPS	Bromodichloromethane	mg/kg	0.29	NPS	0.007
1,2-Dibromo-3-Chloropropane	mg/kg	0.0053	NPS	0.002	Bromoform	mg/kg	19	NPS	NPS
Volatile Organic Compounds				Volatile Organic Compounds					
Carbon Disulfide	mg/kg	77	NPS	1000	Bromomethane	mg/kg	0.68	NPS	0.16
Carbon Tetrachloride	mg/kg	0.65	NPS	1.704	Volatile Organic Compounds				
Chlorobenzene	mg/kg	28	NPS	5.3	Styrene	mg/kg	600	NPS	14
Chloroethane	mg/kg	14000	NPS	NPS	Tert-Butylbenzene	mg/kg	780	NPS	NPS
Chloroform	mg/kg	0.32	NPS	0.085	Tetrachloroethene	mg/kg	8.1	NPS	1.9
Chloromethane	mg/kg	11	NPS	NPS	Toluene	mg/kg	490	NPS	50
Cis-1,2-Dichloroethene	mg/kg	16	NPS	0.261	Trans-1,2-Dichloroethene	mg/kg	160	NPS	5.4
Cis-1,3-Dichloropropene	mg/kg	NPS	NPS	NPS	Trans-1,3-Dichloropropene	mg/kg	NPS	NPS	NPS
Dibromochloromethane	mg/kg	8.3	NPS	0.11	Trichloroethene	mg/kg	0.41	NPS	0.68
Dibromomethane	mg/kg	2.4	NPS	NPS	Trichlorofluoromethane	mg/kg	2300	NPS	1000
Dichlorodifluoromethane	mg/kg	87	NPS	390	Vinyl Acetate	mg/kg	910	NPS	51
Ethylbenzene	mg/kg	5.8	NPS	100	Vinyl Chloride	mg/kg	0.059	NPS	0.11
Hexachlorobutadiene	mg/kg	1.2	NPS	NPS	Semi-Volatile Organic Compounds				
Iodomethane	mg/kg	NPS	NPS	NPS	1,2-Dinitrobenzene	mg/kg	0.63	NPS	0.014
Isopropylbenzene	mg/kg	190	NPS	NPS	1,4-Dinitrobenzene	mg/kg	0.63	NPS	0.005
Methyl Tertiary Butyl Ether	mg/kg	47	NPS	NPS	1,4-Dioxane	mg/kg	5.3	NPS	0.0016
Methylene Chloride	mg/kg	35	NPS	0.06	2,4,5-Trichlorophenol	mg/kg	630	NPS	88
Naphthalene	mg/kg	3.8	3.8	23	2,4,6-Trichlorophenol	mg/kg	6.3	NPS	0.28
N-Butylbenzene	mg/kg	390	NPS	NPS	2,4-Dichlorophenol	mg/kg	19	NPS	0.33
N-Propylbenzene	mg/kg	380	NPS	NPS	2,4-Dimethylphenol	mg/kg	130	NPS	2.7
P-Isopropyltoluene	mg/kg	NPS	NPS	NPS	2,4-Dinitrophenol	mg/kg	NPS	NPS	0.4
Sec-Butylbenzene	mg/kg	780	NPS	NPS	2-Methylphenol	mg/kg	NPS	NPS	1.2
					3,3'-Dichlorobenzidine	mg/kg	NPS	NPS	0.041
					3-Methylphenol	mg/kg	NPS	NPS	1.2

TABLE 2

**SOIL SCREENING LEVELS
REUSE CRITERIA
DENVER PARKS AND RECREATION PROJECT
DRAFT MATERIALS MANAGEMENT PLAN
2017-ESA-JOB-0028
RUDE PARK BALLFIELD ACCESS IMPROVEMENT
CITY AND COUNTY OF DENVER**

	EPA RSL Residential (mg/kg)	Beneficial Use Standard (mg/kg)	GW Protection Level (mg/kg)		EPA RSL Residential (mg/kg)	Beneficial Use Standard (mg/kg)	GW Protection Level (mg/kg)
<i>Semi-Volatile Organic Compounds</i>				<i>Semi-Volatile Organic Compounds</i>			
4-Methylphenol	mg/kg	NPS	0.27	Diphenylamine	mg/kg	630	32
4-Nitrophenol	mg/kg	NPS	2.1	Ethylene glycol	mg/kg	130000	70
Benz[a]anthracene	mg/kg	1.1	1000	Fluoranthene	mg/kg	240	1000
Benzo[a]pyrene	mg/kg	0.11	1000	Fluorene	mg/kg	240	NPS
Benzo[b]fluoranthene	mg/kg	1.1	1000	Hexachlorobenzene	mg/kg	0.21	0.009
Benzo[k]fluoranthene	mg/kg	11	1000	Hexachlorobutadiene	mg/kg	1.2	0.17
Benzoic acid at pH 6.8	mg/kg	NPS	110	Hexachlorocyclopentadiene	mg/kg	0.18	1000
Benzyl alcohol	mg/kg	630	NPS	Hexachloroethane	mg/kg	1.8	0.019
Bis-2-ethylhexyl phthalate	mg/kg	NPS	1000	Indeno[1,2,3-cd]pyrene	mg/kg	1.1	1000
Bromoform	mg/kg	19	NPS	N-Nitrosodimethylamine	mg/kg	NPS	0.000005
Butylbenzylphthalate	mg/kg	NPS	1000	N-Nitrosodipropylamine	mg/kg	NPS	0.0000028
Chlordane	mg/kg	1.7	1000	N-Nitrosodiphenylamine	mg/kg	NPS	0.67
Chrysene	mg/kg	110	1000	Pentachlorophenol	mg/kg	NPS	0.021
Cyclohexanone	mg/kg	2800	200	Phenol	mg/kg	NPS	47
Dibenzo[a,h]anthracene	mg/kg	0.11	1000	Pyrene	mg/kg	180	1000
Diethylphthalate	mg/kg	NPS	140	Pyridine	mg/kg	7.8	0.38
di-n-Butyl phthalate	mg/kg	NPS	1000				
PCBs							
~Aroclor 1016	mg/kg	0.41	NPS	1000			
~Aroclor 1221	mg/kg	0.2	NPS	NPS			
~Aroclor 1232	mg/kg	0.17	NPS	NPS			
~Aroclor 1242	mg/kg	0.23	NPS	NPS			
~Aroclor 1248	mg/kg	0.23	NPS	NPS			
~Aroclor 1254	mg/kg	0.12	NPS	1000			
~Aroclor 1260	mg/kg	0.24	NPS	1000			
~Aroclor 5460	mg/kg	3.5	NPS	NPS			

Notes:

*While the EPA RSL Residential value for arsenic is provided for reference, arsenic concentrations will be compared to the Colorado Department of Public Health and Environment's (CDPHE) *Risk Management Guidance for Evaluating Arsenic Concentrations in Soil* (June 2017). The CDPHE guidance document is provided in Appendix D of the Materials Management Plan (MMP).

GW Protection Level = CDPHE Soil Cleanup Table for Groundwater Protection (March, 2014)

NPS = No published standard

EPA RSL = Environmental Protection Agency Risk Screening Levels for Residential Land Use (June, 2017)

mg/kg = milligram per kilogram

RCRA = Resource Conservation and Recovery Act

APPENDIX A
LIMITED SUBSURFACE INVESTIGATION RUDE PARK BALLFIELD ADA ACCESS
IMPROVEMENT / FEBRUARY 2018



February 8, 2018

Ms. Agatha Linger
Denver Department of Public Health and Environment
Division of Environmental Quality
City and County of Denver
Denver, Colorado 80202

**RE: Limited Subsurface Investigation
Rude Park Ballfield ADA Access Improvement
West Holden Place and South Federal Boulevard
Denver, Colorado
Environmental Quality Project Number: 2017-ESA-JOB-0028**

Dear Ms. Linger:

LT Environmental, Inc. (LTE) has prepared this limited subsurface (LSI) report for the Division of Environmental Quality (EQ) for Rude Park located at West Holden Place and South Federal Boulevard in Denver, Colorado (Figure 1, Site). The park is bounded by Lakewood Gulch to the north, West Holden on the south, and South Federal Boulevard on the west.

PROJECT UNDERSTANDING / SITE HISTORY

According to *Historically Jeffco, Flooding in Jefferson County*, Issue 35, dated 2014, a flood in 1909 scoured Lakewood Gulch in the area that is now Rude Park. Review of a 1933 aerial photograph depicted a flood-scoured area along much of the southern boundary of Lakewood Gulch in the location associated with the Site. The 1948 aerial photograph indicates that fill material of an unknown nature and source was used to bring the ground surface up to the approximate present-day grades. By 1969, the baseball field and one of the recreation center buildings were present on and adjacent to the Site.

As part of construction preplanning a geotechnical engineering study for Rude Park. The results were detailed in the *Geotechnical Engineering Study, Proposed Rude Park ADA Improvements, West Holden and Federal Boulevard, Denver, Colorado*, dated March 2, 2016. The geotechnical engineering study included installing four soil borings, ranging in depth from 5 feet to 6 feet below ground surface (bgs). Fill material was noted in three of the four soil borings, ranging in thickness from 1 foot to 4 feet. The fill was described as overlaying lean clay or clayey sand soil. No indications of debris being present within the fill material were described by Kumar.

As part of preparing the Proposal for Limited Subsurface Investigation (Exploratory Trenching), LTE was provided and reviewed the *Rude Park Ballfield and Access Improvements*, Bid Documents dated March 31, 2017, prepared by Studio CPG and the *Draft Materials Management*





Plan Rude Park Ballfield and Access Improvements, West Holden and Federal Boulevard, Denver, Colorado report prepared by LTE, dated February 2017.

The main excavation activities at the Site were clearing and grubbing existing turf, removing existing concrete and asphalt for installing spread footers and other foundational features related to a retaining wall, stairs, fence posts, and foul poles and for planting new trees and shrubs.

LIMITED SUBSURFACE INVESTIGATION FIELD ACTIVITIES

Prior to initiating the field program, LTE acquired the necessary access and utility clearances to conduct the LSI. The tasks associated with LSI preparation included: conducting one site visit with City and County of Denver Parks and Recreation (Parks) staff to delineate the locations of the proposed park improvements for utility clearance. Parks required that a temporary construction access permit (TCAP) be obtained as part of this LSI.

Exploratory Trenches

LTE completed 18 test trenches for the following proposed features related to the park renovations.

- Clearing and grubbing existing turf;
- Removing existing concrete and asphalt for installing spread footers and other foundational features related to a retaining wall, stairs, fence posts, and foul poles;
- Installing concrete footers for a new fence, foul poles, and scoreboard; and
- Evaluating observed fill material of an unknown nature and source that was likely historically placed at the Site after the historic flooding.

The locations of the exploratory trenches were field marked by LTE personnel (Figure 2).

The trenches were installed on December 6 and 7, 2017, by Hudspeth and Associates, Inc. using a mini-excavator and did not exceed a depth of 10.0 feet bgs. Generally, for each trench, the field procedures were as follows.

1. The existing sod was removed first using the mini-excavator then set aside.
2. Sloping and benching was completed in each trench.
3. Subsurface soil was then removed from the trench location and placed on 10-mil polyethylene (poly) sheeting to limit damage to surrounding sod.

The excavated soil was observed by a qualified LTE staff-level environmental scientist who is a Colorado Department of Public Health and Environment (CDPHE)-certified asbestos building inspector (CABI) and who meets the qualification requirements as outlined in the CDPHE-Air





Quality Control Commission Regulation No. 8 (5 Code of Colorado Regulations (CCR) 1001-10, Part B). A copy of Mr. Jayson Evangelista's CABI certification is included as Attachment 1.

As the trenches were advanced, continuous observation of the soil was made. LTE made observations of the excavated soil and recorded the soil descriptions according to the Unified Soil Classification System (USCS). These observations included depth, soil lithological description, and environmental impacts including staining and odor. LTE screened the excavated soil for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID). Prior to use, the PID was calibrated following LTE equipment calibration standard operating procedures (SOP). LTE made observations for debris and ash mixed with suspect debris that would meet the definition of regulated asbestos contaminated soil (RACS). Table 1 provides summary of the soil lithology, general observations made, PID readings, and photographs illustrating soil observed during the LSI.

At completing each trench, LTE restored the disturbed park areas to match surrounding grades as follows.

1. The excavated soil was placed back in the trench and compacted initially as well as could be achieved using the mini-excavator. The top four feet of each trench was then compacted using a wheel roller on the mini-excavator. Compaction testing was completed in two foot lifts. The compaction testing results are presented as Attachment 2.
2. Exposed soil atop each trench at the ground surface was then stabilized using an erosion control blanket.

Suspect Sample Collection and Analysis

LTE observed potential environmental impacts such as staining, odors, debris, and/or suspect debris mixed with ash that may have contained asbestos. Organic vapor concentrations in the soil as measured with the PID, were measured from 0.0 to 1.1 parts per million (ppm). Ten samples were collected for analysis as part of the LSI. Samples of debris and ash were collected in accordance with Colorado Solid Waste Regulations 6 CCR 1007-2, Part 1, Appendix 5A and submitted for analysis by polarized light microscopy (PLM).

LTE observed suspect construction debris mixed with black ash-like material in the subsurface that may be considered suspect for asbestos and/or stained non-native fill. LTE observed black ash-like material within Trench 5 from approximately 0.5 feet to 1 feet bgs, Trench 6 from approximately 0.5 feet to 3 feet bgs, and in Trench 8 from approximately 0.5 feet to 4 feet bgs. Additionally, construction debris including red brick, wood, and glassware was encountered in Trench 5 from approximately 0.5 feet to 2 feet bgs, in Trench 6 from approximately 0.5 feet to 3 feet bgs, in Trench 7 from approximately 0.5 feet to 4 feet bgs, and in Trench 8 from approximately 0.5 feet to 4 feet bgs. LTE observed black stained non-native fill that was not considered to be ash in nature in Trench 7 from 1.5 feet to 4 feet bgs. Suspect materials best identified as plaster were observed in Trench 8 Material considered to be suspect for asbestos as well as the non-native ash-





like material was submitted for laboratory analysis for asbestos, to determine if it would be considered RACS.

The samples selected for laboratory analysis and the rationale for choosing a sample for analysis are summarized in the following table.

SOIL SAMPLE SELECTION TABLE			
Sample ID	Sample Depth	Observations	Selection Rationale
Trench 5-SS01@12"	1 foot bgs	Black non-native fill material with coal ash and non-suspect construction debris.	Verify chemical impacts to observed material.
Trench 6-SS02@12"	1 foot bgs	Red and flakey Non-native fill mixed with coal ash and red brick.	Verify chemical impacts to observed material.
Trench 6-SS03@3.5'	3.5 feet bgs	Black stained non-native fill with a hydrocarbon odor.	Verify chemical impacts to observed material.
Trench 6-SS04@6'	6 feet bgs	Black stained sand with a hydrocarbon odor.	Verify chemical impacts to observed material.
Trench 8-SS05@2'	2 feet bgs	Native soil mixed with coal ash, brick, and other construction debris.	Verify chemical impacts to observed material.
Trench 5-SS01-Ash	1 foot bgs	Non-native fill with coal ash, white fibrous material, and red brick.	Verify asbestos content of ash-like material observed.
Trench 6-SS02-Ash	1 foot bgs	Red non-native fill, mixed with coal ash and red brick.	Verify asbestos content of ash-like material observed.
Trench 8-SS03-Ash	3 feet bgs	Native soil mixed with coal ash, brick, and other construction debris.	Verify asbestos content of ash-like material observed.





SOIL SAMPLE SELECTION TABLE			
Sample ID	Sample Depth	Observations	Selection Rationale
Trench 8-PL1-01	1 foot bgs	Plaster-like material observed mixed with other construction debris.	Verify asbestos content of suspect material observed.
Trench 8-ACM1-01	3.6 feet bgs	Suspect asbestos containing building material mixed with other construction debris.	Verify asbestos content of suspect material observed.

LTE collected the samples in labeled, laboratory-provided sample containers, which were placed on ice in secured coolers, for delivery under chain-of-custody protocol to Origins Laboratory, Inc. (Origins) of Denver, Colorado, for laboratory analysis. Soil samples were analyzed for VOCs and total petroleum hydrocarbons (TPH) gasoline range organics (GRO) by United States Environmental Protection Agency (USEPA) Method 8260C, Resource Conservation and Recovery Act (RCRA) metals by USEPA Methods 6010C and 7471A, and TPH-diesel range organics (DRO) by USEPA Method 8015. Analytical results are presented in Table 2, and in the laboratory analytical report included in Appendix A. Materials considered to be suspect for asbestos were submitted to Reservoirs Environmental, Inc. (Reservoirs) of Denver, Colorado, for laboratory analysis. Samples were analyzed using Polarized Light Microscopy (PLM) analysis. Analytical results are presented in Table 2 and the asbestos laboratory analytical report is included as Attachment 3.

LIMITED SUBSURFACE INVESTIGATION ANALYTICAL RESULTS

The soil and asbestos analytical results for material sampled from Trenches 5, 6, and 8 are presented on Figure 3 and Table 2 presents the comparisons to USEPA Regional Screening Levels (RSLs) for residential land use, to Table 1A Section 8 CDPHE Hazardous Materials and Waste Management Division 6 CCR 1007- Part 1 *Regulations Pertaining to Solid Waste Sites and Facilities* (Beneficial Use), and to the CDPHE Ground Water Risk-based Protection Levels – Risk Based (GW-RBPL).

It is generally accepted that contaminant concentrations that are compliant with both the USEPA residential RSLs and the CDPHE GW-RBPLs standards are appropriate for unrestricted reuse. In addition, unrestricted reuse requires compliance with Table 1A, Section 8 of 6 CCR 1007-2 Part 1 *Regulations Pertaining to Solid Waste Sites and Facilities*, unless a Beneficial Use Permit is obtained from CDPHE.





Non-native and Ash-like Material Sample Results

During the investigation, non-native fill and or ash-like materials and suspect miscellaneous building material were encountered in Trenches 5, 6, 7, and 8. Laboratory analytical results for Trench 5-SS01@12", Trench 6-SS02@12", Trench 6-SS03@3.5', Trench 6-SS04@6', and Trench 8-SS05@2' indicated metal concentrations above the laboratory reporting limits however, with the exception of arsenic and barium, were not reported at concentrations that exceed the USEPA residential RSLs. The arsenic concentrations ranged from 4.19 milligrams per kilogram (mg/kg) through 6.85 mg/kg, respectively, which exceeded the USEPA residential RSL of 0.68 mg/kg for arsenic. Barium was detected in Trench 8-SS05@2' at concentration of 1,510 mg/kg. VOCs were not reported above the laboratory reporting limit with the exception of methylene chloride for samples collected from Trenches 5 and 8; however, concentrations did not exceed the USEPA residential RSL of 35 mg/kg for methylene chloride.

TPH-GRO and -DRO were not reported above the laboratory reporting limit for the samples collected, and therefore none of the collected samples were further analyzed for polycyclic aromatic hydrocarbons (PAHs). This does not mean that low-level PAHs are not present in the non-native fill or ash-like material observed as part of the LSI.

Asbestos Bulk Sample Results ASBESTOS BULK SAMPLE RESULTS

Five soil samples of ash-like material, which was either mixed with construction debris or suspect asbestos-containing materials, as well as suspect building materials were submitted for PLM analysis. The five samples were determined to be non-detect for asbestos content. Figure 4 presents the asbestos sample results.

CONCLUSIONS AND RECOMMENDATIONS

Following review of the LSI results, LTE has the following conclusions.

- LTE observed indications of potential environmental impacts such as non-native fill and ash-like material, or debris and/or suspect debris as part of the LSI, as a result ten samples were collected for laboratory analytical analysis.
- In general, non-native fill and ash-like material or debris and/or suspect debris were observed in four trenches, which generally were located from the center outfield portion of the ballfield toward the first base line. Work in this area generally consists of grubbing of sod and structural features for a new fence, scoreboards, and foul pole.
- Arsenic concentrations in each of the collected soil samples exceeded the USEPA residential RSL of 0.68 mg/kg. However, published evaluations of arsenic concentrations in Denver-area soil (e.g., *Assessment of Geochemical Variability and a Listing of Geochemical Data for Surface Soils of the Front Range Urban Corridor, Colorado*, Servers and Tourtelot, 1994) have identified background concentrations at levels exceeding the USEPA residential RSL. Consequently, in June 2010, CDPHE





issued the policy document, *Arsenic Concentrations in Soil, Risk management guidance for evaluating*. The purpose of the guidance document is to assist in the evaluation of arsenic data when arsenic is not a suspected contaminant. The guidance includes a decision flow path to determine if arsenic is a contaminant requiring special management and establishes a regional background concentration of 11 mg/kg. None of the laboratory analytical results exceeded 11 mg/kg.

- Barium was identified in sample Trench 8-SS05 @2' at concentrations of 1,510 mg/kg.
- No TPH-GRO or -DRO was detected above the laboratory reporting limits for the samples collected.
- None of the bulk samples submitted for PLM analysis were found to contain asbestos.

Following review of the LSI results, LTE has the following recommendations.

- The previously prepared draft materials management plan (MMP) be updated to reflect the findings of this LSI.
- These LSI findings should be included as part of the MMP.

LIMITATIONS

No investigation is infallible. Some uncertainty will always exist concerning the presence or absence of potential contaminants at a particular property, irrespective of the rigor of the investigation. Accordingly, LTE does not warrant that contaminants, other than those identified in this report, do not exist at the subject property or may not exist there in the future.

LTE believes that it has performed the services summarized in this report in a manner consistent with the level of care and skill ordinarily exercised by members of the environmental profession practicing at the same time and under similar conditions in the area of the project.





CLOSING

LTE appreciates the opportunity to assist with this project. If you have questions or comments regarding the content of this report, please contact the undersigned at 303-433-9788.

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in blue ink that reads 'Racheal Tury'. The signature is fluid and cursive, with the first name being more prominent.

Racheal Tury
Staff Geologist

A handwritten signature in black ink that reads 'Nick Talocco'. The signature is bold and stylized, with a prominent horizontal stroke at the end.

Nick Talocco, P.E.
Senior Engineer

Attachments:

Figure 1 – Site Location Map

Figure 2 – Site Map

Figure 3 – Soil Analytical Results

Figure 4 – Bulk Asbestos Sample Results

Table 1 – Exploratory Summary Table

Table 2 – Soil Analytical Results

Attachment 1 – LTE Asbestos Certifications

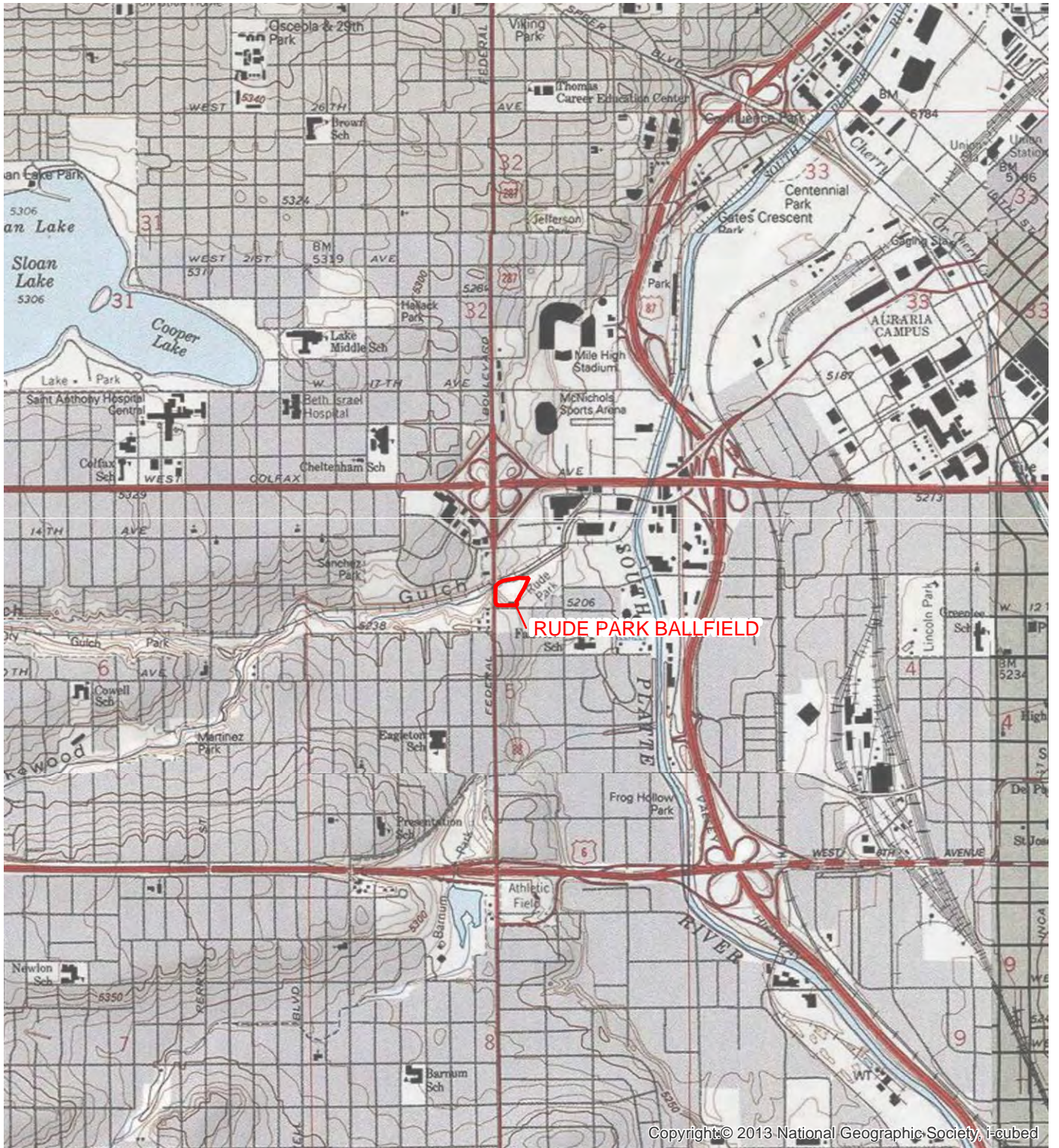
Attachment 2 – Soil Compaction Test Results

Attachment 3 – Soil Laboratory Analytical Report



FIGURES





Copyright © 2013 National Geographic Society, i-cubed
 IMAGE COURTESY OF ESRI/USGS

LEGEND

 APPROXIMATE SITE BOUNDARY

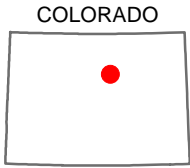
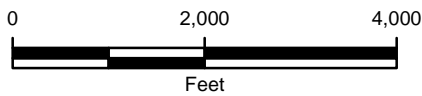


FIGURE 1
 SITE LOCATION MAP
 RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
 DENVER, COLORADO

CITY AND COUNTY OF DENVER



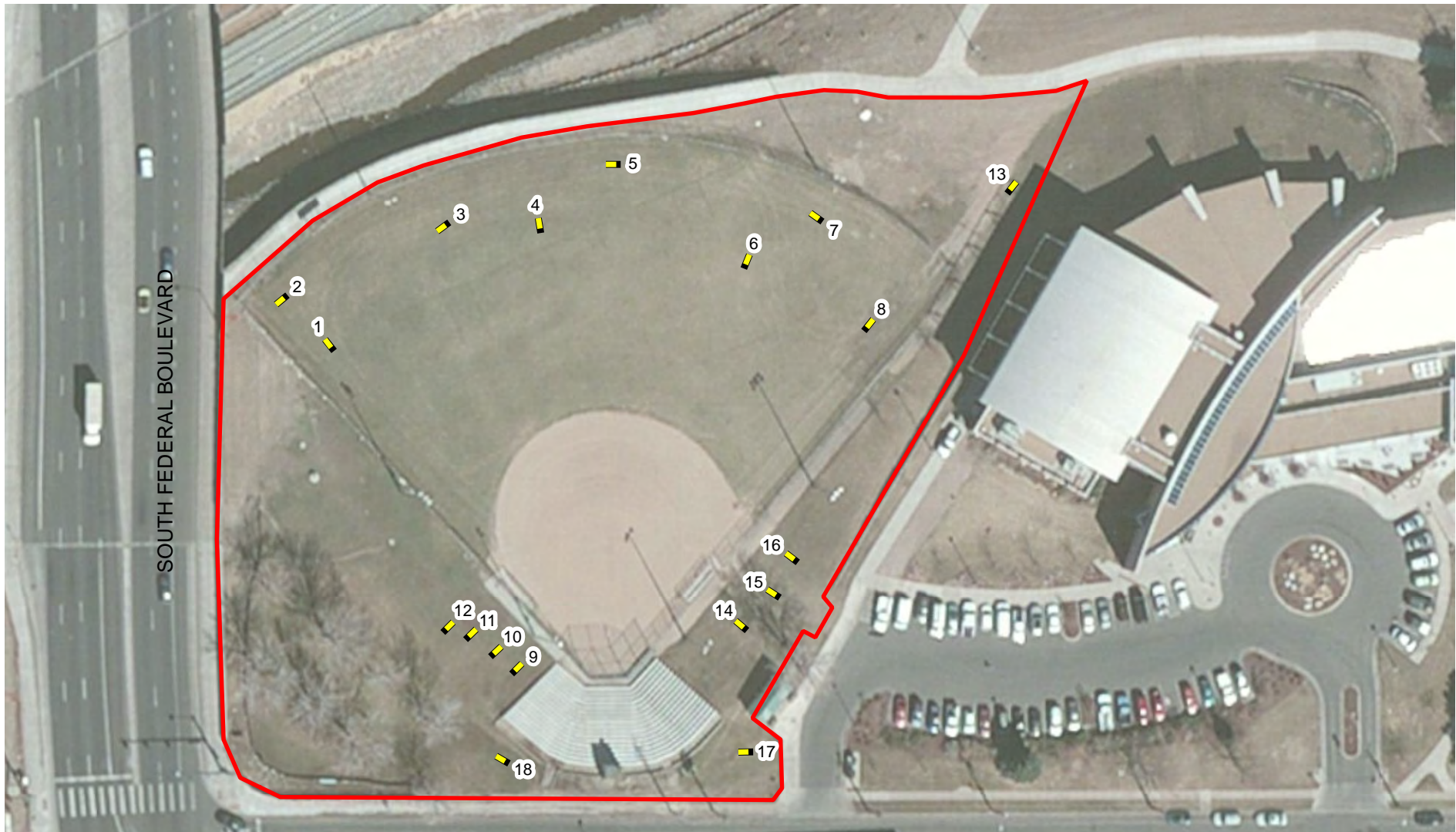



IMAGE COURTESY OF ESRI

LEGEND

 4' X 8' TRENCH

 SITE BOUNDARY

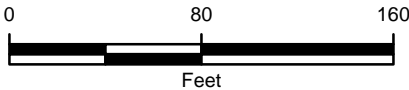
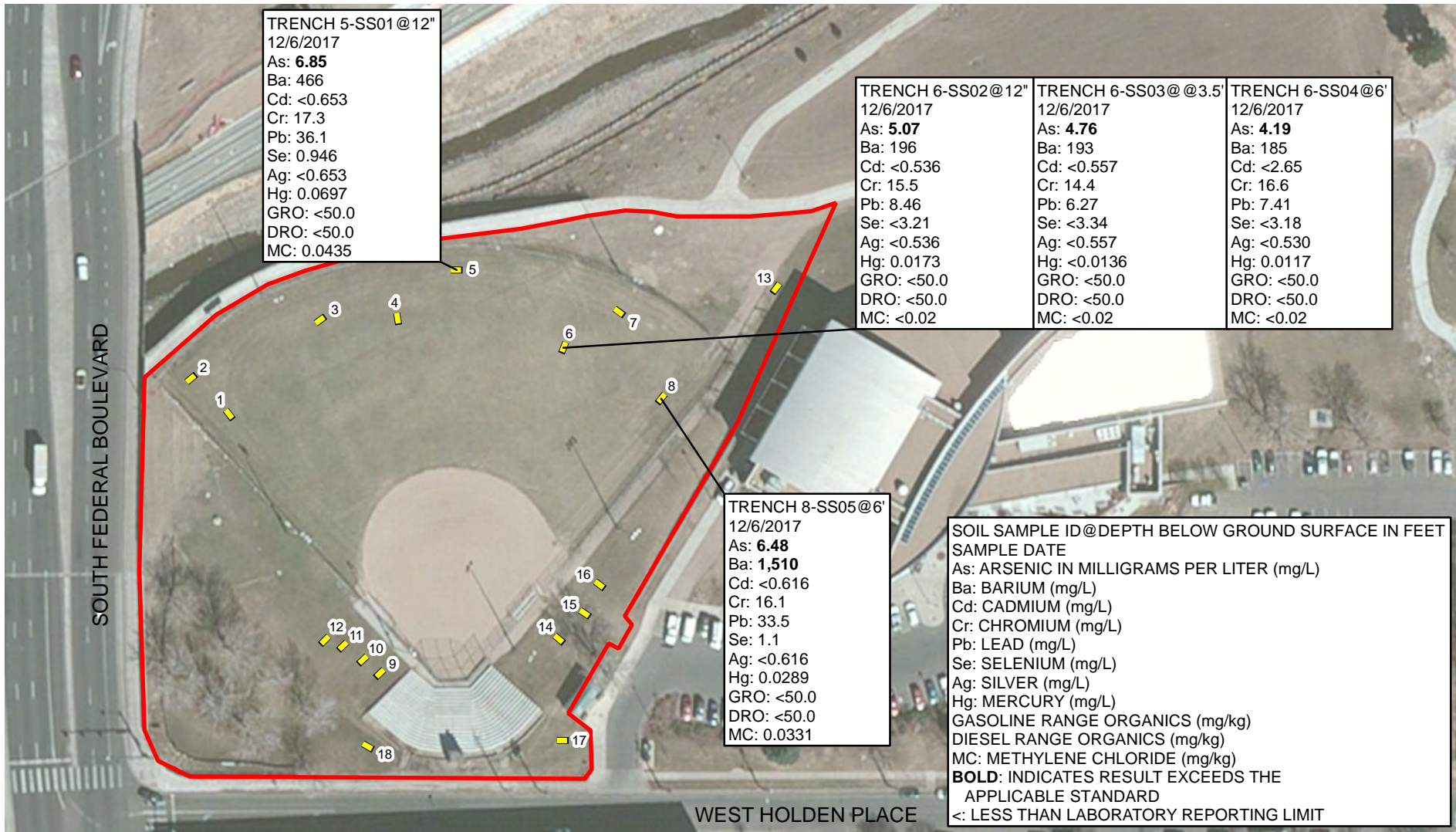


FIGURE 2
SITE MAP
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO

CITY AND COUNTY OF DENVER





TRENCH 5-SS01@12"
 12/6/2017
 As: **6.85**
 Ba: 466
 Cd: <0.653
 Cr: 17.3
 Pb: 36.1
 Se: 0.946
 Ag: <0.653
 Hg: 0.0697
 GRO: <50.0
 DRO: <50.0
 MC: 0.0435

TRENCH 6-SS02@12"
 12/6/2017
 As: **5.07**
 Ba: 196
 Cd: <0.536
 Cr: 15.5
 Pb: 8.46
 Se: <3.21
 Ag: <0.536
 Hg: 0.0173
 GRO: <50.0
 DRO: <50.0
 MC: <0.02

TRENCH 6-SS03@3.5"
 12/6/2017
 As: **4.76**
 Ba: 193
 Cd: <0.557
 Cr: 14.4
 Pb: 6.27
 Se: <3.34
 Ag: <0.557
 Hg: <0.0136
 GRO: <50.0
 DRO: <50.0
 MC: <0.02

TRENCH 6-SS04@6"
 12/6/2017
 As: **4.19**
 Ba: 185
 Cd: <2.65
 Cr: 16.6
 Pb: 7.41
 Se: <3.18
 Ag: <0.530
 Hg: 0.0117
 GRO: <50.0
 DRO: <50.0
 MC: <0.02

TRENCH 8-SS05@6"
 12/6/2017
 As: **6.48**
 Ba: **1,510**
 Cd: <0.616
 Cr: 16.1
 Pb: 33.5
 Se: 1.1
 Ag: <0.616
 Hg: 0.0289
 GRO: <50.0
 DRO: <50.0
 MC: 0.0331

SOIL SAMPLE ID@DEPTH BELOW GROUND SURFACE IN FEET
 SAMPLE DATE
 As: ARSENIC IN MILLIGRAMS PER LITER (mg/L)
 Ba: BARIUM (mg/L)
 Cd: CADMIUM (mg/L)
 Cr: CHROMIUM (mg/L)
 Pb: LEAD (mg/L)
 Se: SELENIUM (mg/L)
 Ag: SILVER (mg/L)
 Hg: MERCURY (mg/L)
 GASOLINE RANGE ORGANICS (mg/kg)
 DIESEL RANGE ORGANICS (mg/kg)
 MC: METHYLENE CHLORIDE (mg/kg)
BOLD: INDICATES RESULT EXCEEDS THE APPLICABLE STANDARD
 <: LESS THAN LABORATORY REPORTING LIMIT

LEGEND

- 4' X 8' TRENCH
- SITE BOUNDARY

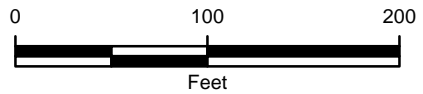


IMAGE COURTESY OF ESRI

FIGURE 3
SOIL ANALYTICAL RESULTS
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO

CITY AND COUNTY OF DENVER



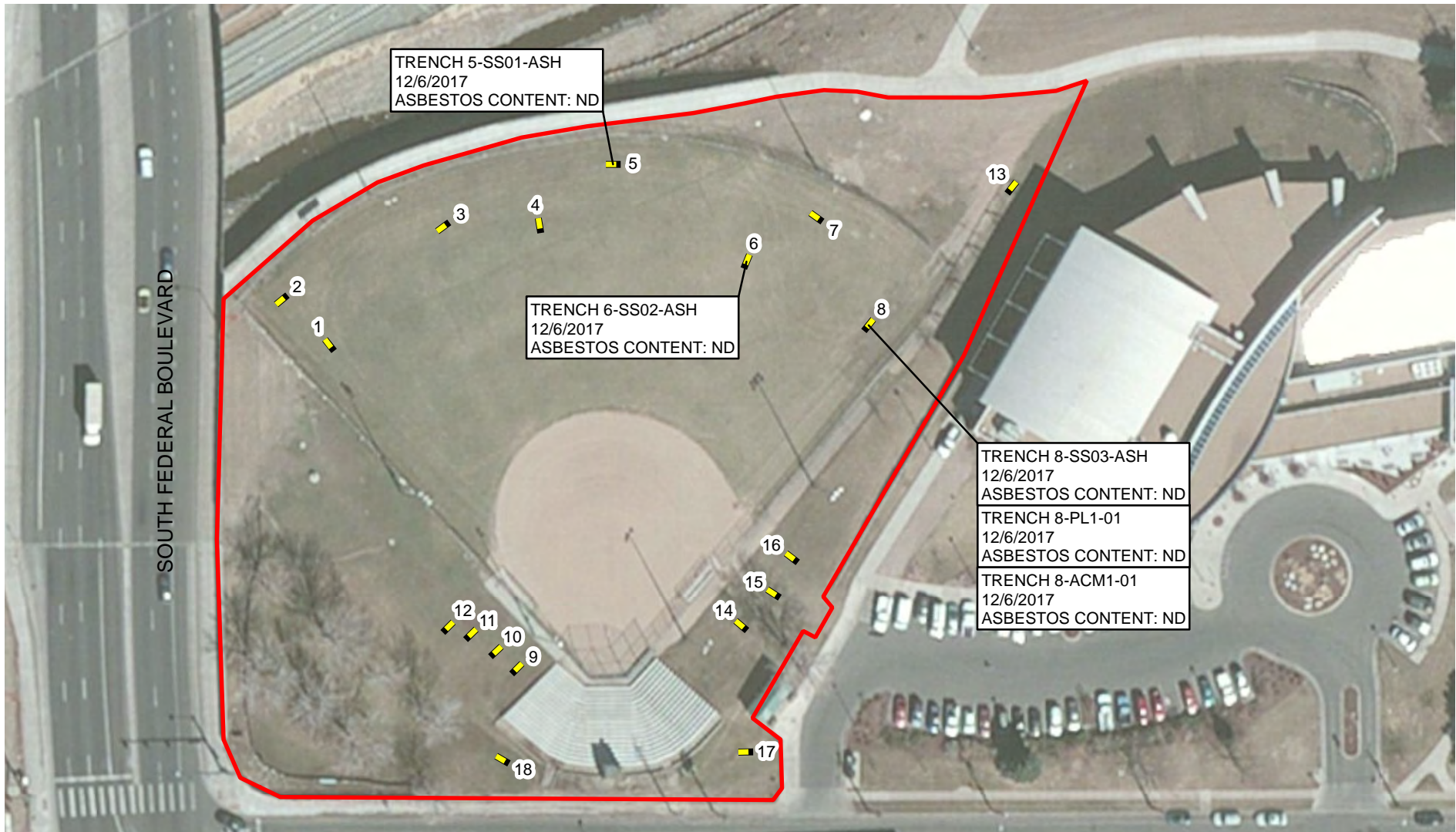



IMAGE COURTESY OF ESRI

LEGEND

 4' X 8' TRENCH

 SITE BOUNDARY

SAMPLE ID
 SAMPLE DATE
 ND: NONE DETECTED

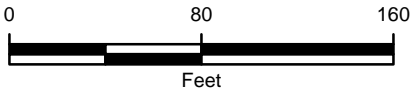


FIGURE 4
 BULK ASBESTOS SAMPLE RESULTS
 RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
 DENVER, COLORADO

CITY AND COUNTY OF DENVER






TABLES



**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 1

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS	No Photo Available	No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS	No Photo Available	No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS	No Photo Available	No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS	No Photo Available	No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
4'-5' BGS		No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
5'-6' BGS	No Photo Available	No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6'-7' BGS	No Photo Available	No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
7'-8' BGS		No debris, clean fill, no stain, no odor	Sand/clay mix	0.0	No samples collected	No samples collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO

SUMMARY TRENCH 2

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
1'-2' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
2'-3' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
3'-4' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
4'-5' BGS	No Photo Available	Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
5'-6' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
6'-7' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
7'-8' BGS	No Photo Available	Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
8'-9' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
9'-10' BGS		Clean fill with no debris, no stain, no odor	Sand/Clay Mix	0.0	No samples collected	No samples collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**


SUMMARY TRENCH 3

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS	No Photo Available	Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
4'-5' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
5'-6' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6'-6.5' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No samples collected	No samples collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**




SUMMARY TRENCH 4

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS	No Photo Available	Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		No Photo Available	Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected
4'-5' BGS	No Photo Available	Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
5'-6' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6'-6.5' BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**



SUMMARY TRENCH 5

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Clean fill with no debris, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6" - 1' BGS		Black stained non-native fill with coal ash, and red brick mixed throughout	Black non native fill with coal ash	0.55	No sample collected	Trench 5-SS01-ASH (ACM soil sample)
1'-2' BGS		Brick foundation refusal	Black non native fill with coal ash	0.55	Trench 5-SS01@ 12	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**


SUMMARY TRENCH 6

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Clean Topsoil, no stain, no odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Red colored flakey non-native fill mixed with coal ash and red brick	Medium clay mixed with debris and ash.	0.45	Trench 6-SS02@12"	Trench 6-SS02-ASH (ACM soil sample)
1'-2' BGS		Red colored flakey non-native fill mixed with coal ash and red brick	Medium clay mixed with debris and ash.	0.45	No sample collected	No sample collected
2'-3' BGS		Red colored flakey non-native fill mixed with coal ash and red brick	Medium clay mixed with debris and ash.	0.5	No sample collected	No sample collected
3'-4' BGS		Black stained fill with slight odor	Sand/Clay Mix	0.0	Trench 6-SS03@3.5'	No sample collected
4'-5' BGS		Black stained fill with slight odor	Sand/Clay Mix	0.0	No sample collected	No sample collected
5'-6' BGS		Black stained fill with slight odor	Coarse non-native sand	0.0	Trench 6-SS04@6'	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 7

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Clean topsoil no debris	sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Brown fill with red brick throughout	sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Brown fill with red brick throughout along with charred wood	sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Brown fill with red brick throughout along with charred wood	sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with red brick foundation with charred wood, refusal.	sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 8

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Clean fill with red brick, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill mixed with coal ash along with brick and other debris	Sand/clay mix	0.0	No sample collected	Trench 8-PL1-01 (Plaster, Friable)
1'-2' BGS		Fill mixed with coal ash along with brick and other debris	Sand/clay mix	0.0	Trench 8-SS05@2'	Trench 8-SS03-ASH (Coal ash soil sample)
2'-3' BGS		Fill mixed with coal ash along with brick and other debris	Sand/clay mix	0.0	No sample collected	Trench 8-ACM1-01 (unidentified building material, Non-Friable)
3'-4' BGS		Fill mixed with coal ash along with brick and other debris. Refusal at 3.6' BGS	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**



SUMMARY TRENCH 9

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**






SUMMARY TRENCH 10

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS	No Photo Available	Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 11

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 12

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with red brick, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with red brick, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 13

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, irrigation line strike which was inspected and repaired prior to backfill, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**


SUMMARY TRENCH 14

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS	No Photo Available	Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS	No Photo Available	Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**


SUMMARY TRENCH 15

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**

SUMMARY TRENCH 16

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
DENVER, COLORADO**


SUMMARY TRENCH 17

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million

**TABLE 1
EXPLORATORY SUMMARY TABLE
SUMMARY TRENCH 18**

**RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
WEST HOLDEN PLACE AND SOUTH FEDERAL BOULEVARD
CITY AND COUNTY OF DENVER, COLORADO**

DEPTH	PHOTO	OBSERVATIONS	SOIL TYPE	PID READING (ppm)	SOIL SAMPLE I.D.	MATERIAL I.D.
0'-6" BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
6 Inches - 1' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
1'-2' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
2'-3' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected
3'-4' BGS		Fill with no debris encountered, no stain, no odor	Sand/clay mix	0.0	No sample collected	No sample collected

Notes:
 (') - feet
 (") - inches
 ACM - asbestos-containing material
 BGS - below grade surface
 I.D. - identification
 ND - non-detect
 PID - photo-ionization detector
 ppm - parts per million



TABLE 2
SOIL ANALYTICAL RESULTS

RUDE PARK BALLFIELD ADA ACCESS IMPROVEMENT
WEST HOLDEN PLACE AND SOUTH FEDERAL BOULEVARD
CITY AND COUNTY OF DENVER, COLORADO

Analyte	Units	Residential RSL	Beneficial Use	GW Protection Level (Risk-Based)	Trench 5-SS01 @12"	Trench 6-SS02 @12"	Trench 6-SS03 @3.5'	Trench 6-SS04 @6'	Trench 8-SS05 @6'
Total Metals									
Arsenic	mg/kg	0.68	0.68	NPS	6.85	5.07	4.76	4.19	6.48
Barium	mg/kg	15000	15000	NPS	466	196	193	185	1510
Cadmium	mg/kg	NPS	71	NPS	<0.653	<0.536	<0.557	<2.65	<0.616
Chromium	mg/kg	NPS	120000	NPS	17.3	15.5	14.4	16.6	16.1
Lead	mg/kg	400	400	NPS	36.1	8.46	6.27	7.41	33.5
Selenium	mg/kg	390	390	NPS	0.946	<3.21	<3.34	<3.18	1.1
Silver	mg/kg	390	390	NPS	<0.653	<0.536	<0.557	<0.530	<0.616
Mercury	mg/kg	11	11	NPS	0.0697	0.0173	<0.0136	0.0117	0.0289
TPH									
TVPH-GRO	mg/kg	NPS			<50.0	<50.0	<50.0	<50.0	<50.0
TEPH-DRO	mg/kg	NPS			<50.0	<50.0	<50.0	<50.0	<50.0
Volatile Organic Compounds									
1,1,1,2-Tetrachloroethane	mg/kg	2	NPS	0.16	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1-Trichloroethane	mg/kg	8100	NPS	62	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	mg/kg	0.6	NPS	0.0024	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	mg/kg	1.1	NPS	0.038	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethane	mg/kg	3.6	NPS	1.8	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethene	mg/kg	230	NPS	12	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloropropene	mg/kg	NPS	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
1,2,3-Trichlorobenzene	mg/kg	63	NPS	NPS	<0.005	<0.005	<0.005	<0.005	<0.005
1,2,3-Trichloropropane	mg/kg	0.0051	NPS	4.80E-04	<0.005	<0.005	<0.005	<0.005	<0.005
1,2,4-Trichlorobenzene	mg/kg	24	NPS	13	<0.005	<0.005	<0.005	<0.005	<0.005
1,2,4-Trimethylbenzene	mg/kg	300	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dibromo-3-Chloropropane	mg/kg	0.0053	NPS	0.002	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromoethane	mg/kg	0.036	NPS	0.00018	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichlorobenzene	mg/kg	1800	NPS	57	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	mg/kg	0.46	NPS	0.0036	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloropropane	mg/kg	2.5	NPS	0.0087	<0.002	<0.002	<0.002	<0.002	<0.002
1,3,5-Trimethylbenzene	mg/kg	270	NPS	23	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	mg/kg	NPS	NPS	8.5	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichloropropane	mg/kg	1600	NPS	0.084	<0.002	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	mg/kg	2.6	NPS	7.8	<0.002	<0.002	<0.002	<0.002	<0.002
2,2-Dichloropropane	mg/kg	NPS	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
2-Butanone	mg/kg	27000	NPS	18	<0.01	<0.01	<0.01	<0.01	<0.01
2-Chlorotoluene	mg/kg	1600	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
2-Hexanone	mg/kg	200	NPS	0.21	<0.01	<0.01	<0.01	<0.01	<0.01
4-Chlorotoluene	mg/kg	1600	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
4-Isopropyltoluene	mg/kg	NPS	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
4-Methyl-2-Pentanone	mg/kg	54000	NPS	3.3	<0.01	<0.01	<0.01	<0.01	<0.01
Acetone	mg/kg	61000	NPS	32	<0.02	<0.02	<0.02	<0.02	<0.02
Benzene	mg/kg	1.2	NPS	0.17	<0.002	<0.002	<0.002	<0.002	<0.002
Volatile Organic Compounds									
Bromobenzene	mg/kg	290	NPS	3	<0.002	<0.002	<0.002	<0.002	<0.002
Bromochloromethane	mg/kg	150	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Bromodichloromethane	mg/kg	0.29	NPS	0.007	<0.002	<0.002	<0.002	<0.002	<0.002
Bromoform	mg/kg	19	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Bromomethane	mg/kg	6.8	NPS	0.16	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Disulfide	mg/kg	770	NPS	1000	<0.005	<0.005	<0.005	<0.005	<0.005
Carbon Tetrachloride	mg/kg	0.65	NPS	1.704	<0.002	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	mg/kg	280	NPS	5.3	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroethane	mg/kg	14000	NPS	NPS	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroform	mg/kg	0.32	NPS	0.085	<0.002	<0.002	<0.002	<0.002	<0.002
Chloromethane	mg/kg	110	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Cis-1,2-Dichloroethene	mg/kg	160	NPS	0.261	<0.002	<0.002	<0.002	<0.002	<0.002
Cis-1,3-Dichloropropene	mg/kg	NPS	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Dibromochloromethane	mg/kg	8.3	NPS	0.11	<0.002	<0.002	<0.002	<0.002	<0.002
Dibromomethane	mg/kg	24	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	mg/kg	5.8	NPS	100	<0.002	<0.002	<0.002	<0.002	<0.002
Hexachlorobutadiene	mg/kg	1.2	NPS	0.17	<0.005	<0.005	<0.005	<0.005	<0.005
Iodomethane	mg/kg	NPS	NPS	NPS	<0.015	<0.015	<0.015	<0.015	<0.015
Isopropylbenzene	mg/kg	1900	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
M+P-Xylene	mg/kg	560	NPS	NPS	<0.004	<0.004	<0.004	<0.004	<0.004
Methyl Tertiary Butyl Ether	mg/kg	47	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Methylene Chloride	mg/kg	57	NPS	0.06	0.0435	<0.02	<0.02	<0.02	0.0331
Naphthalene	mg/kg	3.8	3.8	23	<0.01	<0.01	<0.01	<0.01	<0.01
N-Butylbenzene	mg/kg	3900	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
N-Propylbenzene	mg/kg	3800	NPS	77	<0.002	<0.002	<0.002	<0.002	<0.002
O-Xylene	mg/kg	650	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Sec-Butylbenzene	mg/kg	7800	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Styrene	mg/kg	6000	NPS	14	<0.002	<0.002	<0.002	<0.002	<0.002
Tert-Butylbenzene	mg/kg	7800	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Tetrachloroethene	mg/kg	24	NPS	1.9	<0.002	<0.002	<0.002	<0.002	<0.002
Toluene	mg/kg	4900	NPS	50	<0.002	<0.002	<0.002	<0.002	<0.002
Trans-1,2-Dichloroethene	mg/kg	1600	NPS	5.4	<0.002	<0.002	<0.002	<0.002	<0.002
Trans-1,3-Dichloropropene	mg/kg	NPS	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Trichloroethene	mg/kg	0.94	NPS	NPS	<0.002	<0.002	<0.002	<0.002	<0.002
Trichlorofluoromethane	mg/kg	23000	NPS	1000	<0.003	<0.003	<0.003	<0.003	<0.003
Vinyl Chloride	mg/kg	0.059	NPS	0.11	<0.002	<0.002	<0.002	<0.002	<0.002

Sample ID	Physical Description	Results
Trench 5-SS01-Ash	A - Black Soil	ND
Trench 6-SS02-Ash	A - Brown Soil	ND
Trench 8-SS03-Ash	A - Brown Soil	ND
Trench 8-PL1-01	A - Off White Granular Material	ND
Trench 8-ACM1-01	A - Off White Resinous Material	ND

Notes:

Residential RSL - Region 3 Residential Regional Screening Level, June 2017

Beneficial Use - Table 1A Section 8 Solid Waste Division/Hazardous Materials and Waste Management Division 6 CCR 1007-2 Part 1 Regulations Pertaining to Solid Waste Sites and Facilities

GW Protection Level (Risk-Based) - CDPHE, March 2014



ATTACHMENT 1
LTE ASBESTOS CERTIFICATIONS



STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado.

4300 Cherry Creek Dr. S. Laboratory Services Division
Denver, Colorado 80246-1530 8100 Lowry Blvd.
Phone (303) 692-2000 Denver, Colorado 80230-6928
Located in Glendale, Colorado (303) 692-3090

<http://www.colorado.gov/cdphe>



Colorado Department
of Public Health
and Environment

October 16, 2017

LT Environmental, Inc.
4600 W. 60th Ave.
Arvada, CO 80003

AC #: 16884

Thank you for submitting your Asbestos Consulting Firm registration form. We are pleased to add LT Environmental, Inc. to our online list of registered asbestos consulting firms to which we often refer the public when they are looking for asbestos consulting services.

As an Asbestos Consulting Firm, LT Environmental, Inc. has the responsibility to ensure that all employees are properly trained and certified when performing those activities included in the definition of Asbestos Consulting Firm in Regulation No. 8, Part B, Section I.B.13.

The submittal of your annual renewal application at least 30 days prior to your expiration date of 10/29/2018 will help ensure that your Colorado Asbestos Consulting Firm registration does not lapse.

Please call me at (303) 692-3158 if you have any questions regarding your Asbestos Consulting Firm registration.

Sincerely,

COLORADO DEPARTMENT OF PUBLIC HEALTH
AND ENVIRONMENT

Heidi S. Newbold
Certification Coordinator
Air Pollution Control Division
Indoor Environment Program

cc: fil ACF-16884



Colorado Department
of Public Health
and Environment

ASBESTOS CONSULTING FIRM

This certifies that

LT Environmental, Inc.

Registration No.: ACF - 16884

has met the registration requirements of 25-7-507, C.R.S. and the Air Quality Control Commission Regulation No. 8, Part B, and is hereby authorized to perform asbestos consulting activities as required under Regulation No 8, Part B, in the state of Colorado.

Issued: October 16, 2017

Expires: October 29, 2018

Authorized APCD Representative

SEAL



Colorado Department
of Public Health
and Environment

ASBESTOS CERTIFICATION*

This certifies that

Jayson Evangelista

Certification No.: 21544

has met the requirements of 25-7-507, C.R.S. and Air Quality Control
Commission Regulation No. 8, Part B, and is hereby certified by the
state of Colorado in the following discipline:

Building Inspector*

Issued: August 18, 2017

Expires: November 04, 2018

** This certificate is valid only with the possession of a
current Division-approved training course certification
in the discipline specified above.*


Authorized APCD Representative
SEAL

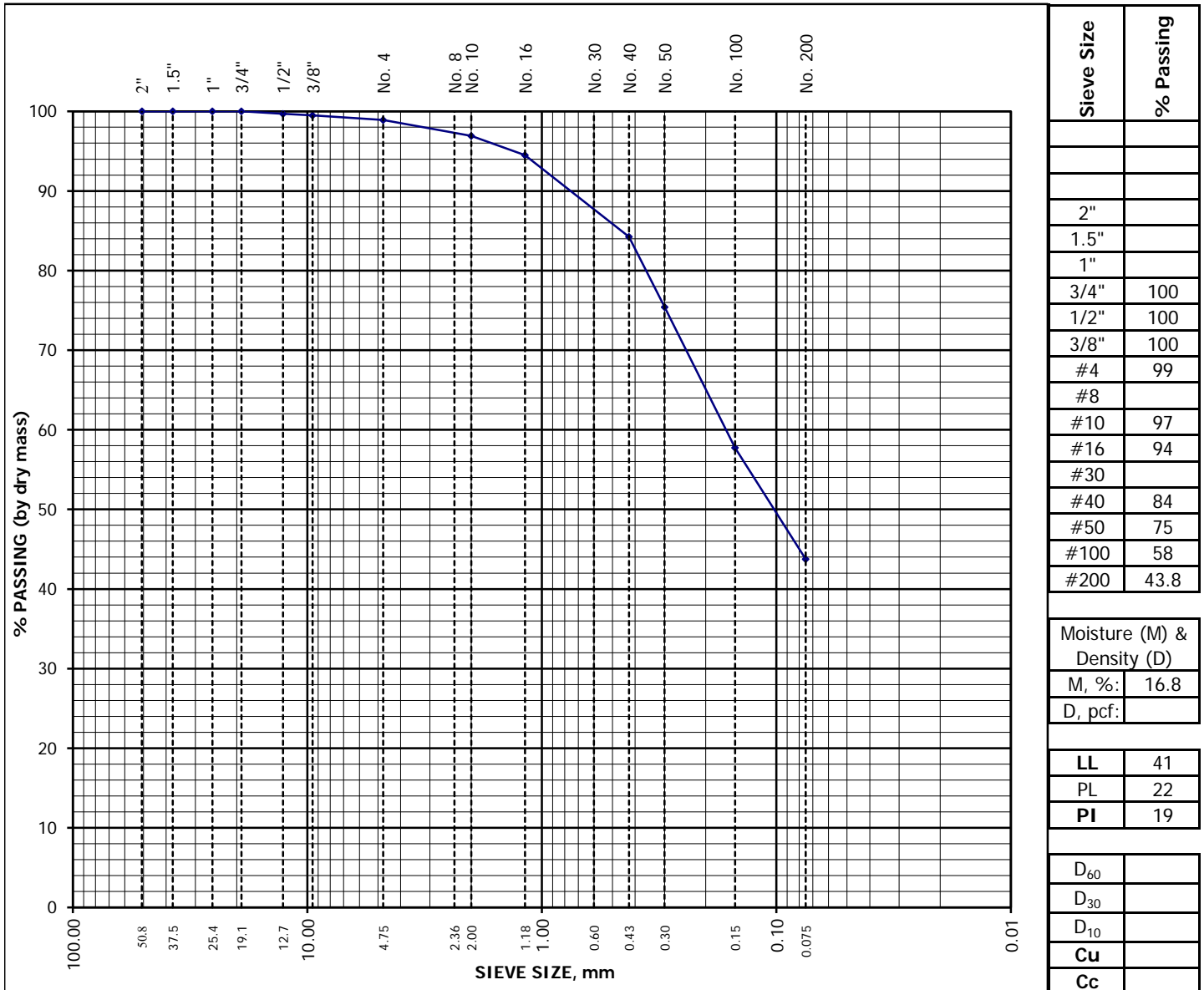
ATTACHMENT 2
SOIL COMPACTION TEST RESULTS



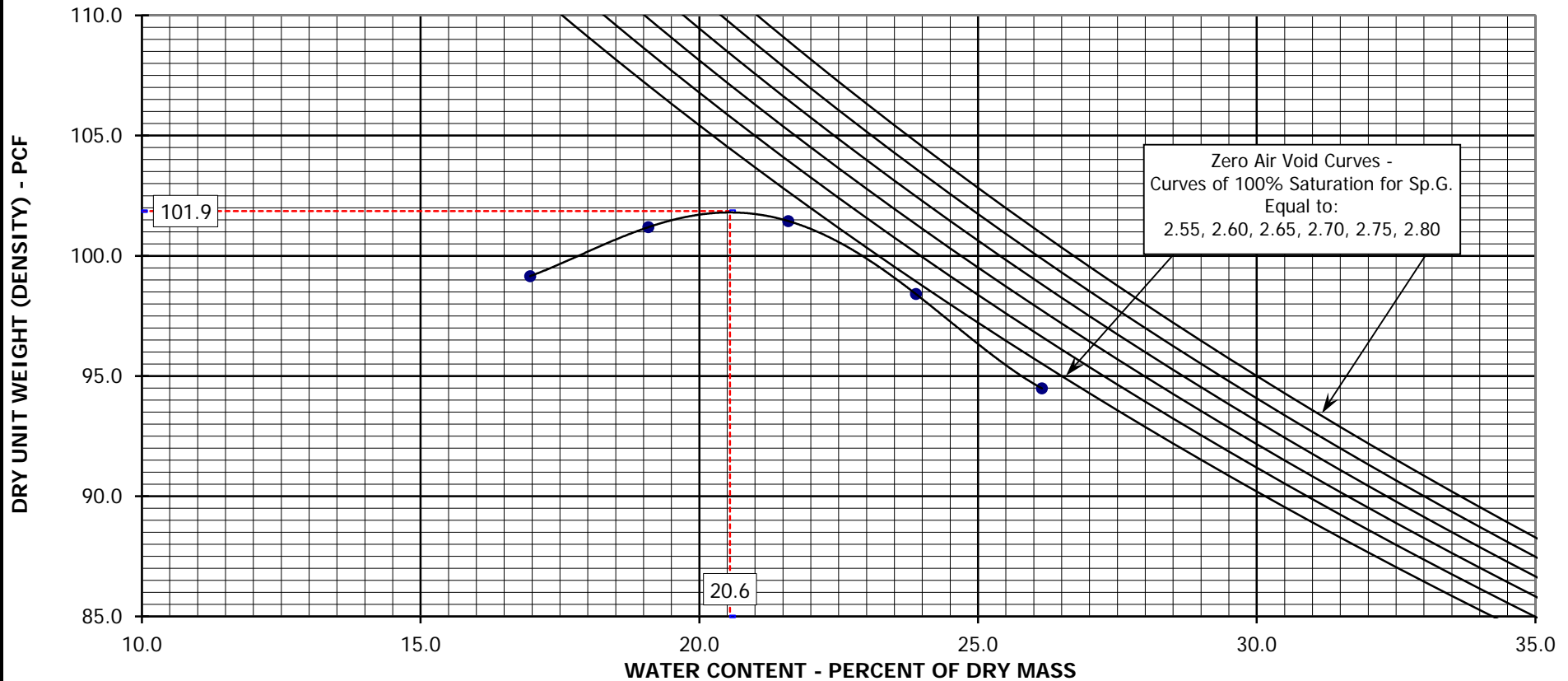
GRADATION PLOT - SOIL & AGGREGATE

Project Number: <u>17.210, LT Environmental</u>	Date: <u>2-Dec-17</u>
Project Name: <u>West Holden Place</u>	Technician: <u>J. Weinerth</u>
Lab ID Number: <u>1721823</u>	Reviewer: <u>J. Cuypers</u>
Sample Location: <u>Provided by LT Environmental</u>	
Visual Description: <u>SAND, clayey, brown</u>	

AASHTO M 145 Classification: A-7-6 **Group Index:** 4
Unified Soil Classification System
(ASTM D 2487): (SC) Clayey sand



Laboratory Maximum Dry Unit Weight (Density): 101.9 pcf
 Laboratory Optimum Moisture Content (OMC): 20.6 %



Sample Location	Elev. or Depth, ft	LL	PL	PI	-#200, %	Soil Description & Classification	Moisture/Density Relationship (Proctor) Test
Provided by LT Environmental	N/A	41	22	19	44	Visual: SAND, clayey, brown AASHTO: A-7-6(4) USCS: (SC) Clayey sand	Project Number: 17.210, LT Environmental Project Name: West Holden Place Drawn By: A. Wright Checked By: J. Cuypers Date: 4-Dec-17
						Tested by: Holiman/J. Weiner Date: 1-Dec-17 Lab ID Number: 1721823	



**FILL AND BACKFILL MOISTURE, DENSITY, AND
COMPACTION REPORT**

West Holden Place
Project No. 17.210
December 6, 2017

Probe Depth (in)	Test ID		Location of Test Test Pit Location on Baseball Field	Depth (ft)	Laboratory Values		Field Values		Compaction (%)	Minimum Required Compaction (%)	Material Tested and Proctor ID
	Daily Report No.	Test No.			MDD (pcf)	OMC (%)	DD (pcf)	MC (%)			
8	120617	1	Left field SE pit	4			111.4	10.7		95	No Proctor available, visual description: CLAY, brown, A-6
8	120617	2	Left field SE pit	2			109.7	11.6		95	No Proctor available, visual description: CLAY, brown, A-6
8	120617	3	Left field SE pit	0			107.9	7.7		95	No Proctor available, visual description: CLAY, brown, A-6
8	120617	4	Left field NW pit	3	101.9	20.6	95.9	20.8	94.1	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	5	Left field NW pit	1.5	101.9	20.6	97.5	16.6	95.7	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	6	Left field NW pit	0	101.9	20.6	98.3	19.3	96.5	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	7	Left center field	2.5			107.0	13.0		95	No Proctor available, visual description: SAND, with clay, A-2
8	120617	8	Left center field	1			105.9	11.2		95	No Proctor available, visual description: SAND, with clay, A-2
8	120617	9	Left center field	0			115.5	9.5		95	No Proctor available, visual description: SAND, with clay, A-2
8	120617	10	Center field	3			108.1	16.1		95	No Proctor available, visual description: SAND, with clay, A-2
8	120617	11	Center field	1			111.4	14.1		95	No Proctor available, visual description: SAND, with clay, A-2
8	120617	12	Center field	0			106.0	12.4		95	No Proctor available, visual description: SAND, with clay, A-2

Part-time observation
 Full-time observation

Contractor's Equipment Used:
 Backhoe
 Water trailer

Moisture Specification: ±2% of OMC

Field Notes: Materials encountered in left field pit 1, left center field pit, and center field pit did not match the soil that was provided by LT Environmental. Tests were taken and recorded for information only. The weather was mostly sunny with an average temperature of 35-45° F. Jason with LT Environmental was notified of results onsite.

Gauge ID: 1971 Dstd. Count: 3060
 Mstd. Count: 454

This report presents opinions formed as a result of our observation of soil placement. We have relied on the contractor to continue applying the recommended compactive effort and moisture to the soil during times when our observer is not observing operations. Tests are made of the soil only as believed necessary to calibrate our observer's judgment. Test data is not the sole basis for opinions on whether the soil meets stated criteria.

Proctor value based on ASTM:
 D698
 D1557
 Other

[X] In our opinion the fill has been compacted to specified requirements as indicated by test 120617.6.
 [X] In our opinion the fill does not meet the specified requirements as indicated by tests 120617.1 through 120617.5, 120617.7 through 120617.19, see notes.
 The contractor has been advised.

Field Representative: T.Afton

Reviewed by: J. Cuypers

Daily Report No. 120617



**FILL AND BACKFILL MOISTURE, DENSITY, AND
COMPACTION REPORT**

West Holden Place
17.210
December 6, 2017

Probe Depth (in)	Test ID		Location of Test Test Pit Location on Baseball Field	Depth (ft)	Laboratory Values		Field Values		Compaction (%)	Minimum Required Compaction (%)	Material Tested and Proctor ID
	Daily Report No.	Test No.			MDD (pcf)	OMC (%)	DD (pcf)	MC (%)			
8	120617	13	Right field W pit	2.5	101.9	20.6	96.9	14.5	95.1	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	14	Right field W pit	1.0	101.9	20.6	92.7	16.6	91.0	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	15	Right field W pit	0.0	101.9	20.6	104.1	12.7	102.2	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	16	Right field NE pit	2.0	101.9	20.6	86.6	24.2	85.0	95	(SC) SAND, clayey, brown, A-7-6, 1721823
8	120617	17	Right field NE pit	0.0	101.9	20.6	94.0	20.0	92.2	95	(SC) SAND, clayey, brown, A-7-6, 1721823 with brick debris
8	120617	18	Right field SE pit	1.5	101.9	20.6	86.3	18.6	84.7	95	(SC) SAND, clayey, brown, A-7-6, 1721823 with brick debris
8	120617	19	Right field SE pit	0.0	101.9	20.6	100.6	13.2	98.7	95	(SC) SAND, clayey, brown, A-7-6, 1721823 with brick debris

Part-time observation
 Full-time observation

Contractor's Equipment Used:
 Backhoe
 Water trailer

Moisture Specification: ±2% of OMC

Field Notes: Materials encountered in left field pit 1, left center field pit, and center field pit did not match the soil that was provided by LT Environmental. Tests were taken and recorded for information only. The weather was mostly sunny with an average temperature of 35-45° F. Jason with LT Environmental was notified of results onsite.

Gauge ID: 1971 Dstd. Count: 3060
 Mstd. Count: 454

This report presents opinions formed as a result of our observation of soil placement. We have relied on the contractor to continue applying the recommended compactive effort and moisture to the soil during times when our observer is not observing operations. Tests are made of the soil only as believed necessary to calibrate our observer's judgment. Test data is not the sole basis for opinions on whether the soil meets stated criteria.

Proctor value based on ASTM:
 D698
 D1557
 Other

[X] In our opinion the fill has been compacted to specified requirements as indicated by test 120617.6.
 [X] In our opinion the fill does not meet the specified requirements as indicated by tests 120617.1 through 120617.5, 120617.7 through 120617.19, see notes.
 The contractor has been advised.

Field Representative: T.Afton

Reviewed by: J. Cuypers

Daily Report No. 120617



**FILL AND BACKFILL MOISTURE, DENSITY, AND
COMPACTION REPORT**

West Holden Place
Project No. 17.210
December 7, 2017

Probe Depth (in)	Test ID		Location of Test Test Pit Location on Baseball Field	Depth (ft)	Laboratory Values		Field Values		Compaction (%)	Minimum Required Compaction (%)	Material Tested and Proctor ID
	Daily Report No.	Test No.			MDD (pcf)	OMC (%)	DD (pcf)	MC (%)			
8	120717	1	Third base line W pit	0			73.4	11.6	<90	95	No Proctor available, visual description: CLAY, organic, brown, A-7
8	120717	2	Third base line 2nd from W pit	0			85.2	10.3	<90	95	No Proctor available, visual description: CLAY, organic, brown, A-7
8	120717	3	Third base line 2nd from E pit	0			80.0	10.6	<90	95	No Proctor available, visual description: CLAY, organic, brown, A-7
8	120717	4	Third base line E pit	0			82.8	10.1	<90	95	No Proctor available, visual description: CLAY, organic, brown, A-7
8	120717	5	First base line N pit	0			74.6	21.0	<90	95	No Proctor available, visual description: CLAY, brown, A-6
8	120717	6	First base line center pit	0			85.5	20.0	<90	95	No Proctor available, visual description: CLAY, brown, A-6
8	120717	7	First base line S pit	0			81.6	21.2	<90	95	No Proctor available, visual description: CLAY, brown, A-6
8	120717	8	First base side top of hill	0			102.4	12.7		95	No Proctor available, visual description: CLAY, organic, brown, A-7
8	120717	9	Third base side top of hill	0			94.2	11.0		95	No Proctor available, visual description: CLAY, organic, brown, A-7
8	120717	10	Outside fence down first base line	0			107.3	8.1		95	No Proctor available, visual description: SAND, with clay, A-2

Part-time observation
 Full-time observation

Contractor's Equipment Used:
 Backhoe
 Water trailer

Moisture Specification: ±2% of OMC

Field Notes: Materials encountered did not match the soil that was provided by LT Environmental. Tests were taken and recorded for information only. In Cesare's experience, Proctor tests in the Denver area do not typically have MDD's below 95 pcf, therefore the highlighted tests likely represent poorly compacted soil. The weather was mostly sunny with an average temperature of 35-45° F. Jason with LT Environmental was notified of results onsite.

Gauge ID: 1971 Dstd. Count: 3060
 Mstd. Count: 454

This report presents opinions formed as a result of our observation of soil placement. We have relied on the contractor to continue applying the recommended compactive effort and moisture to the soil during times when our observer is not observing operations. Tests are made of the soil only as believed necessary to calibrate our observer's judgment. Test data is not the sole basis for opinions on whether the soil meets stated criteria.

Proctor value based on ASTM:
 D698
 D1557
 Other

In our opinion the fill has been compacted to specified requirements as indicated by tests
 In our opinion the fill does not meet the specified requirements as indicated by tests
 120717.1 through 120717.10, see notes.
 The contractor has been advised.

Field Representative: T.Afton

Reviewed by: J. Cuypers

Daily Report No. 120717

ATTACHMENT 3
SOIL LABORATORY ANALYTICAL REPORT





December 14, 2017

Subcontract Number: NA
Laboratory Report: RES 396380-1
Project # / P.O. # 061717001
Project Description: Rude Park

Jayson Evangelista
LT Environmental, Inc. (Arvada)
4600 W. 60th Ave.
Arvada CO 80003

Dear Customer,

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 101896-0 for Transmission Electron Microscopy (TEM) and Polarized Light Microscopy (PLM) analysis and the American Industrial Hygiene Association (AIHA), Lab ID 101533 - Accreditation Certificate #480 for Phase Contrast Microscopy (PCM) analysis. This laboratory is currently proficient in both Proficiency Testing and PAT programs respectively.

Reservoirs Environmental, Inc. has analyzed the following samples for asbestos content as per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the attached analysis table. The results have been submitted to your office.

RES 396380-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those of the client. The results described in this report only apply to the samples analyzed. This report must not be used to claim endorsement of products or analytical results by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without written approval from Reservoirs Environmental, Inc. Samples will be disposed of after sixty days unless longer storage is requested. If you have any questions about this report, please feel free to call 303-964-1986.

Sincerely,


Nicole Castillo for

Jeanne Spencer
President

RESERVOIRS ENVIRONMENTAL INC.

NVLAP Lab Code 101896-0

TABLE: PLM BULK ANALYSIS, PERCENTAGE COMPOSITION BY VOLUME

RES Job Number: **RES 396380-1**
 Client: **LT Environmental, Inc. (Arvada)**
 Client Project Number / P.O.: **061717001**
 Client Project Description: **Rude Park**
 Date Samples Received: **December 11, 2017**
 Method: **EPA 600/R-93/116 - Short Report, Bulk**
 Turnaround: **3-5 Day**
 Date Samples Analyzed: **December 13, 2017**

ND=None Detected
 TR=Trace, <1% Visual Estimate
 Trem/Act=Tremolite/Actinolite

Client Sample Number	Lab ID Number	L A Y E R	Physical Description	Sub Part (%)	Asbestos Content		Non Asbestos Fibrous Components (%)	Non-Fibrous Components (%)
					Mineral	Visual Estimate (%)		
Trench 5-SS01-Ash	EM 1987866	A	Black soil	100		ND	TR	100
Trench 6-SS02-Ash	EM 1987867	A	Brown soil	100		ND	0	100
Trench 8-SS03-Ash	EM 1987868	A	Brown soil	100		ND	0	100
Trench 8-PL1-01	EM 1987869	A	Off white granular material	100		ND	0	100
Trench 8-ACM1-01	EM 1987870	A	Off white resinous material	100		ND	0	100

TEM Analysis recommended for organically bound material (i.e. floor tile) if PLM results are <1%.

Daniel Erhard

Analyst / Data QA

Due Date: 12-14-18
 Due Time: RES 396380



5801 Lagan St, Denver, CO 80216 • Ph: 303-954-1986 • Fax: 303-477-4275 • Toll Free: 866-RES-ENV
 After Hours Cell Phone: 720-339-9228

INVOICE TO: (IF DIFFERENT)
 Company: LT Environmental
 Address: 4600 W. 46th Ave.
 Arvada CO 80003

INVOICE TO: (IF DIFFERENT)
 Company: Jayson Evangelista
 Phone: 720 415 4982
 Fax: 720 415 4984
 Cell/pager: 720-415-4984

CONTACT INFORMATION:
 Contact: N. Cicco Tobacco
 Phone:
 Fax:
 Cell/pager:

RECEIVED BY:
 Company: LT Environmental
 Address: 4600 W. 46th Ave.
 Arvada CO 80003

PROJECT INFORMATION:
 Project Number and/or P.O. #: 061717001
 Project Description/Location: Buckle Parks

FINAL DATA DELIVERABLE EMAIL ADDRESS:
 jevangalista@ltenv.com & ap@ltenv.com

REQUESTED ANALYSIS		VALID MATRIX CODES		LAB NOTES:	
PLM - Short report, Point Count, Long report, Qualitative	PLM - Short report, Point Count, Long report, Qualitative	Air = A	Bulk = B		
TEM - AHERA, Level II, 7402, ISO, +/- (Air, Bulk or Dust), Quant, Semi-Quant, Micro-vac, ISO-Indirect Preps	TEM - AHERA, Level II, 7402, ISO, +/- (Air, Bulk or Dust), Quant, Semi-Quant, Micro-vac, ISO-Indirect Preps	Dust = D	Paint = P		
PCM - 7400A, 7400B, OSHA	PCM - 7400A, 7400B, OSHA	Soil = S	Wipe = W		
DUST - Total, Respirable	DUST - Total, Respirable	Swab = SW	F = Food		
METALS - Analyte(s)	METALS - Analyte(s)	Drinking Water = DW	Waste Water = WW		
RCRA 8, TCLP, Welding Fume, Metals Scan, pH	RCRA 8, TCLP, Welding Fume, Metals Scan, pH	O = Other			
ORGANICS - METH, TSS	ORGANICS - METH, TSS	**ASTM E1792 approved wipe media only**			
Pathogens: Aerobic Plate Count, Salmonella, E. coli, O157:H7, Listeria, S aureus, Campylobacter, +/- or Quantification	Pathogens: Aerobic Plate Count, Salmonella, E. coli, O157:H7, Listeria, S aureus, Campylobacter, +/- or Quantification				
E. coli and/or Coliforms: +/- or Quantification	E. coli and/or Coliforms: +/- or Quantification				
State Water (Please Circle One) Yes / No	State Water (Please Circle One) Yes / No				
Microbial Growth: Aerobic Plate Count ID, Y & M or Bacteria, Fungal, +/- or Quantification	Microbial Growth: Aerobic Plate Count ID, Y & M or Bacteria, Fungal, +/- or Quantification				
Legionella: +/- or Quantification	Legionella: +/- or Quantification				
Other: Bioburden, LAL or Environmental	Other: Bioburden, LAL or Environmental				
Mold: Spore Trap or Bulk: +/-, Identification, Quantification	Mold: Spore Trap or Bulk: +/-, Identification, Quantification				
Viab: Spore Trap or Bulk: +/-, Identification, Quantification	Viab: Spore Trap or Bulk: +/-, Identification, Quantification				
SAMPLER'S INITIALS OR OTHER NOTES:	SAMPLER'S INITIALS OR OTHER NOTES:				
Sample Volume (L) / Area	Sample Volume (L) / Area	Matrix Code	Date Collected mm/dd/yyyy	Time Collected hh:mm:ap	EM Number (Laboratory Use Only)
		S1	12/17/18		79348191
		S1			70
		S1			70
		B1			
		B1			

Client sample ID number (Sample ID's must be unique)	RECEIVED BY:		DATE/TIME:		CARRIER:		SAMPLE CONDITION:	
	Phone	Email	Date	Time	Phone	Email	On Ice	Sealed
1 Trench 5-SS01-Ash			12-11-18	2:15	Hand FedEx	Box / Courier	Yes / No	Yes / No
2 Trench 6-SS02-Ash			12-11-18	2:14	Hand FedEx	Box / Courier	Yes / No	Yes / No
3 Trench 8-SS03-Ash								
4 Trench 8-PL1-01								
5 Trench 8-ACM1-01								
6								
7								
8								
9								
10								

Number of samples received: 5
 NOTE: REI will analyze incoming samples based upon information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing client/company representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET 30 days. Failure to comply with payment terms may result in a 1.5% monthly interest surcharge.

Relinquished By: Maria Vazquez
 Received By: [Signature]
 Date/Time: 12-11-18 2:15
 Date/Time: 12-11-18 2:14

Carrier: [Signature]
 Phone Email Fax: [Signature]
 Phone Email Fax: [Signature]

Contact: [Signature]
 Contact: [Signature]

Initials: [Signature]
 Initials: [Signature]

Date: [Signature]
 Date: [Signature]

Time: [Signature]
 Time: [Signature]

Initials: [Signature]
 Initials: [Signature]



December 26, 2017

LT Environmental, Inc.

Nick Talocco

4600 West 60th Avenue

Arvada CO 80003

Project Name - Rude Park

Project Number - 061717001

Attached are your analytical results for Rude Park received by Origins Laboratory, Inc. December 11, 2017. This project is associated with Origins project number Y712192-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.
303.433.1322
o-squad@oelabinc.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Nick Talocco
Project Number: 061717001
Project: Rude Park

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Trench 5-SS01@12"	Y712192-01	Soil	December 6, 2017 9:45	12/11/2017 14:03
Trench 6-SS02@12"	Y712192-02	Soil	December 6, 2017 10:05	12/11/2017 14:03
Trench 6-SS03@3.5'	Y712192-03	Soil	December 6, 2017 13:20	12/11/2017 14:03
Trench 6-SS04@6'	Y712192-04	Soil	December 6, 2017 13:25	12/11/2017 14:03
Trench 8-SS05@2'	Y712192-05	Soil	December 6, 2017 14:45	12/11/2017 14:03

Per the email from Rachel on 12/26/17 the following ID change was made.
Trench 8-SS05@6' to Trench 8-SS05@2'

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Origins Laboratory

F-012207-01-R1
 Effective Date: 01/09/12

Sample Receipt Checklist

Origins Work Order: 7712192 Client: LTE
 Checklist Completed by: SAG Client Project ID: Rude Park
 Date/time completed: 12/12/17 Shipped Via: HD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A
 Matrix(s) Received: (Check all that apply): Soil/Solid Water Other: _____
 Cooler Number/Temperature: 1 10.2°c / _____ °c / _____ °c / _____ °c
 Thermometer ID: T003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	/			
Is there ice present (document if blue ice is used)	/			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		/		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		/		
Were all samples received intact ⁽¹⁾ ?	/			
Was adequate sample volume provided ⁽¹⁾ ?	/			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	/	/		
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	/			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	/			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	/			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	/			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			/	
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)(pH <2 for samples preserved with HNO3, HCL, H2SO4) / (pH >10 for samples preserved with NaAsO2+NaOH, ZnAc+NaOH)			/	
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) [Signature] Date/Time Reviewed 12/13/17

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 5-SS01@12"
12/6/2017 9:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-01 (Soil)

GRO (TVPH)/DRO (TEPH)by EPA 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B7L1503	12/15/2017	12/16/2017	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	Ua

Surrogate: *o*-Terphenyl 87.0 % 59-131 " " "

Total Metals by 6010C

Arsenic	6.85	3.92	mg/kg dry	1	1725975	12/13/2017	12/15/2017	
Barium	466	0.653	"	"	"	"	"	
Cadmium	ND	0.653	"	"	"	"	"	U
Chromium	17.3	0.653	"	"	"	"	"	
Lead	36.1	1.31	"	"	"	"	"	
Selenium	0.946	3.92	"	"	"	"	"	J
Silver	ND	0.653	"	"	"	"	"	U

Total Metals by 7471A

Mercury	0.0697	0.015	mg/kg dry	1	1726295	12/14/2017	12/15/2017	
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VOC by EPA 8260C

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1,1-Trichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 5-SS01@12"
12/6/2017 9:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-01 (Soil)

VOC by EPA 8260C

1,1,2-Trichloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
1,2,3-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,3-Trichloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,3,5-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,4-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
2,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
2-Butanone	ND	0.0100	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 5-SS01@12"
12/6/2017 9:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-01 (Soil)

VOC by EPA 8260C

2-Chlorotoluene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
2-Hexanone	ND	0.0100	"	"	"	"	"	Ua
4-Chlorotoluene	ND	0.00200	"	"	"	"	"	Ua
4-Isopropyltoluene	ND	0.00200	"	"	"	"	"	Ua
4-Methyl-2-pentanone	ND	0.0100	"	"	"	"	"	Ua
Acetone	ND	0.0200	"	"	"	"	"	Ua
Benzene	ND	0.00200	"	"	"	"	"	Ua
Bromobenzene	ND	0.00200	"	"	"	"	"	Ua
Bromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromodichloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromoform	ND	0.00200	"	"	"	"	"	Ua
Bromomethane	ND	0.00200	"	"	"	"	"	Ua
Carbon disulfide	ND	0.00500	"	"	"	"	"	Ua
Carbon tetrachloride	ND	0.00200	"	"	"	"	"	Ua
Chlorobenzene	ND	0.00200	"	"	"	"	"	Ua
Chloroethane	ND	0.00500	"	"	"	"	"	Ua
Chloroform	ND	0.00200	"	"	"	"	"	Ua
Chloromethane	ND	0.00200	"	"	"	"	"	Ua
cis-1,2-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 5-SS01@12"
12/6/2017 9:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-01 (Soil)

VOC by EPA 8260C

cis-1,3-Dichloropropene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
Dibromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Dibromomethane	ND	0.00200	"	"	"	"	"	Ua
Ethylbenzene	ND	0.00200	"	"	"	"	"	Ua
Hexachlorobutadiene	ND	0.00500	"	"	"	"	"	Ua
Iodomethane	ND	0.0150	"	"	"	"	"	Ua
Isopropylbenzene	ND	0.00200	"	"	"	"	"	Ua
m,p-Xylene	ND	0.00400	"	"	"	"	"	Ua
Methyl tert-Butyl Ether	ND	0.00200	"	"	"	"	"	Ua
Methylene Chloride	0.0435	0.0200	"	"	"	"	"	
Naphthalene	ND	0.0100	"	"	"	"	"	Ua
n-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
n-Propylbenzene	ND	0.00200	"	"	"	"	"	Ua
o-Xylene	ND	0.00200	"	"	"	"	"	Ua
sec-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Styrene	ND	0.00200	"	"	"	"	"	Ua
tert-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Tetrachloroethene	ND	0.00200	"	"	"	"	"	Ua
Toluene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 5-SS01@12"
12/6/2017 9:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-01 (Soil)

VOC by EPA 8260C

trans-1,2-Dichloroethene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
trans-1,3-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
Trichloroethene	ND	0.00200	"	"	"	"	"	Ua
Trichlorofluoromethane	ND	0.00300	"	"	"	"	"	Ua
Vinyl chloride	ND	0.00200	"	"	"	"	"	Ua
Surrogate: 1,2-Dichloroethane-d4	114 %	70-130			"	"	"	
Surrogate: Toluene-d8	99.5 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	107 %	70-130			"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS02@12"
12/6/2017 10:05:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-02 (Soil)

GRO (TVPH)/DRO (TEPH)by EPA 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B7L1503	12/15/2017	12/16/2017	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	Ua

Surrogate: o-Terphenyl 91.6 % 59-131 " " "

Total Metals by 6010C

Arsenic	5.07	3.21	mg/kg dry	1	1725975	12/13/2017	12/15/2017	
Barium	196	0.536	"	"	"	"	"	
Cadmium	ND	0.536	"	"	"	"	"	U
Chromium	15.5	0.536	"	"	"	"	"	
Lead	8.46	1.07	"	"	"	"	"	
Selenium	ND	3.21	"	"	"	"	"	U
Silver	ND	0.536	"	"	"	"	"	U

Total Metals by 7471A

Mercury	0.0173	0.0124	mg/kg dry	1	1726295	12/14/2017	12/15/2017	
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VOC by EPA 8260C

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1,1-Trichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS02@12"
12/6/2017 10:05:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-02 (Soil)

VOC by EPA 8260C

1,1,2-Trichloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
1,2,3-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,3-Trichloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,3,5-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,4-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
2,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
2-Butanone	ND	0.0100	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS02@12"
12/6/2017 10:05:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-02 (Soil)

VOC by EPA 8260C

2-Chlorotoluene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
2-Hexanone	ND	0.0100	"	"	"	"	"	Ua
4-Chlorotoluene	ND	0.00200	"	"	"	"	"	Ua
4-Isopropyltoluene	ND	0.00200	"	"	"	"	"	Ua
4-Methyl-2-pentanone	ND	0.0100	"	"	"	"	"	Ua
Acetone	ND	0.0200	"	"	"	"	"	Ua
Benzene	ND	0.00200	"	"	"	"	"	Ua
Bromobenzene	ND	0.00200	"	"	"	"	"	Ua
Bromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromodichloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromoform	ND	0.00200	"	"	"	"	"	Ua
Bromomethane	ND	0.00200	"	"	"	"	"	Ua
Carbon disulfide	ND	0.00500	"	"	"	"	"	Ua
Carbon tetrachloride	ND	0.00200	"	"	"	"	"	Ua
Chlorobenzene	ND	0.00200	"	"	"	"	"	Ua
Chloroethane	ND	0.00500	"	"	"	"	"	Ua
Chloroform	ND	0.00200	"	"	"	"	"	Ua
Chloromethane	ND	0.00200	"	"	"	"	"	Ua
cis-1,2-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS02@12"
12/6/2017 10:05:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-02 (Soil)

VOC by EPA 8260C

cis-1,3-Dichloropropene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
Dibromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Dibromomethane	ND	0.00200	"	"	"	"	"	Ua
Ethylbenzene	ND	0.00200	"	"	"	"	"	Ua
Hexachlorobutadiene	ND	0.00500	"	"	"	"	"	Ua
Iodomethane	ND	0.0150	"	"	"	"	"	Ua
Isopropylbenzene	ND	0.00200	"	"	"	"	"	Ua
m,p-Xylene	ND	0.00400	"	"	"	"	"	Ua
Methyl tert-Butyl Ether	ND	0.00200	"	"	"	"	"	Ua
Methylene Chloride	ND	0.0200	"	"	"	"	"	Ua
Naphthalene	ND	0.0100	"	"	"	"	"	Ua
n-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
n-Propylbenzene	ND	0.00200	"	"	"	"	"	Ua
o-Xylene	ND	0.00200	"	"	"	"	"	Ua
sec-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Styrene	ND	0.00200	"	"	"	"	"	Ua
tert-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Tetrachloroethene	ND	0.00200	"	"	"	"	"	Ua
Toluene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS02@12"
12/6/2017 10:05:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-02 (Soil)

VOC by EPA 8260C

trans-1,2-Dichloroethene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
trans-1,3-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
Trichloroethene	ND	0.00200	"	"	"	"	"	Ua
Trichlorofluoromethane	ND	0.00300	"	"	"	"	"	Ua
Vinyl chloride	ND	0.00200	"	"	"	"	"	Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	114 %	70-130			"	"	"	
<i>Surrogate: Toluene-d8</i>	96.5 %	70-130			"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>	105 %	70-130			"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS03@3.5'
12/6/2017 1:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-03 (Soil)

GRO (TVPH)/DRO (TEPH)by EPA 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B7L1503	12/15/2017	12/16/2017	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	Ua

Surrogate: o-Terphenyl 88.7 % 59-131 " " "

Total Metals by 6010C

Arsenic	4.76	3.34	mg/kg dry	1	1725975	12/13/2017	12/15/2017	
Barium	193	0.557	"	"	"	"	"	
Cadmium	ND	0.557	"	"	"	"	"	U
Chromium	14.4	0.557	"	"	"	"	"	
Lead	6.27	1.11	"	"	"	"	"	
Selenium	ND	3.34	"	"	"	"	"	U
Silver	ND	0.557	"	"	"	"	"	U

Total Metals by 7471A

Mercury	ND	0.0136	mg/kg dry	1	1726295	12/14/2017	12/15/2017	U
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VOC by EPA 8260C

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1,1-Trichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS03@3.5'
12/6/2017 1:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-03 (Soil)

VOC by EPA 8260C

1,1,2-Trichloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
1,2,3-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,3-Trichloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,3,5-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,4-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
2,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
2-Butanone	ND	0.0100	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS03@3.5'
12/6/2017 1:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-03 (Soil)

VOC by EPA 8260C

2-Chlorotoluene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
2-Hexanone	ND	0.0100	"	"	"	"	"	Ua
4-Chlorotoluene	ND	0.00200	"	"	"	"	"	Ua
4-Isopropyltoluene	ND	0.00200	"	"	"	"	"	Ua
4-Methyl-2-pentanone	ND	0.0100	"	"	"	"	"	Ua
Acetone	ND	0.0200	"	"	"	"	"	Ua
Benzene	ND	0.00200	"	"	"	"	"	Ua
Bromobenzene	ND	0.00200	"	"	"	"	"	Ua
Bromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromodichloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromoform	ND	0.00200	"	"	"	"	"	Ua
Bromomethane	ND	0.00200	"	"	"	"	"	Ua
Carbon disulfide	ND	0.00500	"	"	"	"	"	Ua
Carbon tetrachloride	ND	0.00200	"	"	"	"	"	Ua
Chlorobenzene	ND	0.00200	"	"	"	"	"	Ua
Chloroethane	ND	0.00500	"	"	"	"	"	Ua
Chloroform	ND	0.00200	"	"	"	"	"	Ua
Chloromethane	ND	0.00200	"	"	"	"	"	Ua
cis-1,2-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS03@3.5'
12/6/2017 1:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-03 (Soil)

VOC by EPA 8260C

cis-1,3-Dichloropropene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
Dibromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Dibromomethane	ND	0.00200	"	"	"	"	"	Ua
Ethylbenzene	ND	0.00200	"	"	"	"	"	Ua
Hexachlorobutadiene	ND	0.00500	"	"	"	"	"	Ua
Iodomethane	ND	0.0150	"	"	"	"	"	Ua
Isopropylbenzene	ND	0.00200	"	"	"	"	"	Ua
m,p-Xylene	ND	0.00400	"	"	"	"	"	Ua
Methyl tert-Butyl Ether	ND	0.00200	"	"	"	"	"	Ua
Methylene Chloride	ND	0.0200	"	"	"	"	"	Ua
Naphthalene	ND	0.0100	"	"	"	"	"	Ua
n-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
n-Propylbenzene	ND	0.00200	"	"	"	"	"	Ua
o-Xylene	ND	0.00200	"	"	"	"	"	Ua
sec-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Styrene	ND	0.00200	"	"	"	"	"	Ua
tert-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Tetrachloroethene	ND	0.00200	"	"	"	"	"	Ua
Toluene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS03@3.5'
12/6/2017 1:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-03 (Soil)

VOC by EPA 8260C

trans-1,2-Dichloroethene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
trans-1,3-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
Trichloroethene	ND	0.00200	"	"	"	"	"	Ua
Trichlorofluoromethane	ND	0.00300	"	"	"	"	"	Ua
Vinyl chloride	ND	0.00200	"	"	"	"	"	Ua
Surrogate: 1,2-Dichloroethane-d4	112 %	70-130			"	"	"	
Surrogate: Toluene-d8	98.1 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	103 %	70-130			"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS04@6'
12/6/2017 1:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-04 (Soil)

GRO (TVPH)/DRO (TEPH)by EPA 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B7L1503	12/15/2017	12/16/2017	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	Ua

Surrogate: o-Terphenyl 94.1 % 59-131 " " "

Total Metals by 6010C

Arsenic	4.19	3.18	mg/kg dry	1	1725975	12/13/2017	12/15/2017	
Barium	185	0.530	"	"	"	"	"	
Cadmium	ND	2.65	"	5	"	"	"	U
Chromium	16.6	0.530	"	1	"	"	"	
Lead	7.41	1.06	"	"	"	"	"	
Selenium	ND	3.18	"	"	"	"	"	U
Silver	ND	0.530	"	"	"	"	"	U

Total Metals by 7471A

Mercury	0.0117	0.0133	mg/kg dry	1	1726295	12/14/2017	12/15/2017	J
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VOC by EPA 8260C

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1,1-Trichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS04@6'
12/6/2017 1:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-04 (Soil)

VOC by EPA 8260C

1,1,2-Trichloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
1,2,3-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,3-Trichloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,3,5-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,4-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
2,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
2-Butanone	ND	0.0100	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS04@6'
12/6/2017 1:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-04 (Soil)

VOC by EPA 8260C

2-Chlorotoluene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
2-Hexanone	ND	0.0100	"	"	"	"	"	Ua
4-Chlorotoluene	ND	0.00200	"	"	"	"	"	Ua
4-Isopropyltoluene	ND	0.00200	"	"	"	"	"	Ua
4-Methyl-2-pentanone	ND	0.0100	"	"	"	"	"	Ua
Acetone	ND	0.0200	"	"	"	"	"	Ua
Benzene	ND	0.00200	"	"	"	"	"	Ua
Bromobenzene	ND	0.00200	"	"	"	"	"	Ua
Bromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromodichloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromoform	ND	0.00200	"	"	"	"	"	Ua
Bromomethane	ND	0.00200	"	"	"	"	"	Ua
Carbon disulfide	ND	0.00500	"	"	"	"	"	Ua
Carbon tetrachloride	ND	0.00200	"	"	"	"	"	Ua
Chlorobenzene	ND	0.00200	"	"	"	"	"	Ua
Chloroethane	ND	0.00500	"	"	"	"	"	Ua
Chloroform	ND	0.00200	"	"	"	"	"	Ua
Chloromethane	ND	0.00200	"	"	"	"	"	Ua
cis-1,2-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS04@6'
12/6/2017 1:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-04 (Soil)

VOC by EPA 8260C

cis-1,3-Dichloropropene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
Dibromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Dibromomethane	ND	0.00200	"	"	"	"	"	Ua
Ethylbenzene	ND	0.00200	"	"	"	"	"	Ua
Hexachlorobutadiene	ND	0.00500	"	"	"	"	"	Ua
Iodomethane	ND	0.0150	"	"	"	"	"	Ua
Isopropylbenzene	ND	0.00200	"	"	"	"	"	Ua
m,p-Xylene	ND	0.00400	"	"	"	"	"	Ua
Methyl tert-Butyl Ether	ND	0.00200	"	"	"	"	"	Ua
Methylene Chloride	ND	0.0200	"	"	"	"	"	Ua
Naphthalene	ND	0.0100	"	"	"	"	"	Ua
n-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
n-Propylbenzene	ND	0.00200	"	"	"	"	"	Ua
o-Xylene	ND	0.00200	"	"	"	"	"	Ua
sec-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Styrene	ND	0.00200	"	"	"	"	"	Ua
tert-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Tetrachloroethene	ND	0.00200	"	"	"	"	"	Ua
Toluene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 6-SS04@6'
12/6/2017 1:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-04 (Soil)

VOC by EPA 8260C

trans-1,2-Dichloroethene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
trans-1,3-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
Trichloroethene	ND	0.00200	"	"	"	"	"	Ua
Trichlorofluoromethane	ND	0.00300	"	"	"	"	"	Ua
Vinyl chloride	ND	0.00200	"	"	"	"	"	Ua
Surrogate: 1,2-Dichloroethane-d4	117 %	70-130			"	"	"	
Surrogate: Toluene-d8	98.2 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	104 %	70-130			"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 8-SS05@2'
12/6/2017 2:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-05 (Soil)

GRO (TVPH)/DRO (TEPH)by EPA 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B7L1503	12/15/2017	12/16/2017	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	Ua

Surrogate: *o*-Terphenyl 87.3 % 59-131 " " "

Total Metals by 6010C

Arsenic	6.48	3.70	mg/kg dry	1	1725975	12/13/2017	12/15/2017	
Barium	1510	3.08	"	5	"	"	"	
Cadmium	ND	0.616	"	1	"	"	"	U
Chromium	16.1	0.616	"	"	"	"	"	
Lead	33.5	1.23	"	"	"	"	"	
Selenium	1.10	3.70	"	"	"	"	"	J
Silver	ND	0.616	"	"	"	"	"	U

Total Metals by 7471A

Mercury	0.0289	0.0134	mg/kg dry	1	1726295	12/14/2017	12/15/2017	
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VOC by EPA 8260C

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1,1-Trichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 8-SS05@2'
12/6/2017 2:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-05 (Soil)

VOC by EPA 8260C

1,1,2-Trichloroethane	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
1,1-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua
1,1-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
1,2,3-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,3-Trichloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trichlorobenzene	ND	0.00500	"	"	"	"	"	Ua
1,2,4-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"	"	"	"	"	Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloroethane	ND	0.00200	"	"	"	"	"	Ua
1,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,3,5-Trimethylbenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
1,3-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
1,4-Dichlorobenzene	ND	0.00200	"	"	"	"	"	Ua
2,2-Dichloropropane	ND	0.00200	"	"	"	"	"	Ua
2-Butanone	ND	0.0100	"	"	"	"	"	Ua

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 8-SS05@2'
12/6/2017 2:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-05 (Soil)

VOC by EPA 8260C

2-Chlorotoluene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
2-Hexanone	ND	0.0100	"	"	"	"	"	Ua
4-Chlorotoluene	ND	0.00200	"	"	"	"	"	Ua
4-Isopropyltoluene	ND	0.00200	"	"	"	"	"	Ua
4-Methyl-2-pentanone	ND	0.0100	"	"	"	"	"	Ua
Acetone	ND	0.0200	"	"	"	"	"	Ua
Benzene	ND	0.00200	"	"	"	"	"	Ua
Bromobenzene	ND	0.00200	"	"	"	"	"	Ua
Bromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromodichloromethane	ND	0.00200	"	"	"	"	"	Ua
Bromoform	ND	0.00200	"	"	"	"	"	Ua
Bromomethane	ND	0.00200	"	"	"	"	"	Ua
Carbon disulfide	ND	0.00500	"	"	"	"	"	Ua
Carbon tetrachloride	ND	0.00200	"	"	"	"	"	Ua
Chlorobenzene	ND	0.00200	"	"	"	"	"	Ua
Chloroethane	ND	0.00500	"	"	"	"	"	Ua
Chloroform	ND	0.00200	"	"	"	"	"	Ua
Chloromethane	ND	0.00200	"	"	"	"	"	Ua
cis-1,2-Dichloroethene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 8-SS05@2'
12/6/2017 2:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-05 (Soil)

VOC by EPA 8260C

cis-1,3-Dichloropropene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
Dibromochloromethane	ND	0.00200	"	"	"	"	"	Ua
Dibromomethane	ND	0.00200	"	"	"	"	"	Ua
Ethylbenzene	ND	0.00200	"	"	"	"	"	Ua
Hexachlorobutadiene	ND	0.00500	"	"	"	"	"	Ua
Iodomethane	ND	0.0150	"	"	"	"	"	Ua
Isopropylbenzene	ND	0.00200	"	"	"	"	"	Ua
m,p-Xylene	ND	0.00400	"	"	"	"	"	Ua
Methyl tert-Butyl Ether	ND	0.00200	"	"	"	"	"	Ua
Methylene Chloride	0.0331	0.0200	"	"	"	"	"	
Naphthalene	ND	0.0100	"	"	"	"	"	Ua
n-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
n-Propylbenzene	ND	0.00200	"	"	"	"	"	Ua
o-Xylene	ND	0.00200	"	"	"	"	"	Ua
sec-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Styrene	ND	0.00200	"	"	"	"	"	Ua
tert-Butylbenzene	ND	0.00200	"	"	"	"	"	Ua
Tetrachloroethene	ND	0.00200	"	"	"	"	"	Ua
Toluene	ND	0.00200	"	"	"	"	"	Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Trench 8-SS05@2'
12/6/2017 2:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y712192-05 (Soil)

VOC by EPA 8260C

trans-1,2-Dichloroethene	ND	0.00200	mg/kg	1	B7L1502	12/15/2017	12/15/2017	Ua
trans-1,3-Dichloropropene	ND	0.00200	"	"	"	"	"	Ua
Trichloroethene	ND	0.00200	"	"	"	"	"	Ua
Trichlorofluoromethane	ND	0.00300	"	"	"	"	"	Ua
Vinyl chloride	ND	0.00200	"	"	"	"	"	Ua
Surrogate: 1,2-Dichloroethane-d4	117 %	70-130			"	"	"	
Surrogate: Toluene-d8	98.9 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	105 %	70-130			"	"	"	

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Blank (B7L1502-BLK1)

Prepared: 12/15/2017 Analyzed: 12/15/2017

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg							Ua
1,1,1-Trichloroethane	ND	0.00200	"							Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"							Ua
1,1,2-Trichloroethane	ND	0.00200	"							Ua
1,1-Dichloroethane	ND	0.00200	"							Ua
1,1-Dichloroethene	ND	0.00200	"							Ua
1,1-Dichloropropene	ND	0.00200	"							Ua
1,2,3-Trichlorobenzene	ND	0.00500	"							Ua
1,2,3-Trichloropropane	ND	0.00500	"							Ua
1,2,4-Trichlorobenzene	ND	0.00500	"							Ua
1,2,4-Trimethylbenzene	ND	0.00200	"							Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"							Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"							Ua
1,2-Dichlorobenzene	ND	0.00200	"							Ua
1,2-Dichloroethane	ND	0.00200	"							Ua
1,2-Dichloropropane	ND	0.00200	"							Ua
1,3,5-Trimethylbenzene	ND	0.00200	"							Ua
1,3-Dichlorobenzene	ND	0.00200	"							Ua
1,3-Dichloropropane	ND	0.00200	"							Ua
1,4-Dichlorobenzene	ND	0.00200	"							Ua
2,2-Dichloropropane	ND	0.00200	"							Ua
2-Butanone	ND	0.0100	"							Ua
2-Chlorotoluene	ND	0.00200	"							Ua
2-Hexanone	ND	0.0100	"							Ua
4-Chlorotoluene	ND	0.00200	"							Ua
4-Isopropyltoluene	ND	0.00200	"							Ua

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Blank (B7L1502-BLK1)

Prepared: 12/15/2017 Analyzed: 12/15/2017

4-Methyl-2-pentanone	ND	0.0100	mg/kg							Ua
Acetone	ND	0.0200	"							Ua
Benzene	ND	0.00200	"							Ua
Bromobenzene	ND	0.00200	"							Ua
Bromochloromethane	ND	0.00200	"							Ua
Bromodichloromethane	ND	0.00200	"							Ua
Bromoform	ND	0.00200	"							Ua
Bromomethane	ND	0.00200	"							Ua
Carbon disulfide	ND	0.00500	"							Ua
Carbon tetrachloride	ND	0.00200	"							Ua
Chlorobenzene	ND	0.00200	"							Ua
Chloroethane	ND	0.00500	"							Ua
Chloroform	ND	0.00200	"							Ua
Chloromethane	ND	0.00200	"							Ua
cis-1,2-Dichloroethene	ND	0.00200	"							Ua
cis-1,3-Dichloropropene	ND	0.00200	"							Ua
Dibromochloromethane	ND	0.00200	"							Ua
Dibromomethane	ND	0.00200	"							Ua
Ethylbenzene	ND	0.00200	"							Ua
Hexachlorobutadiene	ND	0.00500	"							Ua
Iodomethane	ND	0.0150	"							Ua
Isopropylbenzene	ND	0.00200	"							Ua
m,p-Xylene	ND	0.00400	"							Ua
Methyl tert-Butyl Ether	ND	0.00200	"							Ua
Methylene Chloride	ND	0.0200	"							Ua
Naphthalene	ND	0.0100	"							Ua

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Blank (B7L1502-BLK1)

Prepared: 12/15/2017 Analyzed: 12/15/2017

n-Butylbenzene	ND	0.00200	mg/kg							Ua
n-Propylbenzene	ND	0.00200	"							Ua
o-Xylene	ND	0.00200	"							Ua
sec-Butylbenzene	ND	0.00200	"							Ua
Styrene	ND	0.00200	"							Ua
tert-Butylbenzene	ND	0.00200	"							Ua
Tetrachloroethene	ND	0.00200	"							Ua
Toluene	ND	0.00200	"							Ua
trans-1,2-Dichloroethene	ND	0.00200	"							Ua
trans-1,3-Dichloropropene	ND	0.00200	"							Ua
Trichloroethene	ND	0.00200	"							Ua
Trichlorofluoromethane	ND	0.00300	"							Ua
Vinyl chloride	ND	0.00200	"							Ua
Surrogate: 1,2-Dichloroethane-d4	65		ug/L	62.5		104	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.6	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Blank (B7L1502-BLK2)

Prepared: 12/15/2017 Analyzed: 12/15/2017

1,1,1,2-Tetrachloroethane	ND	0.00200	mg/kg							Ua
1,1,1-Trichloroethane	ND	0.00200	"							Ua
1,1,2,2-Tetrachloroethane	ND	0.00200	"							Ua
1,1,2-Trichloroethane	ND	0.00200	"							Ua
1,1-Dichloroethane	ND	0.00200	"							Ua
1,1-Dichloroethene	ND	0.00200	"							Ua
1,1-Dichloropropene	ND	0.00200	"							Ua
1,2,3-Trichlorobenzene	ND	0.00500	"							Ua
1,2,3-Trichloropropane	ND	0.00500	"							Ua
1,2,4-Trichlorobenzene	ND	0.00500	"							Ua
1,2,4-Trimethylbenzene	ND	0.00200	"							Ua
1,2-Dibromo-3-chloropropane	ND	0.00500	"							Ua
1,2-Dibromoethane (EDB)	ND	0.00200	"							Ua
1,2-Dichlorobenzene	ND	0.00200	"							Ua
1,2-Dichloroethane	ND	0.00200	"							Ua
1,2-Dichloropropane	ND	0.00200	"							Ua
1,3,5-Trimethylbenzene	ND	0.00200	"							Ua
1,3-Dichlorobenzene	ND	0.00200	"							Ua
1,3-Dichloropropane	ND	0.00200	"							Ua
1,4-Dichlorobenzene	ND	0.00200	"							Ua
2,2-Dichloropropane	ND	0.00200	"							Ua
2-Butanone	ND	0.0100	"							Ua
2-Chlorotoluene	ND	0.00200	"							Ua
2-Hexanone	ND	0.0100	"							Ua
4-Chlorotoluene	ND	0.00200	"							Ua
4-Isopropyltoluene	ND	0.00200	"							Ua

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Blank (B7L1502-BLK2)

Prepared: 12/15/2017 Analyzed: 12/15/2017

4-Methyl-2-pentanone	ND	0.0100	mg/kg							Ua
Acetone	ND	0.0200	"							Ua
Benzene	ND	0.00200	"							Ua
Bromobenzene	ND	0.00200	"							Ua
Bromochloromethane	ND	0.00200	"							Ua
Bromodichloromethane	ND	0.00200	"							Ua
Bromoform	ND	0.00200	"							Ua
Bromomethane	ND	0.00200	"							Ua
Carbon disulfide	ND	0.00500	"							Ua
Carbon tetrachloride	ND	0.00200	"							Ua
Chlorobenzene	ND	0.00200	"							Ua
Chloroethane	ND	0.00500	"							Ua
Chloroform	ND	0.00200	"							Ua
Chloromethane	ND	0.00200	"							Ua
cis-1,2-Dichloroethene	ND	0.00200	"							Ua
cis-1,3-Dichloropropene	ND	0.00200	"							Ua
Dibromochloromethane	ND	0.00200	"							Ua
Dibromomethane	ND	0.00200	"							Ua
Ethylbenzene	ND	0.00200	"							Ua
Hexachlorobutadiene	ND	0.00500	"							Ua
Iodomethane	ND	0.0150	"							Ua
Isopropylbenzene	ND	0.00200	"							Ua
m,p-Xylene	ND	0.00400	"							Ua
Methyl tert-Butyl Ether	ND	0.00200	"							Ua
Methylene Chloride	ND	0.0200	"							Ua
Naphthalene	ND	0.0100	"							Ua

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Blank (B7L1502-BLK2)

Prepared: 12/15/2017 Analyzed: 12/15/2017

n-Butylbenzene	ND	0.00200	mg/kg							Ua
n-Propylbenzene	ND	0.00200	"							Ua
o-Xylene	ND	0.00200	"							Ua
sec-Butylbenzene	ND	0.00200	"							Ua
Styrene	ND	0.00200	"							Ua
tert-Butylbenzene	ND	0.00200	"							Ua
Tetrachloroethene	ND	0.00200	"							Ua
Toluene	ND	0.00200	"							Ua
trans-1,2-Dichloroethene	ND	0.00200	"							Ua
trans-1,3-Dichloropropene	ND	0.00200	"							Ua
Trichloroethene	ND	0.00200	"							Ua
Trichlorofluoromethane	ND	0.00300	"							Ua
Vinyl chloride	ND	0.00200	"							Ua
Surrogate: 1,2-Dichloroethane-d4	69		ug/L	62.5		110	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.0	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

LCS (B7L1502-BS1)

Prepared: 12/15/2017 Analyzed: 12/15/2017

1,1,1,2-Tetrachloroethane	0.111	0.00200	mg/kg	0.100		111	70-130			
1,1,1-Trichloroethane	0.0978	0.00200	"	0.100		97.8	70-130			
1,1,2,2-Tetrachloroethane	0.110	0.00200	"	0.100		110	70-130			
1,1,2-Trichloroethane	0.104	0.00200	"	0.100		104	70-130			
1,1-Dichloroethane	0.102	0.00200	"	0.100		102	70-130			
1,1-Dichloroethene	0.0996	0.00200	"	0.100		99.6	70-130			
1,1-Dichloropropene	0.0967	0.00200	"	0.100		96.7	70-130			
1,2,3-Trichlorobenzene	0.103	0.00500	"	0.100		103	70-130			
1,2,3-Trichloropropane	0.104	0.00500	"	0.100		104	70-130			
1,2,4-Trichlorobenzene	0.103	0.00500	"	0.100		103	70-130			
1,2,4-Trimethylbenzene	0.109	0.00200	"	0.100		109	70-130			
1,2-Dibromo-3-chloropropane	0.102	0.00500	"	0.100		102	70-130			
1,2-Dibromoethane (EDB)	0.0917	0.00200	"	0.100		91.7	70-130			
1,2-Dichlorobenzene	0.109	0.00200	"	0.100		109	70-130			
1,2-Dichloroethane	0.103	0.00200	"	0.100		103	70-130			
1,2-Dichloropropane	0.106	0.00200	"	0.100		106	70-130			
1,3,5-Trimethylbenzene	0.119	0.00200	"	0.100		119	70-130			
1,3-Dichlorobenzene	0.101	0.00200	"	0.100		101	70-130			
1,3-Dichloropropane	0.0988	0.00200	"	0.100		98.8	70-130			
1,4-Dichlorobenzene	0.104	0.00200	"	0.100		104	70-130			
2,2-Dichloropropane	0.0918	0.00200	"	0.100		91.8	70-130			
2-Butanone	0.505	0.0100	"	0.500		101	70-130			
2-Chlorotoluene	0.116	0.00200	"	0.100		116	70-130			
2-Hexanone	0.488	0.0100	"	0.500		97.6	70-130			
4-Chlorotoluene	0.107	0.00200	"	0.100		107	70-130			
4-Isopropyltoluene	0.109	0.00200	"	0.100		109	70-130			

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

LCS (B7L1502-BS1)

Prepared: 12/15/2017 Analyzed: 12/15/2017

4-Methyl-2-pentanone	0.466	0.0100	mg/kg	0.500		93.3	70-130			
Acetone	0.510	0.0200	"	0.500		102	70-130			
Benzene	0.113	0.00200	"	0.100		113	70-130			
Bromobenzene	0.106	0.00200	"	0.100		106	70-130			
Bromochloromethane	0.0983	0.00200	"	0.100		98.3	70-130			
Bromodichloromethane	0.103	0.00200	"	0.100		103	70-130			
Bromoform	0.0904	0.00200	"	0.100		90.4	70-130			
Bromomethane	0.101	0.00200	"	0.100		101	70-130			
Carbon disulfide	0.0892	0.00500	"	0.100		89.2	70-130			
Carbon tetrachloride	0.0982	0.00200	"	0.100		98.2	70-130			
Chlorobenzene	0.106	0.00200	"	0.100		106	70-130			
Chloroethane	0.0986	0.00500	"	0.100		98.6	70-130			
Chloroform	0.108	0.00200	"	0.100		108	70-130			
Chloromethane	0.112	0.00200	"	0.100		112	70-130			
cis-1,2-Dichloroethene	0.105	0.00200	"	0.100		105	70-130			
cis-1,3-Dichloropropene	0.0947	0.00200	"	0.100		94.7	70-130			
Dibromochloromethane	0.0944	0.00200	"	0.100		94.4	70-130			
Dibromomethane	0.0956	0.00200	"	0.100		95.6	70-130			
Ethylbenzene	0.113	0.00200	"	0.100		113	70-130			
Hexachlorobutadiene	0.104	0.00500	"	0.100		104	70-130			
Iodomethane	0.0842	0.0150	"	0.100		84.2	70-130			
Isopropylbenzene	0.111	0.00200	"	0.100		111	70-130			
m,p-Xylene	0.225	0.00400	"	0.200		112	70-130			
Methyl tert-Butyl Ether	0.0962	0.00200	"	0.100		96.2	70-130			
Methylene Chloride	0.110	0.0200	"	0.100		110	70-130			
Naphthalene	0.100	0.0100	"	0.100		100	70-130			

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

LCS (B7L1502-BS1)

Prepared: 12/15/2017 Analyzed: 12/15/2017

n-Butylbenzene	0.115	0.00200	mg/kg	0.100		115	70-130			
n-Propylbenzene	0.114	0.00200	"	0.100		114	70-130			
o-Xylene	0.111	0.00200	"	0.100		111	70-130			
sec-Butylbenzene	0.109	0.00200	"	0.100		109	70-130			
Styrene	0.0987	0.00200	"	0.100		98.7	70-130			
tert-Butylbenzene	0.108	0.00200	"	0.100		108	70-130			
Tetrachloroethene	0.104	0.00200	"	0.100		104	70-130			
Toluene	0.109	0.00200	"	0.100		109	70-130			
trans-1,2-Dichloroethene	0.100	0.00200	"	0.100		100	70-130			
trans-1,3-Dichloropropene	0.0923	0.00200	"	0.100		92.3	70-130			
Trichloroethene	0.109	0.00200	"	0.100		109	70-130			
Trichlorofluoromethane	0.0900	0.00300	"	0.100		90.0	70-130			
Vinyl chloride	0.0938	0.00200	"	0.100		93.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	66		ug/L	62.5		106	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.7	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.3	70-130			

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Nick Talocco
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 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

LCS (B7L1502-BS2)

Prepared: 12/15/2017 Analyzed: 12/15/2017

1,1,1,2-Tetrachloroethane	0.0989	0.00200	mg/kg	0.100		98.9	70-130			
1,1,1-Trichloroethane	0.0933	0.00200	"	0.100		93.3	70-130			
1,1,2,2-Tetrachloroethane	0.101	0.00200	"	0.100		101	70-130			
1,1,2-Trichloroethane	0.0919	0.00200	"	0.100		91.9	70-130			
1,1-Dichloroethane	0.0954	0.00200	"	0.100		95.4	70-130			
1,1-Dichloroethene	0.0983	0.00200	"	0.100		98.3	70-130			
1,1-Dichloropropene	0.0956	0.00200	"	0.100		95.6	70-130			
1,2,3-Trichlorobenzene	0.0926	0.00500	"	0.100		92.6	70-130			
1,2,3-Trichloropropane	0.0990	0.00500	"	0.100		99.0	70-130			
1,2,4-Trichlorobenzene	0.0940	0.00500	"	0.100		94.0	70-130			
1,2,4-Trimethylbenzene	0.0993	0.00200	"	0.100		99.3	70-130			
1,2-Dibromo-3-chloropropane	0.101	0.00500	"	0.100		101	70-130			
1,2-Dibromoethane (EDB)	0.0849	0.00200	"	0.100		84.9	70-130			
1,2-Dichlorobenzene	0.0971	0.00200	"	0.100		97.1	70-130			
1,2-Dichloroethane	0.0929	0.00200	"	0.100		92.9	70-130			
1,2-Dichloropropane	0.0964	0.00200	"	0.100		96.4	70-130			
1,3,5-Trimethylbenzene	0.109	0.00200	"	0.100		109	70-130			
1,3-Dichlorobenzene	0.0923	0.00200	"	0.100		92.3	70-130			
1,3-Dichloropropane	0.0883	0.00200	"	0.100		88.3	70-130			
1,4-Dichlorobenzene	0.0942	0.00200	"	0.100		94.2	70-130			
2,2-Dichloropropane	0.0976	0.00200	"	0.100		97.6	70-130			
2-Butanone	0.477	0.0100	"	0.500		95.3	70-130			
2-Chlorotoluene	0.108	0.00200	"	0.100		108	70-130			
2-Hexanone	0.459	0.0100	"	0.500		91.8	70-130			
4-Chlorotoluene	0.0971	0.00200	"	0.100		97.1	70-130			
4-Isopropyltoluene	0.100	0.00200	"	0.100		100	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

LCS (B7L1502-BS2)

Prepared: 12/15/2017 Analyzed: 12/15/2017

4-Methyl-2-pentanone	0.468	0.0100	mg/kg	0.500		93.7	70-130			
Acetone	0.478	0.0200	"	0.500		95.5	70-130			
Benzene	0.0980	0.00200	"	0.100		98.0	70-130			
Bromobenzene	0.0972	0.00200	"	0.100		97.2	70-130			
Bromochloromethane	0.0904	0.00200	"	0.100		90.4	70-130			
Bromodichloromethane	0.0940	0.00200	"	0.100		94.0	70-130			
Bromoform	0.0829	0.00200	"	0.100		82.9	70-130			
Bromomethane	0.106	0.00200	"	0.100		106	70-130			
Carbon disulfide	0.0945	0.00500	"	0.100		94.5	70-130			
Carbon tetrachloride	0.0838	0.00200	"	0.100		83.8	70-130			
Chlorobenzene	0.0934	0.00200	"	0.100		93.4	70-130			
Chloroethane	0.110	0.00500	"	0.100		110	70-130			
Chloroform	0.0948	0.00200	"	0.100		94.8	70-130			
Chloromethane	0.114	0.00200	"	0.100		114	70-130			
cis-1,2-Dichloroethene	0.101	0.00200	"	0.100		101	70-130			
cis-1,3-Dichloropropene	0.0884	0.00200	"	0.100		88.4	70-130			
Dibromochloromethane	0.0851	0.00200	"	0.100		85.1	70-130			
Dibromomethane	0.0872	0.00200	"	0.100		87.2	70-130			
Ethylbenzene	0.100	0.00200	"	0.100		100	70-130			
Hexachlorobutadiene	0.0962	0.00500	"	0.100		96.2	70-130			
Iodomethane	0.0859	0.0150	"	0.100		85.9	70-130			
Isopropylbenzene	0.0999	0.00200	"	0.100		99.9	70-130			
m,p-Xylene	0.203	0.00400	"	0.200		102	70-130			
Methyl tert-Butyl Ether	0.0933	0.00200	"	0.100		93.3	70-130			
Methylene Chloride	0.101	0.0200	"	0.100		101	70-130			
Naphthalene	0.0896	0.0100	"	0.100		89.6	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

LCS (B7L1502-BS2)

Prepared: 12/15/2017 Analyzed: 12/15/2017

n-Butylbenzene	0.112	0.00200	mg/kg	0.100		112	70-130			
n-Propylbenzene	0.107	0.00200	"	0.100		107	70-130			
o-Xylene	0.101	0.00200	"	0.100		101	70-130			
sec-Butylbenzene	0.101	0.00200	"	0.100		101	70-130			
Styrene	0.0930	0.00200	"	0.100		93.0	70-130			
tert-Butylbenzene	0.0972	0.00200	"	0.100		97.2	70-130			
Tetrachloroethene	0.0933	0.00200	"	0.100		93.3	70-130			
Toluene	0.0945	0.00200	"	0.100		94.5	70-130			
trans-1,2-Dichloroethene	0.0964	0.00200	"	0.100		96.4	70-130			
trans-1,3-Dichloropropene	0.0877	0.00200	"	0.100		87.7	70-130			
Trichloroethene	0.0962	0.00200	"	0.100		96.2	70-130			
Trichlorofluoromethane	0.107	0.00300	"	0.100		107	70-130			
Vinyl chloride	0.0979	0.00200	"	0.100		97.9	70-130			
Surrogate: 1,2-Dichloroethane-d4	61		ug/L	62.5		98.3	70-130			
Surrogate: Toluene-d8	62		"	62.5		98.9	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.6	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike (B7L1502-MS1)	Source: Y712192-01			Prepared: 12/15/2017 Analyzed: 12/15/2017						
1,1,1,2-Tetrachloroethane	0.0852	0.00200	mg/kg	0.100	ND	85.2	70-130			
1,1,1-Trichloroethane	0.0836	0.00200	"	0.100	ND	83.6	70-130			
1,1,2,2-Tetrachloroethane	0.0860	0.00200	"	0.100	ND	86.0	70-130			
1,1,2-Trichloroethane	0.0786	0.00200	"	0.100	ND	78.6	70-130			
1,1-Dichloroethane	0.0852	0.00200	"	0.100	ND	85.2	70-130			
1,1-Dichloroethene	0.0819	0.00200	"	0.100	ND	81.9	70-130			
1,1-Dichloropropene	0.0768	0.00200	"	0.100	ND	76.8	70-130			
1,2,3-Trichlorobenzene	0.0449	0.00500	"	0.100	ND	44.9	70-130			QM-07
1,2,3-Trichloropropane	0.0862	0.00500	"	0.100	ND	86.2	70-130			
1,2,4-Trichlorobenzene	0.0484	0.00500	"	0.100	ND	48.4	70-130			QM-07
1,2,4-Trimethylbenzene	0.0703	0.00200	"	0.100	ND	70.3	70-130			
1,2-Dibromo-3-chloropropane	0.0779	0.00500	"	0.100	ND	77.9	70-130			
1,2-Dibromoethane (EDB)	0.0703	0.00200	"	0.100	ND	70.3	70-130			
1,2-Dichlorobenzene	0.0616	0.00200	"	0.100	ND	61.6	70-130			QM-07
1,2-Dichloroethane	0.0808	0.00200	"	0.100	ND	80.8	70-130			
1,2-Dichloropropane	0.0857	0.00200	"	0.100	ND	85.7	70-130			
1,3,5-Trimethylbenzene	0.0770	0.00200	"	0.100	ND	77.0	70-130			
1,3-Dichlorobenzene	0.0597	0.00200	"	0.100	ND	59.7	70-130			QM-07
1,3-Dichloropropane	0.0761	0.00200	"	0.100	ND	76.1	70-130			
1,4-Dichlorobenzene	0.0593	0.00200	"	0.100	ND	59.3	70-130			QM-07
2,2-Dichloropropane	0.0919	0.00200	"	0.100	ND	91.9	70-130			
2-Butanone	0.445	0.0100	"	0.500	ND	89.0	70-130			
2-Chlorotoluene	0.0734	0.00200	"	0.100	ND	73.4	70-130			
2-Hexanone	0.404	0.0100	"	0.500	ND	80.8	70-130			
4-Chlorotoluene	0.0686	0.00200	"	0.100	ND	68.6	70-130			QM-07
4-Isopropyltoluene	0.0672	0.00200	"	0.100	ND	67.2	70-130			QM-07

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike (B7L1502-MS1)	Source: Y712192-01			Prepared: 12/15/2017 Analyzed: 12/15/2017						
4-Methyl-2-pentanone	0.431	0.0100	mg/kg	0.500	ND	86.2	70-130			
Acetone	0.444	0.0200	"	0.500	ND	88.8	70-130			
Benzene	0.0822	0.00200	"	0.100	ND	82.2	70-130			
Bromobenzene	0.0686	0.00200	"	0.100	ND	68.6	70-130			QM-07
Bromochloromethane	0.0802	0.00200	"	0.100	ND	80.2	70-130			
Bromodichloromethane	0.0810	0.00200	"	0.100	ND	81.0	70-130			
Bromoform	0.0705	0.00200	"	0.100	ND	70.5	70-130			
Bromomethane	0.111	0.00200	"	0.100	ND	111	70-130			
Carbon disulfide	0.0741	0.00500	"	0.100	ND	74.1	70-130			
Carbon tetrachloride	0.0806	0.00200	"	0.100	ND	80.6	70-130			
Chlorobenzene	0.0678	0.00200	"	0.100	ND	67.8	70-130			QM-07
Chloroethane	0.115	0.00500	"	0.100	ND	115	70-130			
Chloroform	0.0821	0.00200	"	0.100	0.000860	81.3	70-130			
Chloromethane	0.113	0.00200	"	0.100	ND	113	70-130			
cis-1,2-Dichloroethene	0.0850	0.00200	"	0.100	ND	85.0	70-130			
cis-1,3-Dichloropropene	0.0745	0.00200	"	0.100	ND	74.5	70-130			
Dibromochloromethane	0.0702	0.00200	"	0.100	ND	70.2	70-130			
Dibromomethane	0.0753	0.00200	"	0.100	ND	75.3	70-130			
Ethylbenzene	0.0789	0.00200	"	0.100	ND	78.9	70-130			
Hexachlorobutadiene	0.0496	0.00500	"	0.100	ND	49.6	70-130			QM-07
Iodomethane	0.0746	0.0150	"	0.100	ND	74.6	70-130			
Isopropylbenzene	0.0758	0.00200	"	0.100	ND	75.8	70-130			
m,p-Xylene	0.159	0.00400	"	0.200	ND	79.5	70-130			
Methyl tert-Butyl Ether	0.0893	0.00200	"	0.100	ND	89.3	70-130			
Methylene Chloride	0.129	0.0200	"	0.100	0.0435	85.1	70-130			
Naphthalene	0.0430	0.0100	"	0.100	ND	43.0	70-130			QM-07

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Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike (B7L1502-MS1)	Source: Y712192-01			Prepared: 12/15/2017 Analyzed: 12/15/2017						
n-Butylbenzene	0.0680	0.00200	mg/kg	0.100	ND	68.0	70-130			QM-07
n-Propylbenzene	0.0758	0.00200	"	0.100	ND	75.8	70-130			
o-Xylene	0.0794	0.00200	"	0.100	ND	79.4	70-130			
sec-Butylbenzene	0.0671	0.00200	"	0.100	ND	67.1	70-130			QM-07
Styrene	0.0619	0.00200	"	0.100	ND	61.9	70-130			QM-07
tert-Butylbenzene	0.0697	0.00200	"	0.100	ND	69.7	70-130			QM-07
Tetrachloroethene	0.0689	0.00200	"	0.100	ND	68.9	70-130			QM-07
Toluene	0.0757	0.00200	"	0.100	ND	75.7	70-130			
trans-1,2-Dichloroethene	0.0794	0.00200	"	0.100	ND	79.4	70-130			
trans-1,3-Dichloropropene	0.0706	0.00200	"	0.100	ND	70.6	70-130			
Trichloroethene	0.0769	0.00200	"	0.100	ND	76.9	70-130			
Trichlorofluoromethane	0.0889	0.00300	"	0.100	ND	88.9	70-130			
Vinyl chloride	0.0970	0.00200	"	0.100	ND	97.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	66		ug/L	62.5		105	70-130			
Surrogate: Toluene-d8	62		"	62.5		98.4	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		103	70-130			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike (B7L1502-MS2)	Source: Y712192-02			Prepared: 12/15/2017 Analyzed: 12/15/2017						
1,1,1,2-Tetrachloroethane	0.102	0.00200	mg/kg	0.100	ND	102	70-130			
1,1,1-Trichloroethane	0.0981	0.00200	"	0.100	ND	98.1	70-130			
1,1,2,2-Tetrachloroethane	0.104	0.00200	"	0.100	ND	104	70-130			
1,1,2-Trichloroethane	0.0942	0.00200	"	0.100	ND	94.2	70-130			
1,1-Dichloroethane	0.0987	0.00200	"	0.100	ND	98.7	70-130			
1,1-Dichloroethene	0.101	0.00200	"	0.100	ND	101	70-130			
1,1-Dichloropropene	0.0993	0.00200	"	0.100	ND	99.3	70-130			
1,2,3-Trichlorobenzene	0.0941	0.00500	"	0.100	ND	94.1	70-130			
1,2,3-Trichloropropane	0.103	0.00500	"	0.100	ND	103	70-130			
1,2,4-Trichlorobenzene	0.0949	0.00500	"	0.100	ND	94.9	70-130			
1,2,4-Trimethylbenzene	0.100	0.00200	"	0.100	ND	100	70-130			
1,2-Dibromo-3-chloropropane	0.110	0.00500	"	0.100	ND	110	70-130			
1,2-Dibromoethane (EDB)	0.0878	0.00200	"	0.100	ND	87.8	70-130			
1,2-Dichlorobenzene	0.100	0.00200	"	0.100	ND	100	70-130			
1,2-Dichloroethane	0.0956	0.00200	"	0.100	ND	95.6	70-130			
1,2-Dichloropropane	0.101	0.00200	"	0.100	ND	101	70-130			
1,3,5-Trimethylbenzene	0.111	0.00200	"	0.100	ND	111	70-130			
1,3-Dichlorobenzene	0.0944	0.00200	"	0.100	ND	94.4	70-130			
1,3-Dichloropropane	0.0908	0.00200	"	0.100	ND	90.8	70-130			
1,4-Dichlorobenzene	0.0971	0.00200	"	0.100	ND	97.1	70-130			
2,2-Dichloropropane	0.103	0.00200	"	0.100	ND	103	70-130			
2-Butanone	0.516	0.0100	"	0.500	ND	103	70-130			
2-Chlorotoluene	0.110	0.00200	"	0.100	ND	110	70-130			
2-Hexanone	0.494	0.0100	"	0.500	ND	98.8	70-130			
4-Chlorotoluene	0.100	0.00200	"	0.100	ND	100	70-130			
4-Isopropyltoluene	0.101	0.00200	"	0.100	ND	101	70-130			

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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike (B7L1502-MS2)	Source: Y712192-02			Prepared: 12/15/2017 Analyzed: 12/15/2017						
4-Methyl-2-pentanone	0.468	0.0100	mg/kg	0.500	ND	93.7	70-130			
Acetone	0.517	0.0200	"	0.500	ND	103	70-130			
Benzene	0.101	0.00200	"	0.100	ND	101	70-130			
Bromobenzene	0.100	0.00200	"	0.100	ND	100	70-130			
Bromochloromethane	0.0930	0.00200	"	0.100	ND	93.0	70-130			
Bromodichloromethane	0.0971	0.00200	"	0.100	ND	97.1	70-130			
Bromoform	0.0881	0.00200	"	0.100	ND	88.1	70-130			
Bromomethane	0.101	0.00200	"	0.100	ND	101	70-130			
Carbon disulfide	0.0982	0.00500	"	0.100	ND	98.2	70-130			
Carbon tetrachloride	0.0931	0.00200	"	0.100	ND	93.1	70-130			
Chlorobenzene	0.0959	0.00200	"	0.100	ND	95.9	70-130			
Chloroethane	0.0933	0.00500	"	0.100	ND	93.3	70-130			
Chloroform	0.0977	0.00200	"	0.100	0.000980	96.7	70-130			
Chloromethane	0.107	0.00200	"	0.100	ND	107	70-130			
cis-1,2-Dichloroethene	0.104	0.00200	"	0.100	ND	104	70-130			
cis-1,3-Dichloropropene	0.0920	0.00200	"	0.100	ND	92.0	70-130			
Dibromochloromethane	0.0882	0.00200	"	0.100	ND	88.2	70-130			
Dibromomethane	0.0920	0.00200	"	0.100	ND	92.0	70-130			
Ethylbenzene	0.102	0.00200	"	0.100	ND	102	70-130			
Hexachlorobutadiene	0.0931	0.00500	"	0.100	ND	93.1	70-130			
Iodomethane	0.0885	0.0150	"	0.100	ND	88.5	70-130			
Isopropylbenzene	0.102	0.00200	"	0.100	ND	102	70-130			
m,p-Xylene	0.209	0.00400	"	0.200	ND	104	70-130			
Methyl tert-Butyl Ether	0.0985	0.00200	"	0.100	ND	98.5	70-130			
Methylene Chloride	0.110	0.0200	"	0.100	0.00654	103	70-130			
Naphthalene	0.0934	0.0100	"	0.100	ND	93.4	70-130			

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Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike (B7L1502-MS2)	Source: Y712192-02			Prepared: 12/15/2017 Analyzed: 12/15/2017						
n-Butylbenzene	0.112	0.00200	mg/kg	0.100	ND	112	70-130			
n-Propylbenzene	0.108	0.00200	"	0.100	ND	108	70-130			
o-Xylene	0.103	0.00200	"	0.100	ND	103	70-130			
sec-Butylbenzene	0.101	0.00200	"	0.100	ND	101	70-130			
Styrene	0.0894	0.00200	"	0.100	ND	89.4	70-130			
tert-Butylbenzene	0.0988	0.00200	"	0.100	ND	98.8	70-130			
Tetrachloroethene	0.0950	0.00200	"	0.100	ND	95.0	70-130			
Toluene	0.0974	0.00200	"	0.100	ND	97.4	70-130			
trans-1,2-Dichloroethene	0.0999	0.00200	"	0.100	ND	99.9	70-130			
trans-1,3-Dichloropropene	0.0904	0.00200	"	0.100	ND	90.4	70-130			
Trichloroethene	0.0986	0.00200	"	0.100	ND	98.6	70-130			
Trichlorofluoromethane	0.0885	0.00300	"	0.100	ND	88.5	70-130			
Vinyl chloride	0.0921	0.00200	"	0.100	ND	92.1	70-130			
Surrogate: 1,2-Dichloroethane-d4	62		ug/L	62.5		99.1	70-130			
Surrogate: Toluene-d8	61		"	62.5		97.1	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.8	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike Dup (B7L1502-MSD1)	Source: Y712192-01			Prepared: 12/15/2017 Analyzed: 12/18/2017						
1,1,1,2-Tetrachloroethane	0.0937	0.00200	mg/kg	0.100	ND	93.7	70-130	9.52	20	
1,1,1-Trichloroethane	0.0910	0.00200	"	0.100	ND	91.0	70-130	8.38	20	
1,1,2,2-Tetrachloroethane	0.101	0.00200	"	0.100	ND	101	70-130	15.6	20	
1,1,2-Trichloroethane	0.0889	0.00200	"	0.100	ND	88.9	70-130	12.3	20	
1,1-Dichloroethane	0.0961	0.00200	"	0.100	ND	96.1	70-130	12.0	20	
1,1-Dichloroethene	0.0912	0.00200	"	0.100	ND	91.2	70-130	10.8	20	
1,1-Dichloropropene	0.0841	0.00200	"	0.100	ND	84.1	70-130	9.00	20	
1,2,3-Trichlorobenzene	0.0558	0.00500	"	0.100	ND	55.8	70-130	21.5	20	QM-07, QR-03
1,2,3-Trichloropropane	0.100	0.00500	"	0.100	ND	100	70-130	14.9	20	
1,2,4-Trichlorobenzene	0.0564	0.00500	"	0.100	ND	56.4	70-130	15.4	20	QM-07
1,2,4-Trimethylbenzene	0.0781	0.00200	"	0.100	ND	78.1	70-130	10.6	20	
1,2-Dibromo-3-chloropropane	0.0936	0.00500	"	0.100	ND	93.6	70-130	18.3	20	
1,2-Dibromoethane (EDB)	0.0793	0.00200	"	0.100	ND	79.3	70-130	12.1	20	
1,2-Dichlorobenzene	0.0694	0.00200	"	0.100	ND	69.4	70-130	11.9	20	QM-07
1,2-Dichloroethane	0.0931	0.00200	"	0.100	ND	93.1	70-130	14.1	20	
1,2-Dichloropropane	0.0959	0.00200	"	0.100	ND	95.9	70-130	11.3	20	
1,3,5-Trimethylbenzene	0.0870	0.00200	"	0.100	ND	87.0	70-130	12.2	20	
1,3-Dichlorobenzene	0.0649	0.00200	"	0.100	ND	64.9	70-130	8.22	20	QM-07
1,3-Dichloropropane	0.0853	0.00200	"	0.100	ND	85.3	70-130	11.4	20	
1,4-Dichlorobenzene	0.0654	0.00200	"	0.100	ND	65.4	70-130	9.82	20	QM-07
2,2-Dichloropropane	0.0983	0.00200	"	0.100	ND	98.3	70-130	6.75	20	
2-Butanone	0.547	0.0100	"	0.500	ND	109	70-130	20.5	20	QR-02
2-Chlorotoluene	0.0818	0.00200	"	0.100	ND	81.8	70-130	10.7	20	
2-Hexanone	0.485	0.0100	"	0.500	ND	97.0	70-130	18.3	20	
4-Chlorotoluene	0.0751	0.00200	"	0.100	ND	75.1	70-130	9.10	20	
4-Isopropyltoluene	0.0768	0.00200	"	0.100	ND	76.8	70-130	13.4	20	

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 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike Dup (B7L1502-MSD1)	Source: Y712192-01			Prepared: 12/15/2017 Analyzed: 12/18/2017						
4-Methyl-2-pentanone	0.482	0.0100	mg/kg	0.500	ND	96.4	70-130	11.2	20	
Acetone	0.563	0.0200	"	0.500	ND	113	70-130	23.6	20	QR-02
Benzene	0.0898	0.00200	"	0.100	ND	89.8	70-130	8.79	20	
Bromobenzene	0.0754	0.00200	"	0.100	ND	75.4	70-130	9.39	20	
Bromochloromethane	0.0875	0.00200	"	0.100	ND	87.5	70-130	8.73	20	
Bromodichloromethane	0.0901	0.00200	"	0.100	ND	90.1	70-130	10.6	20	
Bromoform	0.0785	0.00200	"	0.100	ND	78.5	70-130	10.7	20	
Bromomethane	0.111	0.00200	"	0.100	ND	111	70-130	0.379	20	
Carbon disulfide	0.0793	0.00500	"	0.100	ND	79.3	70-130	6.81	20	
Carbon tetrachloride	0.0821	0.00200	"	0.100	ND	82.1	70-130	1.87	20	
Chlorobenzene	0.0715	0.00200	"	0.100	ND	71.5	70-130	5.23	20	
Chloroethane	0.117	0.00500	"	0.100	ND	117	70-130	1.57	20	
Chloroform	0.0927	0.00200	"	0.100	0.000860	91.8	70-130	12.0	20	
Chloromethane	0.108	0.00200	"	0.100	ND	108	70-130	4.26	20	
cis-1,2-Dichloroethene	0.0955	0.00200	"	0.100	ND	95.5	70-130	11.6	20	
cis-1,3-Dichloropropene	0.0803	0.00200	"	0.100	ND	80.3	70-130	7.54	20	
Dibromochloromethane	0.0784	0.00200	"	0.100	ND	78.4	70-130	11.0	20	
Dibromomethane	0.0834	0.00200	"	0.100	ND	83.4	70-130	10.1	20	
Ethylbenzene	0.0863	0.00200	"	0.100	ND	86.3	70-130	8.89	20	
Hexachlorobutadiene	0.0575	0.00500	"	0.100	ND	57.5	70-130	14.8	20	QM-07
Iodomethane	0.0794	0.0150	"	0.100	ND	79.4	70-130	6.23	20	
Isopropylbenzene	0.0838	0.00200	"	0.100	ND	83.8	70-130	10.0	20	
m,p-Xylene	0.172	0.00400	"	0.200	ND	86.0	70-130	7.82	20	
Methyl tert-Butyl Ether	0.103	0.00200	"	0.100	ND	103	70-130	14.3	20	
Methylene Chloride	0.153	0.0200	"	0.100	0.0435	110	70-130	17.4	20	
Naphthalene	0.0567	0.0100	"	0.100	ND	56.7	70-130	27.6	20	QM-07, QR-03

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike Dup (B7L1502-MSD1)	Source: Y712192-01			Prepared: 12/15/2017 Analyzed: 12/18/2017						
n-Butylbenzene	0.0798	0.00200	mg/kg	0.100	ND	79.8	70-130	15.9	20	
n-Propylbenzene	0.0844	0.00200	"	0.100	ND	84.4	70-130	10.7	20	
o-Xylene	0.0853	0.00200	"	0.100	ND	85.3	70-130	7.16	20	
sec-Butylbenzene	0.0771	0.00200	"	0.100	ND	77.1	70-130	14.0	20	
Styrene	0.0716	0.00200	"	0.100	ND	71.6	70-130	14.5	20	
tert-Butylbenzene	0.0791	0.00200	"	0.100	ND	79.1	70-130	12.5	20	
Tetrachloroethene	0.0732	0.00200	"	0.100	ND	73.2	70-130	6.11	20	
Toluene	0.0807	0.00200	"	0.100	ND	80.7	70-130	6.45	20	
trans-1,2-Dichloroethene	0.0885	0.00200	"	0.100	ND	88.5	70-130	10.8	20	
trans-1,3-Dichloropropene	0.0777	0.00200	"	0.100	ND	77.7	70-130	9.66	20	
Trichloroethene	0.0820	0.00200	"	0.100	ND	82.0	70-130	6.39	20	
Trichlorofluoromethane	0.0976	0.00300	"	0.100	ND	97.6	70-130	9.26	20	
Vinyl chloride	0.0975	0.00200	"	0.100	ND	97.5	70-130	0.494	20	
Surrogate: 1,2-Dichloroethane-d4	64		ug/L	62.5		103	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.3	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike Dup (B7L1502-MSD2)	Source: Y712192-02			Prepared: 12/15/2017 Analyzed: 12/15/2017						
1,1,1,2-Tetrachloroethane	0.0918	0.00200	mg/kg	0.100	ND	91.8	70-130	10.6	20	
1,1,1-Trichloroethane	0.0893	0.00200	"	0.100	ND	89.3	70-130	9.44	20	
1,1,2,2-Tetrachloroethane	0.0946	0.00200	"	0.100	ND	94.6	70-130	9.89	20	
1,1,2-Trichloroethane	0.0894	0.00200	"	0.100	ND	89.4	70-130	5.21	20	
1,1-Dichloroethane	0.0894	0.00200	"	0.100	ND	89.4	70-130	9.84	20	
1,1-Dichloroethene	0.0901	0.00200	"	0.100	ND	90.1	70-130	11.3	20	
1,1-Dichloropropene	0.0893	0.00200	"	0.100	ND	89.3	70-130	10.6	20	
1,2,3-Trichlorobenzene	0.0850	0.00500	"	0.100	ND	85.0	70-130	10.2	20	
1,2,3-Trichloropropane	0.0930	0.00500	"	0.100	ND	93.0	70-130	9.80	20	
1,2,4-Trichlorobenzene	0.0846	0.00500	"	0.100	ND	84.6	70-130	11.5	20	
1,2,4-Trimethylbenzene	0.0915	0.00200	"	0.100	ND	91.5	70-130	9.25	20	
1,2-Dibromo-3-chloropropane	0.0994	0.00500	"	0.100	ND	99.4	70-130	10.3	20	
1,2-Dibromoethane (EDB)	0.0818	0.00200	"	0.100	ND	81.8	70-130	7.07	20	
1,2-Dichlorobenzene	0.0896	0.00200	"	0.100	ND	89.6	70-130	11.2	20	
1,2-Dichloroethane	0.0867	0.00200	"	0.100	ND	86.7	70-130	9.79	20	
1,2-Dichloropropane	0.0927	0.00200	"	0.100	ND	92.7	70-130	8.15	20	
1,3,5-Trimethylbenzene	0.0984	0.00200	"	0.100	ND	98.4	70-130	12.1	20	
1,3-Dichlorobenzene	0.0845	0.00200	"	0.100	ND	84.5	70-130	11.1	20	
1,3-Dichloropropane	0.0851	0.00200	"	0.100	ND	85.1	70-130	6.44	20	
1,4-Dichlorobenzene	0.0868	0.00200	"	0.100	ND	86.8	70-130	11.2	20	
2,2-Dichloropropane	0.0926	0.00200	"	0.100	ND	92.6	70-130	10.6	20	
2-Butanone	0.474	0.0100	"	0.500	ND	94.8	70-130	8.54	20	
2-Chlorotoluene	0.0985	0.00200	"	0.100	ND	98.5	70-130	11.4	20	
2-Hexanone	0.455	0.0100	"	0.500	ND	91.0	70-130	8.30	20	
4-Chlorotoluene	0.0890	0.00200	"	0.100	ND	89.0	70-130	11.8	20	
4-Isopropyltoluene	0.0894	0.00200	"	0.100	ND	89.4	70-130	12.4	20	

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike Dup (B7L1502-MSD2)	Source: Y712192-02			Prepared: 12/15/2017 Analyzed: 12/15/2017						
4-Methyl-2-pentanone	0.464	0.0100	mg/kg	0.500	ND	92.9	70-130	0.836	20	
Acetone	0.466	0.0200	"	0.500	ND	93.3	70-130	10.2	20	
Benzene	0.0913	0.00200	"	0.100	ND	91.3	70-130	9.81	20	
Bromobenzene	0.0902	0.00200	"	0.100	ND	90.2	70-130	10.3	20	
Bromochloromethane	0.0845	0.00200	"	0.100	ND	84.5	70-130	9.58	20	
Bromodichloromethane	0.0893	0.00200	"	0.100	ND	89.3	70-130	8.35	20	
Bromoform	0.0802	0.00200	"	0.100	ND	80.2	70-130	9.44	20	
Bromomethane	0.0895	0.00200	"	0.100	ND	89.5	70-130	11.7	20	
Carbon disulfide	0.0887	0.00500	"	0.100	ND	88.7	70-130	10.2	20	
Carbon tetrachloride	0.0893	0.00200	"	0.100	ND	89.3	70-130	4.25	20	
Chlorobenzene	0.0882	0.00200	"	0.100	ND	88.2	70-130	8.41	20	
Chloroethane	0.0939	0.00500	"	0.100	ND	93.9	70-130	0.684	20	
Chloroform	0.0888	0.00200	"	0.100	0.000980	87.8	70-130	9.52	20	
Chloromethane	0.100	0.00200	"	0.100	ND	100	70-130	6.71	20	
cis-1,2-Dichloroethene	0.0942	0.00200	"	0.100	ND	94.2	70-130	10.0	20	
cis-1,3-Dichloropropene	0.0843	0.00200	"	0.100	ND	84.3	70-130	8.76	20	
Dibromochloromethane	0.0816	0.00200	"	0.100	ND	81.6	70-130	7.82	20	
Dibromomethane	0.0843	0.00200	"	0.100	ND	84.3	70-130	8.76	20	
Ethylbenzene	0.0916	0.00200	"	0.100	ND	91.6	70-130	10.7	20	
Hexachlorobutadiene	0.0803	0.00500	"	0.100	ND	80.3	70-130	14.7	20	
Iodomethane	0.0790	0.0150	"	0.100	ND	79.0	70-130	11.3	20	
Isopropylbenzene	0.0916	0.00200	"	0.100	ND	91.6	70-130	10.5	20	
m,p-Xylene	0.187	0.00400	"	0.200	ND	93.4	70-130	11.0	20	
Methyl tert-Butyl Ether	0.0901	0.00200	"	0.100	ND	90.1	70-130	8.90	20	
Methylene Chloride	0.112	0.0200	"	0.100	0.00654	105	70-130	2.02	20	
Naphthalene	0.0851	0.0100	"	0.100	ND	85.1	70-130	9.25	20	

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1502 - EPA 5030 (soil)

Matrix Spike Dup (B7L1502-MSD2)	Source: Y712192-02			Prepared: 12/15/2017 Analyzed: 12/15/2017						
n-Butylbenzene	0.0971	0.00200	mg/kg	0.100	ND	97.1	70-130	14.0	20	
n-Propylbenzene	0.0963	0.00200	"	0.100	ND	96.3	70-130	11.6	20	
o-Xylene	0.0929	0.00200	"	0.100	ND	92.9	70-130	10.5	20	
sec-Butylbenzene	0.0896	0.00200	"	0.100	ND	89.6	70-130	11.5	20	
Styrene	0.0813	0.00200	"	0.100	ND	81.3	70-130	9.54	20	
tert-Butylbenzene	0.0877	0.00200	"	0.100	ND	87.7	70-130	11.9	20	
Tetrachloroethene	0.0873	0.00200	"	0.100	ND	87.3	70-130	8.45	20	
Toluene	0.0891	0.00200	"	0.100	ND	89.1	70-130	8.92	20	
trans-1,2-Dichloroethene	0.0899	0.00200	"	0.100	ND	89.9	70-130	10.5	20	
trans-1,3-Dichloropropene	0.0835	0.00200	"	0.100	ND	83.5	70-130	7.91	20	
Trichloroethene	0.0902	0.00200	"	0.100	ND	90.2	70-130	8.96	20	
Trichlorofluoromethane	0.0799	0.00300	"	0.100	ND	79.9	70-130	10.2	20	
Vinyl chloride	0.0852	0.00200	"	0.100	ND	85.2	70-130	7.83	20	
Surrogate: 1,2-Dichloroethane-d4	63		ug/L	62.5		101	70-130			
Surrogate: Toluene-d8	61		"	62.5		98.4	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.5	70-130			

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Extractable Petroleum Hydrocarbons by 8015C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L1503 - EPA 3580

Blank (B7L1503-BLK1)

Prepared: 12/15/2017 Analyzed: 12/16/2017

Gasoline (C6-C10)	ND	50.0	mg/kg							Ua
Diesel (C10-C28)	ND	50.0	"							Ua
Surrogate: o-Terphenyl	56		"	50.0		113	59-131			

LCS (B7L1503-BS1)

Prepared: 12/15/2017 Analyzed: 12/16/2017

Gasoline (C6-C10)	1160	50.0	mg/kg	1000		116	59-133			
Diesel (C10-C28)	1100	50.0	"	1000		110	64-121			
Surrogate: o-Terphenyl	59		"	50.0		118	59-131			

Matrix Spike (B7L1503-MS1)

Source: Y712192-01

Prepared: 12/15/2017 Analyzed: 12/16/2017

Gasoline (C6-C10)	1120	50.0	mg/kg	1000	ND	112	57-139			
Diesel (C10-C28)	1080	50.0	"	1000	ND	108	53-125			
Surrogate: o-Terphenyl	59		"	50.0		117	59-131			

Matrix Spike Dup (B7L1503-MSD1)

Source: Y712192-01

Prepared: 12/15/2017 Analyzed: 12/16/2017

Gasoline (C6-C10)	1070	50.0	mg/kg	1000	ND	107	57-139	3.95	20	
Diesel (C10-C28)	1050	50.0	"	1000	ND	105	53-125	2.66	20	
Surrogate: o-Terphenyl	55		"	50.0		110	59-131			

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Total Metals by 6010C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1725975 - SW846 3050B

BLANK (1203937923-BLK)

Prepared: 12/13/2017 Analyzed: 12/15/2017

Lead	ND	0.986	mg/kg				-			U
Silver	ND	0.493	"				-			U
Chromium	0.262	0.493	"				-			J
Cadmium	ND	0.493	"				-			U
Barium	ND	0.493	"				-			U
Arsenic	ND	2.96	"				-			U
Selenium	ND	2.96	"				-			U

LCS (1203937924-BKS)

Prepared: 12/13/2017 Analyzed: 12/15/2017

Arsenic	45.0	2.91	mg/kg	48.5	92.6	80-120				
Barium	46.3	0.485	"	48.5	95.3	80-120				
Cadmium	44.5	0.485	"	48.5	91.7	80-120				
Chromium	45.8	0.485	"	48.5	94.3	80-120				
Lead	45.1	0.971	"	48.5	92.8	80-120				
Selenium	46.0	2.91	"	48.5	94.8	80-120				
Silver	46.2	0.485	"	48.5	95.2	80-120				

DUP (1203937925 D)

Source: Y712192-01

Prepared: 12/13/2017 Analyzed: 12/15/2017

Cadmium	ND	0.612	mg/kg dry		<0.122	0-20	NR	20		U
Silver	ND	0.612	"		<0.122	0-20	NR	20		U
Selenium	0.756	3.67	"		0.946	0-20	22.3	20		J
Chromium	13.0	0.612	"		17.3	0-20	28.3	20		
Barium	402	0.612	"		466	0-20	14.7	20		
Arsenic	7.57	3.67	"		6.85	0-20	10.1	20		
Lead	23.9	1.22	"		36.1	0-20	40.5	20		

MS (1203937926 S)

Source: Y712192-01

Prepared: 12/13/2017 Analyzed: 12/15/2017

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

Total Metals by 6010C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1725975 - SW846 3050B

MS (1203937926 S)	Source: Y712192-01			Prepared: 12/13/2017 Analyzed: 12/15/2017						
Arsenic	60.9	3.64	mg/kg dry	60.6	6.85	89.1	75-125			
Barium	516	0.606	"	60.6	466	82.7	75-125			
Cadmium	49.9	0.606	"	60.6	<0.121	82.4	75-125			
Chromium	72.1	0.606	"	60.6	17.3	90.5	75-125			
Lead	81.7	1.21	"	60.6	36.1	75.3	75-125			
Selenium	53.1	3.64	"	60.6	0.946	86	75-125			
Silver	56.5	0.606	"	60.6	<0.121	93	75-125			

Origins Laboratory, Inc.



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LT Environmental, Inc.
 4600 West 60th Avenue
 Arvada CO 80003

Nick Talocco
 Project Number: 061717001
 Project: Rude Park

**Total Metals by 7471A - Quality Control
 GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1726295 - SW846 7471A Prep										
BLANK (1203938754-BLK)					Prepared: 12/14/2017 Analyzed: 12/15/2017					
Mercury	0.00456	0.0118	mg/kg				-			J
LCS (1203938755-BKS)					Prepared: 12/14/2017 Analyzed: 12/15/2017					
Mercury	0.113	0.011	mg/kg	0.110		103	80-120			
MS (1203938756 S)					Source: 439630001 Prepared: 12/14/2017 Analyzed: 12/15/2017					
Mercury	0.189	0.012	mg/kg dry	0.120	0.0388	124	80-120			
MSD (1203938757 SD)					Source: 439630001 Prepared: 12/14/2017 Analyzed: 12/15/2017					
Mercury	0.192	0.0131	mg/kg dry	0.131	0.0388	117	80-120	1.74	20	

Origins Laboratory, Inc.



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LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Nick Talocco
Project Number: 061717001
Project: Rude Park

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

QR-03 The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.

QR-02 The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

J Greater than the detection limit but less than the reporting limit

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Jen Pellegrini For Noelle Doyle Mathis, President

APPENDIX B
GUIDANCE FOR REUSE OF SOIL ON CITY PROJECTS / OCTOBER 2017





Department of Environmental Health

Division of Environmental Quality

200 W 14th Ave, Suite 310

Denver, CO 80204

p: 720-913-1311

f: 720-865-5534

www.denvergov.org/deh

INTEROFFICE MEMORANDUM

TO: City and County of Denver Department Executive Directors

FROM: Doug Linkhart, Executive Director

DATE: April 29, 2015

SUBJECT: Guidance for Third Party Reuse of Excess Soil from City Projects

There is increasing demand in and around the City and County of Denver (City) for soil available for reuse. City projects sometimes generate excess soil that potentially could be reused. Such reuse offers several benefits to the City including reduced hauling costs, disposal fees, and vehicle emissions. The soil must be adequately characterized based on the intended reuse in order to protect public health and the environment. If contaminated, the soil must be disposed at the City-owned Denver Arapahoe Disposal Site (DADS) in accordance with Executive Order 115. If the soil meets the Colorado Department of Public Health and Environment (CDPHE) regulatory standards and guidance, the Department of Environmental Health (DEH) encourages its reuse.

This guidance provides procedures and criteria by which contractors and third parties may, or may not, reuse excess soil from City projects at non-City sites.

As such, to promote safe and sustainable reuse, it is within DEH's purview to implement the following requirements for City excess soils to be reused:

1. City personnel are responsible for contacting the City's Department of Environmental Health (DEH)¹ when they receive a contractor or third party request to reuse soil. DEH is responsible for promptly informing the contractor or third party of City sampling and analysis requirements, which are designed to promote safe and sustainable reuse.
2. Soil must be adequately characterized by sampling utilizing a sampling plan and methodology sufficient to evaluate the equivalent of at least every 500 cubic yards to be excavated.
3. Analyze those soil samples for, at a minimum:
 - a. Volatile organic constituents

¹ Diane DeLillio, 720-865-5448, diane.delillio@denvergov.org



Department of Environmental Health

Division of Environmental Quality

200 W 14th Ave, Suite 310

Denver, CO 80204

p: 720-913-1311

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www.denvergov.org/deh

- b. Semi-volatile organic constituents
 - c. Total petroleum hydrocarbons
 - d. Pesticides
 - e. Herbicides
 - f. PCBs
 - g. Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
 - h. Asbestos.
4. The sampling and analysis must be conducted by environmental professionals approved by DEH.
 5. The party requesting the excess soil shall pay all costs associated with the sampling and analysis of the soil.
 6. Before the City will release the soil for reuse, the party requesting the excess soil must demonstrate to DEH's satisfaction that the soil meets either CDPHE's most restrictive criteria for residential soil or applicable CDPHE criteria based on the designated land use of the receiving site.
 7. DEH maintains the documentation for sample collection, analytical results, and the environmental consultant's field notes and evaluation.
 8. The party will be required to sign a release to accept the soil from the City and to release the City from liability.

CC: Jessica Brody, CAO
Zach Clayton, DEH
Gregg Thomas, DEH

APPENDIX C

**COLORADO DISCHARGE PERMIT SYSTEM GENERAL PERMIT STORMWATER
DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES COR0300000**



CDPS GENERAL PERMIT
STORMWATER DISCHARGES ASSOCIATED WITH
CONSTRUCTION ACTIVITY
AUTHORIZATION TO DISCHARGE UNDER THE
COLORADO DISCHARGE PERMIT SYSTEM

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act"), this permit authorizes the discharge of stormwater associated with construction activities (and specific allowable non-stormwater discharges in accordance with Part I.D.3 of the permit) certified under this permit, from those locations specified throughout the State of Colorado to specified waters of the State. Such discharges shall be in accordance with the conditions of this permit.

This permit specifically authorizes the facility listed on page 1 of this permit to discharge, as of this date, in accordance with permit requirements and conditions set forth in Parts I and II hereof. All discharges authorized herein shall be consistent with the terms and conditions of this permit.

This permit and the authorization to discharge shall expire at midnight, **June 30, 2012**.

Issued and Signed this 31st day of May, 2007

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT



Janet S. Kieler
Permits Section Manager
Water Quality Control Division

SIGNED AND ISSUED MAY 31, 2007

EFFECTIVE JULY 1, 2007

ADMINISTRATIVELY
CONTINUED EFFECTIVE
JULY 1, 2012

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PART I

A. COVERAGE UNDER THIS PERMIT

1. **Authority to Discharge**

Under this permit, facilities are granted authorization to discharge stormwater associated with construction activities into waters of the state of Colorado. This permit also authorizes the discharge of specific allowable non-stormwater discharges, in accordance with Part I.D.3 of the permit, which includes discharges to the ground. This includes stormwater discharges from areas that are dedicated to producing earthen materials, such as soils, sand and gravel, for use at a single construction site (i.e., borrow or fill areas). This permit also authorizes stormwater discharges from dedicated asphalt batch plants and dedicated concrete batch plants. (Coverage under the construction site permit is not required for batch plants if they have alternate CDPS permit coverage.) This permit does not authorize the discharge of mine water or process water from such areas.

- a) **Applicable Sections:** In accordance with Part I.A.3 of this permit, some parts of this permit do not apply to sites covered under a Qualifying Local Program, as defined in I.A.2.d. For sites not covered by a Qualifying Local Program, all parts of the permit apply except Part I.A.3. The permittee will be responsible for determining and then complying with the applicable sections.
- b) **Oil and Gas Construction:** Stormwater discharges associated with construction activities directly related to oil and gas exploration, production, processing, and treatment operations or transmission facilities are regulated under the Colorado Discharge Permit System Regulations (5CCR 1002-61), and require coverage under this permit in accordance with that regulation. However, references in this permit to specific authority under the Federal Clean Water Act (CWA) do not apply to stormwater discharges associated with these oil and gas related construction activities, to the extent that the references are limited by the federal Energy Policy Act of 2005.

2. **Definitions**

- a) **Stormwater:** Stormwater is precipitation-induced surface runoff.
- b) **Construction activity:** Construction activity refers to ground surface disturbing activities, which include, but are not limited to, clearing, grading, excavation, demolition, installation of new or improved haul roads and access roads, staging areas, stockpiling of fill materials, and borrow areas. Construction does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.
- c) **Small construction activity:** Stormwater discharge associated with small construction activity means the discharge of stormwater from construction activities that result in land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale, if the larger common plan will ultimately disturb equal to or greater than one and less than five acres.
- d) **Qualifying Local Program:** This permit includes conditions that incorporate qualifying local erosion and sediment control program (Qualifying Local Program) requirements by reference. A Qualifying Local Program is a municipal stormwater program for stormwater discharges associated with small construction activity that has been formally approved by the Division.

Other Definitions: Definitions of additional terms can be found in Part I.E. of this permit.

3. **Permit Coverage Without Application – for small construction activities under a Qualifying Local Program only**

If a small construction site is within the jurisdiction of a Qualifying Local Program, the operator of the construction activity is authorized to discharge stormwater associated with small construction activity under this general permit without the submittal of an application to the Division.

- a) **Applicable Sections:** For sites covered by a Qualifying Local Program, only Parts 1.A.1, 1.A.2, 1.A.3, I.D.1, I.D.2, I.D.3, I.D.4, I.D.7, I.D.8, I.D.11, I.E and Part II of this permit, with the exception of Parts II.A.1, II.B.3, II.B.8, and II.B10, apply.

A. COVERAGE UNDER THIS PERMIT (cont.)

- b) **Local Agency Authority:** This permit does not pre-empt or supersede the authority of local agencies to prohibit, restrict, or control discharges of stormwater to storm drain systems or other water courses within their jurisdiction.
- c) **Permit Coverage Termination:** When a site under a Qualifying Local Program has been finally stabilized, coverage under this permit is automatically terminated.
- d) **Compliance with Qualifying Local Program:** A construction site operator that has authorization to discharge under this permit under Part I.A.3 shall comply with the requirements of the Qualifying Local Program with jurisdiction over the site.
- e) **Full Permit Applicability:** The Division may require any operator within the jurisdiction of a Qualifying Local Program covered under this permit to apply for and obtain coverage under the full requirements of this permit. The operator must be notified in writing that an application for full coverage is required. When a permit certification under this permit is issued to an operator that would otherwise be covered under Part I.A.3 of this permit, the full requirements of this permit replace the requirements as per Part I.A.3 of this permit, upon the effective date of the permit certification. A site brought under the full requirements of this permit must still comply with local stormwater management requirements, policies or guidelines as required by Part I.D.1.g of this permit.

4. **Application, Due Dates**

- a) **Application Due Dates:** At least **ten calendar days** prior to the commencement of construction activities, the applicant shall submit an application form as provided by the Division, with a certification that the Stormwater Management Plan (SWMP) is complete.

One original completed discharge permit application shall be submitted, by mail or hand delivery, to:

Colorado Department of Public Health and Environment
Water Quality Control Division
WQCD-Permits-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

- b) **Summary of Application:** The application requires, at a minimum, the following:
 - 1) The applicant's company name; address; telephone number; and email address (if available); whether the applicant is the owner, developer, or contractor; and local contact information;
 - 2) Project name, address, county and location of the construction site, including the latitude and longitude to the nearest 15 seconds of the approximate center of the construction activity;
 - 3) Legal description or map of the construction site;
 - 4) Estimates of: the total area of the site, the area of the site that is expected to be disturbed, and the total area of the larger common plan of development or sale to undergo disturbance;
 - 5) The nature of the construction activity;
 - 6) The anticipated start date and final stabilization date for the project;
 - 7) The name of the receiving water(s), or the municipal separate storm sewer system and the ultimate (i.e., named) receiving water(s);
 - 8) Certification that the SWMP for the construction site is complete (see Part I.C. below); and
 - 9) The signature of the applicant, signed in accordance with Part I.F.1 of this permit.

5. **Permit Certification Procedures**

If this general permit is appropriate for the applicant's operation, then a certification will be developed and the applicant will be authorized to discharge stormwater under this general permit.

- a) **Request for Additional Information:** The Division shall have up to **ten calendar days** after receipt of the above information to request additional data and/or deny the authorization for any particular discharge. Upon receipt of additional information, the Division shall have an additional **ten calendar days** to issue or deny authorization for the particular discharge. (Notification of denial shall be by letter, in cases where coverage under an alternate general permit or an individual permit is required, instead of coverage under this permit.)

A. COVERAGE UNDER THIS PERMIT (cont.)

- b) **Automatic Coverage:** If the applicant does not receive a request for additional information or a notification of denial from the Division dated within ten calendar days of receipt of the application by the Division, authorization to discharge in accordance with the conditions of this permit shall be deemed granted.
- c) **Individual Permit Required:** If, after evaluation of the application (or additional information, such as the SWMP), it is found that this general permit is not appropriate for the operation, then the application will be processed as one for an individual permit. The applicant will be notified of the Division's decision to deny certification under this general permit. For an individual permit, additional information may be requested, and 180 days may be required to process the application and issue the permit. At the Division's discretion, temporary coverage under this general permit may be allowed until the individual permit goes into effect.
- d) **General vs. Individual Permit Coverage:** Any permittee authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual CDPS permit. The permittee shall submit an individual application, with reasons supporting the request, to the Division at least 180 days prior to any discharge.
- e) **Local Agency Authority:** This permit does not pre-empt or supersede the authority of local agencies to prohibit, restrict, or control discharges of stormwater to storm drain systems or other water courses within their jurisdiction.

6. **Inactivation Notice**

When a site has been finally stabilized in accordance with the SWMP, the permittee must submit an **Inactivation Notice** form that is signed in accordance with Part I.F.1. of this permit. The Inactivation Notice form is available from the Division and includes:

- a) Permit certification number;
- b) The permittee's name, address, telephone number;
- c) Name, location, and county for the construction site for which the inactivation notice is being submitted; and
- d) Certification that the site has been finally stabilized, and a description of the final stabilization method(s).

7. **Transfer of Permit**

When responsibility for stormwater discharges at a construction site changes from one entity to another, the permittee shall submit a completed **Notice of Transfer and Acceptance of Terms** form that is signed in accordance with Part I.F.1. of this permit. The Notice of Transfer form is available from the Division and includes:

- a) Permit certification number;
- b) Name, location, and county for the construction site for which the Notice of Transfer is being submitted;
- c) Identifying information for the new permittee;
- d) Identifying information for the current permittee; and
- e) Effective date of transfer.

If the new responsible party will not complete the transfer form, the permit may be inactivated upon written request to the Division and completion of the Inactivation Notice if the permittee has no legal responsibility, through ownership or contract, for the construction activities at the site. In this case, the new owner or operator would be required to obtain permit coverage separately.

8. **Reassignment of Permit**

When a permittee no longer has control of a specific portion of a permitted site, and wishes to transfer coverage of that portion of the site to a second party, the permittee shall submit a completed **Notice of Reassignment of Permit Coverage** form that is signed in accordance with Part I.F.1. of this permit. The Notice of Reassignment of Permit Coverage form is available from the Division and includes:

- a) Current permit certification number;
- b) Identifying information and certification as required by Part I.A.4.b for the new permittee;
- c) Identifying information for the current permittee, revised site information and certification for reassignment; and
- d) Effective date of reassignment.

A. COVERAGE UNDER THIS PERMIT (cont.)

If the new responsible party will not complete the reassignment form, the applicable portion of the permitted site may be removed from permit coverage upon written request to the Division if the permittee has no legal responsibility, through ownership or contract, for the construction activities at the portion of the site. In this case, the new owner or operator would be required to obtain permit coverage separately.

9. **Sale of Residence to Homeowners**

For residential construction only, when a residential lot **has been conveyed to a homeowner** and all criteria in paragraphs a through e, below, are met, coverage under this permit is no longer required and the conveyed lot may be removed from coverage under the permittee's certification. At such time, the permittee is no longer responsible for meeting the terms and conditions of this permit for the conveyed lot, including the requirement to transfer or reassign permit coverage. The permittee remains responsible for inactivation of the original certification.

- a) The lot has been sold to the homeowner(s) for private residential use;
- b) the lot is less than one acre of disturbed area;
- c) all construction activity conducted by the permittee on the lot is completed;
- d) a certificate of occupancy (or equivalent) has been awarded to the home owner; and
- e) the SWMP has been amended to indicate the lot is no longer covered by permit.

Lots not meeting all of the above criteria require continued permit coverage. However, this permit coverage may be transferred (Part I.A.7, above) or reassigned (Part I.A.8, above) to a new owner or operator.

10. **Permit Expiration Date**

Authorization to discharge under this general permit shall expire on June 30, 2012. The Division must evaluate and reissue this general permit at least once every five years and must recertify the permittee's authority to discharge under the general permit at such time. Therefore, a permittee desiring continued coverage under the general permit must reapply by March 31, 2012. The Division will initiate the renewal process; however, it is ultimately the permittee's responsibility to ensure that the renewal is submitted. The Division will determine if the permittee may continue to operate under the terms of the general permit. An individual permit may be required for any facility not reauthorized to discharge under the reissued general permit.

11. **Individual Permit Criteria**

Various criteria can be used in evaluating whether or not an individual (or alternate general) permit is required instead of this general permit. This information may come from the application, SWMP, or additional information as requested by the Division, and includes, but is not limited to, the following:

- a) the quality of the receiving waters (i.e., the presence of downstream drinking water intakes or a high quality fishery, or for preservation of high quality water);
- b) the size of the construction site;
- c) evidence of noncompliance under a previous permit for the operation;
- d) the use of chemicals within the stormwater system; or
- e) discharges of pollutants of concern to waters for which there is an established Total Maximum Daily Load (TMDL).

In addition, an individual permit may be required when the Division has shown or has reason to suspect that the stormwater discharge may contribute to a violation of a water quality standard.

B. STORMWATER MANAGEMENT PLAN (SWMP) – **GENERAL REQUIREMENTS**

- 1. A SWMP shall be developed for each facility covered by this permit. The SWMP shall be prepared in accordance with good engineering, hydrologic and pollution control practices. (The SWMP need not be prepared by a registered engineer.)

B. STORMWATER MANAGEMENT PLAN (SWMP) – **GENERAL REQUIREMENTS** (cont.)

2. The SWMP shall:
 - a) Identify all potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges associated with construction activity from the facility;
 - b) Describe the practices to be used to reduce the pollutants in stormwater discharges associated with construction activity at the facility; and ensure the practices are selected and described in accordance with good engineering practices, including the installation, implementation and maintenance requirements; and
 - c) Be properly prepared, and updated in accordance with Part I.D.5.c, to ensure compliance with the terms and conditions of this permit.
3. Facilities must implement the provisions of the SWMP as written and updated, from commencement of construction activity until final stabilization is complete, as a condition of this permit. The Division reserves the right to review the SWMP, and to require the permittee to develop and implement additional measures to prevent and control pollution as needed.
4. The SWMP may reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under section 311 of the CWA, or Best Management Practices (BMPs) Programs otherwise required by a separate CDPS permit, and may incorporate any part of such plans into the SWMP by reference, provided that the relevant sections of such plans are available as part of the SWMP consistent with Part I.D.5.b.
5. For any sites with permit coverage before June 30, 2007, the permittee's SWMP must meet the new SWMP requirements as summarized in Section II.I of the rationale. Any needed changes must be made by **October 1, 2007**.

C. STORMWATER MANAGEMENT PLAN (SWMP) – **CONTENTS**

The SWMP shall include the following items, at a minimum.

1. **Site Description.** The SWMP shall clearly describe the construction activity, to include:
 - a) The nature of the construction activity at the site.
 - b) The proposed sequence for major activities.
 - c) Estimates of the total area of the site, and the area and location expected to be disturbed by clearing, excavation, grading, or other construction activities.
 - d) A summary of any existing data used in the development of the site construction plans or SWMP that describe the soil or existing potential for soil erosion.
 - e) A description of the existing vegetation at the site and an estimate of the percent vegetative ground cover.
 - f) The location and description of all potential pollution sources, including ground surface disturbing activities (see Part I.A.2.b), vehicle fueling, storage of fertilizers or chemicals, etc.
 - g) The location and description of any anticipated allowable sources of non-stormwater discharge at the site, e.g., uncontaminated springs, landscape irrigation return flow, construction dewatering, and concrete washout.
 - h) The name of the receiving water(s) and the size, type and location of any outfall(s). If the stormwater discharge is to a municipal separate storm sewer system, the name of that system, the location of the storm sewer discharge, and the ultimate receiving water(s).
2. **Site Map.** The SWMP shall include a legible site map(s), showing the entire site, identifying:
 - a) construction site boundaries;
 - b) all areas of ground surface disturbance;
 - c) areas of cut and fill;
 - d) areas used for storage of building materials, equipment, soil, or waste;
 - e) locations of dedicated asphalt or concrete batch plants;
 - f) locations of all structural BMPs;
 - g) locations of non-structural BMPs as applicable; and
 - h) locations of springs, streams, wetlands and other surface waters.

C. STORMWATER MANAGEMENT PLAN (SWMP) – CONTENTS (cont.)

3. **Stormwater Management Controls.**

The SWMP must include a description of all stormwater management controls that will be implemented as part of the construction activity to control pollutants in stormwater discharges. The appropriateness and priorities of stormwater management controls in the SWMP shall reflect the potential pollutant sources identified at the facility.

The description of stormwater management controls shall address the following components, at a minimum:

- a) **SWMP Administrator** - The SWMP shall identify a specific individual(s), position or title who is responsible for developing, implementing, maintaining, and revising the SWMP. The activities and responsibilities of the administrator shall address all aspects of the facility's SWMP.
- b) **Identification of Potential Pollutant Sources** - All potential pollutant sources, including materials and activities, at a site must be evaluated for the potential to contribute pollutants to stormwater discharges. The SWMP shall identify and describe those sources determined to have the potential to contribute pollutants to stormwater discharges, and the sources must be controlled through BMP selection and implementation, as required in paragraph (c), below.

At a minimum, each of the following sources and activities shall be evaluated for the potential to contribute pollutants to stormwater discharges, and identified in the SWMP if found to have such potential:

- 1) all disturbed and stored soils;
 - 2) vehicle tracking of sediments;
 - 3) management of contaminated soils;
 - 4) loading and unloading operations;
 - 5) outdoor storage activities (building materials, fertilizers, chemicals, etc.);
 - 6) vehicle and equipment maintenance and fueling;
 - 7) significant dust or particulate generating processes;
 - 8) routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc.;
 - 9) on-site waste management practices (waste piles, liquid wastes, dumpsters, etc.);
 - 10) concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment;
 - 11) dedicated asphalt and concrete batch plants;
 - 12) non-industrial waste sources such as worker trash and portable toilets; and
 - 13) other areas or procedures where potential spills can occur.
- c) **Best Management Practices (BMPs) for Stormwater Pollution Prevention** - The SWMP shall identify and describe appropriate BMPs, including, but not limited to, those required by paragraphs 1 through 8 below, that will be implemented at the facility to reduce the potential of the sources identified in Part I.C.3.b to contribute pollutants to stormwater discharges. The SWMP shall clearly describe the installation and implementation specifications for each BMP identified in the SWMP to ensure proper implementation, operation and maintenance of the BMP.
 - 1) Structural Practices for Erosion and Sediment Control. The SWMP shall clearly describe and locate all structural practices implemented at the site to minimize erosion and sediment transport. Practices may include, but are not limited to: straw bales, wattles/sediment control logs, silt fences, earth dikes, drainage swales, sediment traps, subsurface drains, pipe slope drains, inlet protection, outlet protection, gabions, and temporary or permanent sediment basins.
 - 2) Non-Structural Practices for Erosion and Sediment Control. The SWMP shall clearly describe and locate, as applicable, all non-structural practices implemented at the site to minimize erosion and sediment transport. Description must include interim and permanent stabilization practices, and site-specific scheduling for implementation of the practices. The SWMP should include practices to ensure that existing vegetation is preserved where possible. Non-structural practices may include, but are not limited to: temporary vegetation, permanent vegetation, mulching, geotextiles, sod stabilization, slope roughening, vegetative buffer strips, protection of trees, and preservation of mature vegetation.

C. STORMWATER MANAGEMENT PLAN (SWMP) – CONTENTS (cont.)

- 3) Phased BMP Implementation. The SWMP shall clearly describe the relationship between the phases of construction, and the implementation and maintenance of both structural and non-structural stormwater management controls. The SWMP must identify the stormwater management controls to be implemented during the project phases, which can include, but are not limited to, clearing and grubbing; road construction; utility and infrastructure installation; vertical construction; final grading; and final stabilization.
- 4) Materials Handling and Spill Prevention. The SWMP shall clearly describe and locate all practices implemented at the site to minimize impacts from procedures or significant materials (see definitions at Part I.E.) that could contribute pollutants to runoff. Such procedures or significant materials could include: exposed storage of building materials; paints and solvents; fertilizers or chemicals; waste material; and equipment maintenance or fueling procedures.

Areas or procedures where potential spills can occur must have spill prevention and response procedures identified in the SWMP.

- 5) Dedicated Concrete or Asphalt Batch Plants. The SWMP shall clearly describe and locate all practices implemented at the site to control stormwater pollution from dedicated concrete batch plants or dedicated asphalt batch plants covered by this certification.
- 6) Vehicle Tracking Control. The SWMP shall clearly describe and locate all practices implemented at the site to control potential sediment discharges from vehicle tracking. Practices must be implemented for all areas of potential vehicle tracking, and can include: minimizing site access; street sweeping or scraping; tracking pads; graveled parking areas; requiring that vehicles stay on paved areas on-site; wash racks; contractor education; and/or sediment control BMPs, etc.
- 7) Waste Management and Disposal, Including Concrete Washout.
 - i) The SWMP shall clearly describe and locate the practices implemented at the site to control stormwater pollution from all construction site wastes (liquid and solid), including concrete washout activities.
 - ii) The practices used for concrete washout must ensure that these activities do not result in the contribution of pollutants associated with the washing activity to stormwater runoff.
 - iii) Part I.D.3.c of the permit authorizes the conditional discharge of concrete washout water to the ground. The SWMP shall clearly describe and locate the practices to be used that will ensure that no washout water from concrete washout activities is discharged from the site as surface runoff or to surface waters.
- 8) Groundwater and Stormwater Dewatering.
 - i) The SWMP shall clearly describe and locate the practices implemented at the site to control stormwater pollution from the dewatering of groundwater or stormwater from excavations, wells, etc.
 - ii) Part I.D.3.d of the permit authorizes the conditional discharge of construction dewatering to the ground. For any construction dewatering of groundwater not authorized under a separate CDPS discharge permit, the SWMP shall clearly describe and locate the practices to be used that will ensure that no groundwater from construction dewatering is discharged from the site as surface runoff or to surface waters.

4. **Final Stabilization and Long-term Stormwater Management**

- a) The SWMP shall clearly describe the practices used to achieve final stabilization of all disturbed areas at the site, and any planned practices to control pollutants in stormwater discharges that will occur after construction operations have been completed at the site.
- b) Final stabilization practices for obtaining a vegetative cover should include, as appropriate: seed mix selection and application methods; soil preparation and amendments; soil stabilization practices (e.g., crimped straw, hydro mulch or rolled erosion control products); and appropriate sediment control BMPs as needed until final stabilization is achieved; etc.

C. STORMWATER MANAGEMENT PLAN (SWMP) – CONTENTS (cont.)

- c) Final stabilization is reached when all ground surface disturbing activities at the site have been completed, and uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.

The Division may, after consultation with the permittee and upon good cause, amend the final stabilization criteria in this section for specific operations.

5. **Inspection and Maintenance**

Part I.D.6 of the permit includes requirements for site inspections. Part I.D.7 of the permit includes requirements for BMP maintenance. The SWMP shall clearly describe the inspection and maintenance procedures implemented at the site to maintain all erosion and sediment control practices and other protective practices identified in the SWMP, in good and effective operating condition.

D. TERMS AND CONDITIONS

1. **General Limitations**

The following limitations shall apply to all discharges covered by this permit:

- a) Stormwater discharges from construction activities shall not cause, have the reasonable potential to cause, or measurably contribute to an exceedance of any water quality standard, including narrative standards for water quality.
- b) Concrete washout water shall not be discharged to state surface waters or to storm sewer systems. On-site permanent disposal of concrete washout waste is not authorized by this permit. Discharge to the ground of concrete washout waste that will subsequently be disposed of off-site is authorized by this permit. See Part I.D.3.c of the permit.
- c) Bulk storage structures for petroleum products and any other chemicals shall have secondary containment or equivalent adequate protection so as to contain all spills and prevent any spilled material from entering State waters.
- d) No chemicals are to be added to the discharge unless permission for the use of a specific chemical is granted by the Division. In granting the use of such chemicals, special conditions and monitoring may be addressed by separate correspondence.
- e) The Division reserves the right to require sampling and testing, on a case-by-case basis, in the event that there is reason to suspect that compliance with the SWMP is a problem, or to measure the effectiveness of the BMPs in removing pollutants in the effluent. Such monitoring may include Whole Effluent Toxicity testing.
- f) All site wastes must be properly managed to prevent potential pollution of State waters. This permit does not authorize on-site waste disposal.
- g) All dischargers must comply with the lawful requirements of federal agencies, municipalities, counties, drainage districts and other local agencies regarding any discharges of stormwater to storm drain systems or other water courses under their jurisdiction, including applicable requirements in municipal stormwater management programs developed to comply with CDPS permits. Dischargers must comply with local stormwater management requirements, policies or guidelines including erosion and sediment control.

2. **BMP Implementation and Design Standards**

Facilities must select, install, implement, and maintain appropriate BMPs, following good engineering, hydrologic and pollution control practices. BMPs implemented at the site must be adequately designed to provide control for all potential pollutant sources associated with construction activity to prevent pollution or degradation of State waters.

D. TERMS AND CONDITIONS (cont.)

3. **Prohibition of Non-Stormwater Discharges**

- a) Except as provided in paragraphs b, c, and d below, **all discharges covered by this permit shall be composed entirely of stormwater associated with construction activity.** Discharges of material other than stormwater must be addressed in a separate CDPS permit issued for that discharge.
- b) Discharges from the following sources that are combined with stormwater discharges associated with construction activity may be authorized by this permit, provided that the non-stormwater component of the discharge is identified in the SWMP (see Part I.C.1.g of this permit):
 - emergency fire fighting activities
 - landscape irrigation return flow
 - uncontaminated springs
- c) Discharges to the ground of concrete washout water from washing of tools and concrete mixer chutes may be authorized by this permit, provided that:
 - 1) the source is identified in the SWMP;
 - 2) BMPs are included in the SWMP in accordance with Part I.C.3(c)(7) and to prevent pollution of groundwater in violation of Part I.D.1.a; and
 - 3) these discharges do not leave the site as surface runoff or to surface waters
- d) Discharges to the ground of water from construction dewatering activities may be authorized by this permit, provided that:
 - 1) the source is groundwater and/or groundwater combined with stormwater that does not contain pollutants in concentrations exceeding the State groundwater standards in Regulations 5 CCR 1002-41 and 42;
 - 2) the source is identified in the SWMP;
 - 3) BMPs are included in the SWMP, as required by Part I.C.3(c)(8); and
 - 4) these discharges do not leave the site as surface runoff or to surface waters.

Discharges to the ground from construction dewatering activities that do not meet the above criteria must be covered under a separate CDPS discharge permit. Contaminated groundwater requiring coverage under a separate CDPS discharge permit may include groundwater contaminated with pollutants from a landfill, mining activity, industrial pollutant plume, underground storage tank, or other source.

4. **Releases in Excess of Reportable Quantities**

This permit does not relieve the permittee of the reporting requirements of 40 CFR 110, 40 CFR 117 or 40 CFR 302. Any discharge of hazardous material must be handled in accordance with the Division's Noncompliance Notification Requirements (see Part II.A.3 of the permit).

5. **SWMP Requirements**

- a) **SWMP Preparation and Implementation:** The SWMP shall be prepared prior to applying for coverage under the general permit, and certification of its completion submitted with the application. The SWMP shall be implemented prior to commencement of construction activities. The plan shall be updated as appropriate (see paragraph c, below), below). SWMP provisions shall be implemented until expiration or inactivation of permit coverage.
- b) **SWMP Retention Requirements:** A copy of the SWMP must be retained on site unless another location, specified by the permittee, is approved by the Division.
- c) **SWMP Review/Changes:** The permittee shall amend the SWMP:
 - 1) when there is a change in design, construction, operation, or maintenance of the site, which would require the implementation of new or revised BMPs; or
 - 2) if the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity; or

D. TERMS AND CONDITIONS (cont.)

- 3) when BMPs are no longer necessary and are removed.

SWMP changes shall be made prior to changes in the site conditions, except as allowed for in paragraph d, below. SWMP revisions may include, but are not limited to: potential pollutant source identification; selection of appropriate BMPs for site conditions; BMP maintenance procedures; and interim and final stabilization practices. The SWMP changes may include a schedule for further BMP design and implementation, provided that, if any interim BMPs are needed to comply with the permit, they are also included in the SWMP and implemented during the interim period.

- d) **Responsive SWMP Changes:** SWMP changes addressing BMP installation and/or implementation are often required to be made in response to changing conditions, or when current BMPs are determined ineffective. The majority of SWMP revisions to address these changes can be made immediately with quick in-the-field revisions to the SWMP. In the less common scenario where more complex development of materials to modify the SWMP is necessary, SWMP revisions shall be made in accordance with the following requirements:
 - 1) the SWMP shall be revised as soon as practicable, but in no case more than 72 hours after the change(s) in BMP installation and/or implementation occur at the site, and
 - 2) a notation must be included in the SWMP prior to the site change(s) that includes the time and date of the change(s) in the field, an identification of the BMP(s) removed or added, and the location(s) of those BMP(s).

6. **Inspections**

Site inspections must be conducted in accordance with the following requirements and minimum schedules. The required minimum inspection schedules do not reduce or eliminate the permittee's responsibility to implement and maintain BMPs in good and effective operational condition, and in accordance with the SWMP, which could require more frequent inspections.

- a) **Minimum Inspection Schedule:** The permittee shall, at a minimum, make a thorough inspection, in accordance with the requirements in I.D.6.b below, at least once every 14 calendar days. Also, post-storm event inspections must be conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. Provided the timing is appropriate, the post-storm inspections may be used to fulfill the 14-day routine inspection requirement. A more frequent inspection schedule than the minimum inspections described may be necessary, to ensure that BMPs continue to operate as needed to comply with the permit. The following conditional modifications to this Minimum Inspection Schedule are allowed:
 - 1) **Post-Storm Event Inspections at Temporarily Idle Sites** – If no construction activities will occur following a storm event, post-storm event inspections shall be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event. The occurrence of any such delayed inspection must be documented in the inspection record. Routine inspections still must be conducted at least every 14 calendar days.
 - 2) **Inspections at Completed Sites/Areas** – For sites or portions of sites that meet the following criteria, but final stabilization has not been achieved due to a vegetative cover that has not become established, the permittee shall make a thorough inspection of their stormwater management system at least once every month, and post-storm event inspections are not required. This reduced inspection schedule is *only* allowed if:
 - i) all construction activities that will result in surface ground disturbance are completed;
 - ii) all activities required for final stabilization, in accordance with the SWMP, have been completed, with the exception of the application of seed that has not occurred due to seasonal conditions or the necessity for additional seed application to augment previous efforts; and
 - iii) the SWMP has been amended to indicate those areas that will be inspected in accordance with the reduced schedule allowed for in this paragraph.

D. TERMS AND CONDITIONS (cont.)

- 3) **Winter Conditions Inspections Exclusion** – Inspections are not required at sites where construction activities are temporarily halted, snow cover exists over the entire site for an extended period, and melting conditions posing a risk of surface erosion do not exist. This exception is applicable only during the period where melting conditions do not exist, and applies to the routine 14-day and monthly inspections, as well as the post-storm-event inspections. The following information must be documented in the inspection record for use of this exclusion: dates when snow cover occurred, date when construction activities ceased, and date melting conditions began. Inspections, as described above, are required at all other times.

When site conditions make the schedule required in this section impractical, the permittee may petition the Division to grant an alternate inspection schedule.

b) **Inspection Requirements**

- 1) **Inspection Scope** - The construction site perimeter, all disturbed areas, material and/or waste storage areas that are exposed to precipitation, discharge locations, and locations where vehicles access the site shall be inspected for evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters. All erosion and sediment control practices identified in the SWMP shall be evaluated to ensure that they are maintained and operating correctly.
- 2) **Inspection Report/Records** - The permittee shall keep a record of inspections. Inspection reports must identify any incidents of non-compliance with the terms and conditions of this permit. Inspection records must be retained for three years from expiration or inactivation of permit coverage. At a minimum, the inspection report must include:
- i) The inspection date;
 - ii) Name(s) and title(s) of personnel making the inspection;
 - iii) Location(s) of discharges of sediment or other pollutants from the site;
 - iv) Location(s) of BMPs that need to be maintained;
 - v) Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
 - vi) Location(s) where additional BMPs are needed that were not in place at the time of inspection;
 - vii) Deviations from the minimum inspection schedule as provided in Part I.D.6.a above;
 - vii) Description of corrective action for items iii, iv, v, and vi, above, dates corrective action(s) taken, and measures taken to prevent future violations, including requisite changes to the SWMP, as necessary; and
 - viii) After adequate corrective action(s) has been taken, or where a report does not identify any incidents requiring corrective action, the report shall contain a signed statement indicating the site is in compliance with the permit to the best of the signer's knowledge and belief.

- c) **Required Actions Following Site Inspections** – Where site inspections note the need for BMP maintenance activities, BMPs must be maintained in accordance with the SWMP and Part I.D.7 of the permit. Repair, replacement, or installation of new BMPs determined necessary during site inspections to address ineffective or inadequate BMPs must be conducted in accordance with Part I.D.8 of the permit. SWMP updates required as a result of deficiencies in the SWMP noted during site inspections shall be made in accordance with Part I.D.5.c of the permit.

7. **BMP Maintenance**

All erosion and sediment control practices and other protective measures identified in the SWMP must be maintained in effective operating condition. Proper selection and installation of BMPs and implementation of comprehensive Inspection and Maintenance procedures, in accordance with the SWMP, should be adequate to meet this condition. BMPs that are not adequately maintained in accordance with good engineering, hydrologic and pollution control practices, including removal of collected sediment outside the acceptable tolerances of the BMPs, are considered to be no longer operating effectively and must be addressed in accordance with Part I.D.8, below. A specific timeline for implementing maintenance procedures is not included in this permit because BMP maintenance is expected to be proactive, not responsive. Observations resulting in BMP maintenance activities can be made during a site inspection, or during general observations of site conditions.

D. TERMS AND CONDITIONS (cont.)

8. **Replacement and Failed BMPs**

Adequate site assessment must be performed as part of comprehensive Inspection and Maintenance procedures, to assess the adequacy of BMPs at the site, and the necessity of changes to those BMPs to ensure continued effective performance. Where site assessment results in the determination that new or replacement BMPs are necessary, the BMPs must be installed to ensure on-going implementation of BMPs as per Part I.D.2.

Where BMPs have failed, resulting in noncompliance with Part I.D.2, they must be addressed as soon as possible, immediately in most cases, to minimize the discharge of pollutants.

When new BMPs are installed or BMPs are replaced, the SWMP must be updated in accordance with Part I.D.5(c).

9. **Reporting**

No scheduled reporting requirements are included in this permit; however, the Division reserves the right to request that a copy of the inspection reports be submitted.

10. **SWMP Availability**

A copy of the SWMP shall be provided upon request to the Division, EPA, or any local agency in charge of approving sediment and erosion plans, grading plans or stormwater management plans, and within the time frame specified in the request. If the SWMP is required to be submitted to any of these entities, it must include a signed certification in accordance with Part I.F.1 of the permit, certifying that the SWMP is complete and meets all permit requirements.

All SWMPs required under this permit are considered reports that shall be available to the public under Section 308(b) of the CWA and Section 61.5(4) of the Colorado Discharge Permit System Regulations. The permittee shall make plans available to members of the public upon request. However, the permittee may claim any portion of a SWMP as confidential in accordance with 40 CFR Part 2.

11. **Total Maximum Daily Load (TMDL)**

If a TMDL has been approved for any waterbody into which the permittee discharges, and stormwater discharges associated with construction activity have been assigned a pollutant-specific Wasteload Allocation (WLA) under the TMDL, the Division will either:

- a) Ensure that the WLA is being implemented properly through alternative local requirements, such as by a municipal stormwater permit; or
- b) Notify the permittee of the WLA, and amend the permittee's certification to add specific BMPs and/or other requirements, as appropriate. The permittee may be required to do the following:
 - 1) Under the permittee's SWMP, implement specific management practices based on requirements of the WLA, and evaluate whether the requirements are being met through implementation of existing stormwater BMPs or if additional BMPs are necessary. Document the calculations or other evidence that show that the requirements are expected to be met; and
 - 2) If the evaluation shows that additional or modified BMPs are necessary, describe the type and schedule for the BMP additions/revisions.

Discharge monitoring may also be required. The permittee may maintain coverage under the general permit provided they comply with the applicable requirements outlined above. The Division reserves the right to require individual or alternate general permit coverage.

E. ADDITIONAL DEFINITIONS

For the purposes of this permit:

1. **Best Management Practices (BMPs):** schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, pollution prevention, and practices to control site runoff, spillage or leaks, waste disposal, or drainage from material storage.
2. **Dedicated asphalt plants and concrete plants:** portable asphalt plants and concrete plants that are located on or adjacent to a construction site and that provide materials only to that specific construction site.
3. **Final stabilization:** when all ground surface disturbing activities at the site have been completed, and uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed. For purposes of this permit, establishment of a vegetative cover capable of providing erosion control equivalent to pre-existing conditions at the site will be considered final stabilization.
4. **Municipal separate storm sewer system:** a conveyance or system of conveyances (including: roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a State, city, town, county, district, or other public body (created by state law), having jurisdiction over disposal of sewage, industrial waste, stormwater, or other wastes; designed or used for collecting or conveying stormwater.
5. **Operator:** the entity that has day-to-day supervision and control of activities occurring at the construction site. This can be the owner, the developer, the general contractor or the agent of one of these parties, in some circumstances. It is anticipated that at different phases of a construction project, different types of parties may satisfy the definition of 'operator' and that the permit may be transferred as the roles change.
6. **Outfall:** a point source at the point where stormwater leaves the construction site and discharges to a receiving water or a stormwater collection system.
7. **Part of a larger common plan of development or sale:** a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules.
8. **Point source:** any discernible, confined and discrete conveyance from which pollutants are or may be discharged. Point source discharges of stormwater result from structures which increase the imperviousness of the ground which acts to collect runoff, with runoff being conveyed along the resulting drainage or grading pattern.
9. **Pollutant:** dredged spoil, dirt, slurry, solid waste, incinerator residue, sewage, sewage sludge, garbage, trash, chemical waste, biological nutrient, biological material, radioactive material, heat, wrecked or discarded equipment, rock, sand, or any industrial, municipal or agricultural waste.
10. **Process water:** any water which, during manufacturing or processing, comes into contact with or results from the production of any raw material, intermediate product, finished product, by product or waste product. This definition includes mine drainage.
11. **Receiving Water:** any classified stream segment (including tributaries) in the State of Colorado into which stormwater related to construction activities discharges. This definition includes all water courses, even if they are usually dry, such as borrow ditches, arroyos, and other unnamed waterways.
12. **Significant Materials** include, but are not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharge.
13. **Stormwater:** precipitation-induced surface runoff.

F. GENERAL REQUIREMENTS

1. **Signatory Requirements**

- a) All reports required for submittal shall be signed and certified for accuracy by the permittee in accordance with the following criteria:
- 1) In the case of corporations, by a principal executive officer of at least the level of vice-president or his or her duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the form originates;
 - 2) In the case of a partnership, by a general partner;
 - 3) In the case of a sole proprietorship, by the proprietor;
 - 4) In the case of a municipal, state, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee, if such representative is responsible for the overall operation of the facility from which the discharge described in the form originates.
- b) **Changes to authorization.** If an authorization under paragraph a) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph a) of this section must be submitted to the Division, prior to or together with any reports, information, or applications to be signed by an authorized representative.
- c) **Certification.** Any person signing a document under paragraph a) of this section shall make the following certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

2. **Retention of Records**

- a) The permittee shall retain copies of the SWMP and all reports required by this permit and records of all data used to complete the application to be covered by this permit, for three years after expiration or inactivation of permit coverage.
- b) The permittee shall retain a copy of the SWMP required by this permit at the construction site from the date of project initiation to the date of expiration or inactivation of permit coverage, unless another location, specified by the permittee, is approved by the Division.

3. **Monitoring**

The Division reserves the right to require sampling and testing, on a case-by-case basis (see Part I.D.1.e), for example to implement the provisions of a TMDL (see Part I.D.11 of the permit). Reporting procedures for any monitoring data collected will be included in the notification by the Division of monitoring requirements.

If monitoring is required, the following definitions apply:

- a) The **thirty (30) day average** shall be determined by the arithmetic mean of all samples collected during a thirty (30) consecutive-day period.
- b) A **grab** sample, for monitoring requirements, is a single “dip and take” sample.

PART II

A. MANAGEMENT REQUIREMENTS

1. Amending a Permit Certification

The permittee shall inform the Division (Permits Section) in writing of changes to the information provided in the permit application, including the legal contact, the project legal description or map originally submitted with the application, or the planned total disturbed acreage. The permittee shall furnish the Division with any plans and specifications which the Division deems reasonably necessary to evaluate the effect on the discharge and receiving stream. If applicable, this notification may be accomplished through submittal of an application for a CDPS process water permit authorizing the discharge. The SWMP shall be updated and implemented prior to the changes (see Part I.D.5.c).

Any discharge to the waters of the State from a point source other than specifically authorized by this permit or a different CDPS permit is prohibited.

2. Special Notifications - Definitions

- a) **Spill:** An unintentional release of solid or liquid material which may cause pollution of state waters.
- b) **Upset:** An exceptional incident in which there is unintentional and temporary noncompliance with permit discharge limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

3. Noncompliance Notification

- a) The permittee shall report the following instances of noncompliance:
 - 1) Any noncompliance which may endanger health or the environment;
 - 2) Any spill or discharge of hazardous substances or oil which may cause pollution of the waters of the state.
 - 3) Any discharge of stormwater which may cause an exceedance of a water quality standard.
- b) For all instances of noncompliance based on environmental hazards and chemical spills and releases, all needed information must be provided orally to the Colorado Department of Public Health and Environment spill reporting line (24-hour number for environmental hazards and chemical spills and releases: 1-877-518-5608) within 24 hours from the time the permittee becomes aware of the circumstances.

For all other instances of noncompliance as defined in this section, all needed information must be provided orally to the Water Quality Control Division within 24 hours from the time the permittee becomes aware of the circumstances.

For all instances of noncompliance identified here, a written submission shall also be provided within 5 calendar days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of:

- 1) The noncompliance and its cause;
- 2) The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue;
- 3) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

A. MANAGEMENT REQUIREMENTS (cont.)

4. **Submission of Incorrect or Incomplete Information**

Where the permittee failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or report to the Division, or relevant new information becomes available, the permittee shall promptly submit the relevant application information which was not submitted or any additional information needed to correct any erroneous information previously submitted.

5. **Bypass**

- a) A bypass, which causes effluent limitations (i.e., requirements to implement BMPs in accordance with Parts I.B.3 and I.D.2 of the permit) to be exceeded is prohibited, and the Division may take enforcement action against a permittee for such a bypass, unless:
- 1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 - 2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities (e.g., alternative BMPs), retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment (e.g., implemented additional BMPs) to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
 - 3) The permittee submitted notices as required in "Non-Compliance Notification," Part II.A.3.

6. **Upsets**

- a) **Effect of an Upset:** An upset constitutes an affirmative defense to an action brought for noncompliance with permit limitations and requirements if the requirements of paragraph b of this section are met. (No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.)
- b) **Conditions Necessary for a Demonstration of Upset:** A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed contemporaneous operating logs, or other relevant evidence that:
- 1) An upset occurred and that the permittee can identify the specific cause(s) of the upset;
 - 2) The permitted facility was at the time being properly operated;
 - 3) The permittee submitted notice of the upset as required in Part II.A.3. of this permit (24-hour notice); and
 - 4) The permittee complied with any remedial measures required under 40 CFR Section 122.41(d) of the federal regulations or Section 61.8(3)(h) of the Colorado Discharge Permit System Regulations.
- c) **Burden of Proof:** In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

7. **Removed Substances**

Solids, sludges, or other pollutants removed in the course of treatment or control of discharges shall be properly disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State.

8. **Minimization of Adverse Impact**

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the State resulting from noncompliance with any terms and conditions specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

A. MANAGEMENT REQUIREMENTS (cont.)

9. **Reduction, Loss, or Failure of Stormwater Controls**

The permittee has the duty to halt or reduce any activity if necessary to maintain compliance with the permit requirements. Upon reduction, loss, or failure of any stormwater controls, the permittee shall, to the extent necessary to maintain compliance with its permit, control production, or remove all pollutant sources from exposure to stormwater, or both, until the stormwater controls are restored or an alternative method of treatment/control is provided.

It shall not be a defense for a permittee in an enforcement action that it would be necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

10. **Proper Operation and Maintenance**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

B. RESPONSIBILITIES

1. **Inspections and Right to Entry**

The permittee shall allow the Director of the State Water Quality Control Division, the EPA Regional Administrator, and/or their authorized representative(s), upon the presentation of credentials:

- a) To enter upon the permittee's premises where a regulated facility or activity is located or in which any records are required to be kept under the terms and conditions of this permit;
- b) At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit and to inspect any monitoring equipment or monitoring method required in the permit; and
- c) To enter upon the permittee's premises to investigate, within reason, any actual, suspected, or potential source of water pollution, or any violation of the Colorado Water Quality Control Act. The investigation may include, but is not limited to, the following: sampling of any discharge and/or process waters, the taking of photographs, interviewing permittee staff on alleged violations and other matters related to the permit, and access to any and all facilities or areas within the permittee's premises that may have any effect on the discharge, permit, or any alleged violation.

2. **Duty to Provide Information**

The permittee shall furnish to the Division, within the time frame specified by the Division, any information which the Division may request to determine whether cause exists for modifying, revoking and reissuing, or inactivating coverage under this permit, or to determine compliance with this permit. The permittee shall also furnish to the Division, upon request, copies of records required to be kept by this permit.

3. **Transfer of Ownership or Control**

Certification under this permit may be transferred to a new permittee if:

- a) The current permittee notifies the Division in writing when the transfer is desired as outlined in Part I.A.7; and
- b) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage and liability between them; and
- c) The current permittee has met all fee requirements of the Colorado Discharge Permit System Regulations, Section 61.15.

B. RESPONSIBILITIES (cont.)

4. **Modification, Suspension, or Revocation of Permit By Division**

All permit modification, inactivation or revocation and reissuance actions shall be subject to the requirements of the Colorado Discharge Permit System Regulations, Sections 61.5(2), 61.5(3), 61.7 and 61.15, 5 C.C.R. 1002-61, except for minor modifications.

- a) This permit, and/or certification under this permit, may be modified, suspended, or revoked in whole or in part during its term for reasons determined by the Division including, but not limited to, the following:
 - 1) Violation of any terms or conditions of the permit;
 - 2) Obtaining a permit by misrepresentation or failing to disclose any fact which is material to the granting or denial of a permit or to the establishment of terms or conditions of the permit;
 - 3) Materially false or inaccurate statements or information in the application for the permit;
 - 4) Promulgation of toxic effluent standards or prohibitions (including any schedule of compliance specified in such effluent standard or prohibition) which are established under Section 307 of the Clean Water Act, where such a toxic pollutant is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit.
- b) This permit, and/or certification under this permit, may be modified in whole or in part due to a change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge, such as:
 - 1) Promulgation of Water Quality Standards applicable to waters affected by the permitted discharge; or
 - 2) Effluent limitations or other requirements applicable pursuant to the State Act or federal requirements; or
 - 3) Control regulations promulgated; or
 - 4) Other available information indicates a potential for violation of adopted Water Quality Standards or stream classifications.
- c) This permit, or certification under this permit, may be modified in whole or in part to include new effluent limitations and other appropriate permit conditions where data submitted pursuant to Part I indicate that such effluent limitations and permit conditions are necessary to ensure compliance with applicable water quality standards and protection of classified uses.
- d) At the request of the permittee, the Division may modify or inactivate certification under this permit if the following conditions are met:
 - 1) In the case of inactivation, the permittee notifies the Division of its intent to inactivate the certification, and certifies that the site has been finally stabilized;
 - 2) In the case of inactivation, the permittee has ceased any and all discharges to state waters and demonstrates to the Division there is no probability of further uncontrolled discharge(s) which may affect waters of the State.
 - 3) The Division finds that the permittee has shown reasonable grounds consistent with the Federal and State statutes and regulations for such modification, amendment or inactivation;
 - 4) Fee requirements of Section 61.15 of the Colorado Discharge Permit System Regulations have been met; and
 - 5) Applicable requirements of public notice have been met.

For small construction sites covered by a Qualifying Local Program, coverage under this permit is automatically terminated when a site has been finally stabilized.

B. RESPONSIBILITIES (cont.)

5. **Permit Violations**

Failure to comply with any terms and/or conditions of this permit shall be a violation of this permit.

Dischargers of stormwater associated with industrial activity, as defined in the EPA Stormwater Regulation (40 CFR 122.26(b)(14) and Section 61.3(2) of the Colorado Discharge Permit System Regulations, which do not obtain coverage under this or other Colorado general permits, or under an individual CDPS permit regulating industrial stormwater, will be in violation of the federal Clean Water Act and the Colorado Water Quality Control Act, 25-8-101, as amended. Failure to comply with CDPS permit requirements will also constitute a violation.

6. **Legal Responsibilities**

The issuance of this permit does not convey any property or water rights in either real or personal property, or stream flows, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority granted by Section 510 of the Clean Water Act.

7. **Severability**

The provisions of this permit are severable. If any provisions of this permit, or the application of any provision of this permit to any circumstance, are held invalid, the application of such provision to other circumstances and the application of the remainder of this permit shall not be affected.

8. **Renewal Application**

If the permittee desires to continue to discharge, a permit renewal application shall be submitted at least ninety (90) days before this permit expires. If the permittee anticipates that there will be no discharge after the expiration date of this permit, the Division should be promptly notified so that it can inactivate the certification in accordance with Part II.B.4.d.

9. **Confidentiality**

Except for data determined to be confidential under Section 308 of the Federal Clean Water Act and Colorado Discharge Permit System Regulations, Section 61.5(4), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division. The permittee must state what is confidential at the time of submittal.

Any information relating to any secret process, method of manufacture or production, or sales or marketing data which has been declared confidential by the permittee, and which may be acquired, ascertained, or discovered, whether in any sampling investigation, emergency investigation, or otherwise, shall not be publicly disclosed by any member, officer, or employee of the Commission or the Division, but shall be kept confidential. Any person seeking to invoke the protection of this section shall bear the burden of proving its applicability. This section shall never be interpreted as preventing full disclosure of effluent data.

10. **Fees**

The permittee is required to submit payment of an annual fee as set forth in the Water Quality Control Act. Failure to submit the required fee when due and payable is a violation of the permit and will result in enforcement action pursuant to Section 25-8-601 et. seq., C.R.S. 1973 as amended.

B. RESPONSIBILITIES (cont.)

11. **Requiring an Individual CDPS Permit**

The Director may require the permittee to apply for and obtain an individual or alternate general CDPS permit if:

- a) The discharger is not in compliance with the conditions of this general permit;
- b) Conditions or standards have changed so that the discharge no longer qualifies for a general permit; or
- c) Data/information become available which indicate water quality standards may be violated.

The permittee must be notified in writing that an application for an individual or alternate general CDPS permit is required. When an individual or alternate general CDPS permit is issued to an operator otherwise covered under this general permit, the applicability of this general permit to that operator is automatically inactivated upon the effective date of the individual or alternate general CDPS permit.

RATIONALE

STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY

GENERAL PERMIT IN COLORADO THIRD RENEWAL COLORADO DISCHARGE PERMIT NUMBER COR-030000

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I. INTRODUCTION

This permit is for the regulation of stormwater runoff from construction activities, and specific allowable non-stormwater discharges in accordance with Part I.D.3 of the permit. The term "construction activity" includes ground surface disturbing activities, including, but not limited to, clearing, grading, excavation, demolition, installation of new or improved haul and access roads, staging areas, stockpiling of fill materials, and borrow areas. "Stormwater" is precipitation-induced surface runoff. This rationale will explain the background of the Stormwater program, activities which are covered under this permit, how to apply for coverage under this permit, and the requirements of this permit.

The forms discussed in the rationale and permit are available on the Water Quality Control Division's website at: www.cdphe.state.co.us/wq/PermitsUnit

II. CHANGES IN THIS GENERAL PERMIT

Several notable changes from the previous General Permit for Construction Activities have been incorporated into this permit. Significant changes are listed below. Numerous other minor changes were made for clarification purposes only.

A. Authority to Discharge

This section has been restructured to list all of the types of activities covered by this permit, and to be consistent with the definition of "construction activity." The definition of construction activity has been expanded to provide clarification. See Part I.A.1 of the permit.

II. CHANGES IN THIS GENERAL PERMIT (cont.)

B. Authority to Discharge – Oil and Gas Construction

This section has been added, to take into account a regulatory change. The federal Energy Policy Act of 2005 exempts nearly all oil and gas construction activities from federal requirements under the Clean Water Act's NPDES stormwater discharge permit program. In January 2006, the Colorado Water Quality Control Commission held a hearing to determine what effects, if any, the change in federal law would have upon Colorado's stormwater regulations. The Commission determined that oil and gas construction sites in Colorado that disturb one or more acres are still required to be covered under Colorado's stormwater permitting regulations (Colorado Discharge Permit System (CDPS) regulations (5CCR 1002-61)). In practice, oil and gas construction sites have the same requirements under this permit as do other types of construction. However, this permit contains some references to the federal Clean Water Act; generally these references are not applicable to oil and gas construction sites to the extent that the references are limited by the federal Energy Policy Act of 2005. See Part I.A.1(b) of the permit.

C. Application Requirements

The permit application requirements have changed slightly, including the addition of an email address, if available. See Part I.A.4(b).

The applicant must be either the owner and/or operator of the construction site. An operator at a construction site that is not covered by a certification held by an appropriate entity may be held liable for operating without the necessary permit coverage.

D. Temporary Coverage

Part I.A.5(d) of the previous permit (effective July 1, 2002) dealt with temporarily covering a facility under the general permit even if an individual permit is more appropriate. This permit section essentially duplicated the previous section (see Part I.A.5(c)), and so it has been deleted.

E. Reassignment of Permit Coverage

Procedures have been added to clarify the requirements for the transfer of coverage of specific portions of a permitted site to a second party. See Section VIII.I.3 of the rationale and Part I.A.8 of the permit.

F. Individual Permit Criteria

This section has been modified to include situations involving a Total Maximum Daily Load (TMDL). See Part I.A.11 of the permit.

G. Stormwater Management Plan (SWMP)

The Stormwater Management Plan section has been divided into two parts: Stormwater Management Plan (SWMP) – General Requirements, which provides the basic framework and general requirements for the SWMP, and Stormwater Management Plan (SWMP) – Contents, which specifically identifies each item that must be addressed in the SWMP. See Parts I.B and I.C of the permit.

H. Stormwater Management Plan (SWMP) – General Requirements

The SWMP General Requirements section has been modified to require that the SWMP be updated in accordance with Parts I.D.5(c) and I.D.5(d) of the permit (SWMP Review/Changes). This additional requirement ensures that the SWMP provisions reflect current site conditions. See Part I.B.2(c) of the permit.

II. CHANGES IN THIS GENERAL PERMIT (cont.)

I. Stormwater Management Plan (SWMP) – Contents

The SWMP Contents section has been modified. Some of the changes are limited to organization of information, which does not require modification of an existing permittee's current SWMP. Most of the SWMP changes involve either clarifications, reformatting, or taking recommendations from the Division's SWMP guide and making them permit requirements (e.g., vehicle tracking controls, BMP installation specifications). If an **existing permittee (i.e., those with permit coverage before June 30, 2007)** followed the recommendations in the SWMP guide (Appendix A of the permit application), then their SWMP will presumably meet the new requirements. However, for any existing permittees who did not follow the applicable SWMP guide recommendations, their SWMP must be amended to include the new required items:

-SWMP Administrator

-Identification of potential pollutant sources

-Best Management Practices descriptions and installation specifications, including dedicated concrete or asphalt batch plants; vehicle tracking control; and waste management and disposal (including concrete washout activities).

For existing permittees, any SWMP changes based on the change in permit requirements must be completed by **October 1, 2007**. The plan is not to be submitted to the Division unless requested, but must be available on site as outlined in Part I.D.5(b) of the permit.

The BMP requirement clarifications included in this renewed permit in no way imply that adequate BMPs to address all pollutant sources at a permitted site were not required in previous permits. The revised requirements are intended only to better clarify SWMP content requirements and provide improved direction to permittees.

The SWMP changes are listed below. All new applicants (after June 30, 2007) for permit coverage for their sites must fully comply with the new SWMP organization, plan requirements, and implementation.

1. **Site Description:** The requirement to provide an estimate of the run-off coefficient has been removed. The run-off coefficient as currently utilized in the SWMP may not contribute sufficiently to permit compliance to justify the effort in determining accurate values. See Part I.C.1 of the permit. However, the Division still encourages use of the coefficient as needed to adequately evaluate site-specific BMP selection and design criteria (e.g., pond capacities, BMP location, etc.) See Section C.2 of the SWMP guidance (Appendix A of the permit application).
2. **Site Map:** The requirement to identify boundaries of the 100-year flood plain has been removed. The boundaries as currently utilized in the SWMP may not contribute sufficiently to permit compliance to justify the effort in determining their location. See Part I.C.2 of the permit.
3. **Stormwater Management Controls:** This section has been modified to require identification of a SWMP Administrator and all potential pollutants sources in the SWMP. See Part I.C.3 of the permit.
 - a) The SWMP Administrator is a specific individual(s), position or title who is responsible for the process of developing, implementing, maintaining, and revising the SWMP. This individual serves as the comprehensive point of contact for all aspects of the facility's SWMP. **This requirement may necessitate changes to existing permittees' SWMPs.**

II. CHANGES IN THIS GENERAL PERMIT (cont.)

- b) *The requirement to identify Potential Pollutant Sources has been expanded to include more details for the evaluation of such sources. This evaluation allows for the appropriate selection of BMPs for implementation at a facility or site. Additionally, this section was added to be consistent with the SWMP guide. **This requirement may necessitate changes to existing permittees' SWMPs.***
- c) *Best Management Practices (BMPs) for Stormwater Pollution Prevention: This section was modified to require the following items to be addressed in the SWMP. **These requirements may necessitate changes to existing permittees' SWMPs.** This section also requires that the SWMP provide installation and implementation specifications for each BMP identified in the SWMP. For structural BMPs, in most cases, this must include a technical drawing to provide adequate installation specifications. See Part I.C.3(c).*
 - i) *Dedicated concrete or asphalt batch plants. This section requires that the practices used to reduce the pollutants in stormwater discharges associated with dedicated concrete or asphalt batch plants be identified in the SWMP. (Coverage under the construction site SWMP and permit is not required for batch plants if they have alternate CDPS permit coverage.)*
 - ii) *Vehicle tracking control. This section requires that practices be implemented to control sediment from vehicle tracking, and that all such practices implemented at the site be clearly described in the SWMP.*
 - iii) *Waste management and disposal. This section requires that the practices implemented at the site to control stormwater pollution from construction site waste, including concrete washout activities, be clearly described in the SWMP. It also requires that concrete washout activities be conducted in a manner that does not contribute pollutants to surface waters or stormwater runoff.*
 - iv) *Concrete Washout Water. Part I.D.3(c) of the permit has been revised to conditionally authorize discharges to the ground of concrete wash water from washing of tools and concrete mixer chutes when appropriate BMPs are implemented. The permit prohibits the discharge of concrete washout water to surface waters and to storm sewer systems. Part I.C.3(c)(7) of the permit requires that BMPs be in place to prevent surface discharges of concrete washout water from the site.*

The use of unlined pits to contain concrete washout water is a common practice in Colorado. The Division has further evaluated the need for a permit for discharge of concrete washout water to the ground. The Division has determined that the use of appropriate BMPs for on-site washing of tools and concrete mixer chutes would prevent any significant discharge to groundwater. BMPs to protect groundwater are required by Part I.C.3(c)(7) of the permit. Because pH is a pollutant of concern for washout activities, the soil must have adequate buffering capacity to result in protection of the groundwater standard, or a liner/containment must be used. The following management practices are recommended to prevent an impact from unlined pits to groundwater:

- (1) the use of the washout site should be temporary (less than 1 year), and*
- (2) the washout site should be not be located in an area where shallow groundwater may be present, such as near natural drainages, springs, or wetlands.*

II. *CHANGES IN THIS GENERAL PERMIT (cont.)*

Where adequate management practices are not followed to protect groundwater quality, the Department may require discharges to unlined pits to cease, or require the entity to obtain alternate regulatory approval through notice from either the Water Quality Control Division or the Hazardous Materials and Waste Management Division.

In addition, Part I.D.1(b) of the permit has been revised to clearly state that the permit does not authorize on-site permanent disposal of concrete washout waste, only temporary containment of concrete washout water from washing of tools and concrete mixer chutes. Upon termination of use of the washout site, accumulated solid waste, including concrete waste and any contaminated soils, must be removed from the site to prevent on-site disposal of solid waste.

- v) *Construction Dewatering. Part I.D.3(d) of the permit has been revised to conditionally authorize discharges to the ground of water from construction dewatering activities when appropriate BMPs are implemented. The permit does not authorize the discharge of groundwater from construction dewatering to surface waters or to storm sewer systems. Part I.C.3(c)(8) of the permit requires that BMPs be in place to prevent surface discharges. The permittee may apply for coverage under a separate CDPS discharge permit, such as the Construction Dewatering general permit, if there is a potential for discharges to surface waters.*

The Division has determined that potential pollutant sources introduced into groundwater from construction dewatering operations do not have a reasonable potential to result in exceedance of groundwater standards when the discharge is to the ground. The primary pollutant of concern in uncontaminated groundwater is sediment. Although technology-based standards for sediment do exist in 5 CCR 1002-41, the discharge of sediment to the ground as part of construction dewatering does not have the reasonable potential to result in transport of sediment to the groundwater table so as to result in an exceedance of those standards.

For a discharge of water contaminated with other pollutants that are present in concentrations that may cause an exceedance of groundwater standards, separate CDPS discharge permit coverage is required. Contaminated groundwater may include that contaminated with pollutants from a landfill, mining activity, industrial pollutant plume, underground storage tank, or other source of human-induced groundwater pollution and exceeding the State groundwater standards in Regulations 5 CCR 1002-41 and 42.

J. *Terms and Conditions, General Limitations and Design Standards*

This section reiterates the requirement that facilities select, install, implement, and maintain appropriate BMPs, following good engineering, hydrologic and pollution control practices. In addition, requirements for protection of water quality standards (see Part I.D.1.(a) of the permit) and requirements to adequately design BMPs to prevent pollution or degradation of State waters (see Part I.D.2 of the permit) have been revised and are fully discussed in Part III.B of the rationale, below. Additional language was also added to Section III.B of the rationale further clarifying the expectations for compliance with this permit.

1. *Management of Site Waste*

This section has been modified to clarify that on-site waste must be properly managed to prevent potential pollution of State waters, and that this permit does not authorize on-site waste disposal. Solid waste disposal is regulated by the Hazardous Materials and Waste Management Division.

II. *CHANGES IN THIS GENERAL PERMIT (cont.)*

K. *Terms and Conditions, SWMP Requirements*

1. **SWMP Review/Changes:** *This section now requires that when changes are made to site conditions, the SWMP must be revised immediately, except for some BMP description changes which conditionally may occur within 72 hours. This requirement is included to both ensure that the SWMP be kept accurate and up-to-date, and to clarify that stormwater management at a site typically should be proactive instead of responsive, and be integrated into site management to ensure it is calibrated with those changes. The section was also clarified to state that only changes in site conditions that do not require new or modified BMPs do not need to be addressed in the SWMP. See Part I.D.5(c) of the permit.*
2. **SWMP Certification:** *The previous permit was unclear on a requirement that the copy of SWMP that remains at the facility had to be signed in accordance with permit signatory requirements. This requirement has been deleted. The signatory requirement of Part I.F.1 only applies to the SWMP if it is to be submitted to the Division or to EPA. See Part I.F.1 of the permit.*

L. *Terms and Conditions, Post-Storm Inspections*

The previous permit required post-storm inspections, but did not specify the timing of inspections. This section now requires that post-storm event inspections generally be conducted within 24 hours of the event. An alternative timeline has been allowed, only for sites where there are no construction activities occurring following a storm event. For this condition, post-storm event inspections shall instead be conducted prior to commencing construction activities, but no later than 72 hours following the storm event, and the delay noted in the inspection report.

Any exception from the minimum inspection schedule is temporary, and does not eliminate the requirement to perform routine maintenance due to the effects of a storm event, including maintaining vehicle tracking controls and removing sediment from impervious areas. In many cases, maintenance needs will require a more frequent inspection schedule than the minimum inspections required in the permit, to ensure that BMPs continue to operate as needed to comply with the permit. See Part I.D.6(a) of the permit.

M. *Terms and Conditions, Inspections*

1. *The Winter Conditions Inspection Exclusion section has been modified to include documentation requirements for this exclusion. See Part I.D.6(a) of the permit. The Inspection Scope has been modified to include the requirement to inspect waste storage areas during inspections conducted in accordance with the permit. See Part I.D.6(b) of the permit.*
2. *The requirements for sites to qualify for reduced inspection frequencies for completed sites have been slightly modified (see Part I.D.6(a)(2) of the permit,). The requirement now is that only construction activities that disturb the ground surface must be completed. Construction activities that can be conducted without disturbance of the ground surface; for example, interior building construction, and some oil well activities, would not prohibit a site from otherwise qualifying for the reduced inspection frequency. In addition, the requirement for the site to be prepared for final stabilization has been slightly modified to allow for sites that have not yet been seeded to qualify, as long as the site has otherwise been prepared for final stabilization, including completion of appropriate soil preparation, amendments and stabilization practice. This will allow for sites with seasonal seeding limitations or where additional seed application may be needed in the future to still qualify.*

II. CHANGES IN THIS GENERAL PERMIT (cont.)

3. *The Inspection Report/Records section (Part I.D.6(b)(2)) was added to clarify requirements for inspection reports generated during an inspection conducted in accordance with Part I.D.6 of the permit. Inspection reports must be signed by the inspector, or the individual verifying the corrective action indicated in the inspection report, on behalf of the permittee. Inspection reports are not typically required to be submitted to the Division, and therefore, are not required to be signed and certified for accuracy in accordance with Part I.F.1 of the permit. However, any inspection reports that are submitted to the Division must follow the signatory requirements contained in that section.*

N. Terms and Conditions, Maintenance, Repair, and Replacement of Control Practices

These sections have been added to clarify requirements for maintaining the BMPs identified in the SWMP and for addressing ineffective or failed BMPs. BMP maintenance and site assessment to determine the overall adequacy of stormwater quality management at the site must occur proactively, in order to ensure adequate control of pollutant sources at the site. In most cases, if BMPs are already not operating effectively, or have failed, the issue must be addressed immediately, to prevent discharge of pollutants. See Parts I.D.7 and I.D.8 of the permit.

O. Total Maximum Daily Load (TMDL)

A section on TMDLs has been added. This section gives a general outline of the additional requirements that may be imposed by the Division if the facility discharges to a waterbody for which a stormwater-related TMDL is in place. See Section VIII.C of the rationale and Part I.D.11 of the permit.

P. Additional Definitions

Part I.E of the permit has been modified to remove the definition of runoff coefficient, as it is no longer a permit requirement. The definition for state waters has also been deleted, but can be found in Regulation 61.

Q. Changes in Discharge

The section on the types of discharge or facility changes that necessitate Division notification has been clarified. See Part II.A.1 of the permit.

R. Non-Compliance Notification

The section on notification to the Division regarding instances of non-compliance has been amended to clarify which types of noncompliance require notification. See Part II.A.3 of the permit.

S. Short Term Certifications

The previous permit allowed small short-term construction activities to be authorized for a predetermined period from 3 to 12 months, and then automatically expire (an inactivation request did not need to be submitted). The issuance of these certifications has led to significant confusion and incidents of noncompliance resulting from permittees unintentionally letting their certifications expire prior to final stabilization, as well as issues regarding billing. Therefore, the provisions for short-term certifications have been deleted.

T. Bypass

The Division has revised the Bypass conditions in Part II.A.5 of the permit to be consistent with the requirements of Regulation 61.8(3)(i). The revised language addresses under what rare occurrences BMPs may be bypassed at a site.

III. BACKGROUND

As required under the Clean Water Act amendments of 1987, the Environmental Protection Agency (EPA) has established a framework for regulating municipal and industrial stormwater discharges. This framework is under the National Pollutant Discharge Elimination System (NPDES) program (Note: The Colorado program is referred to as the Colorado Discharge Permit System, or CDPS, instead of NPDES.) The Water Quality Control Division ("the Division") has stormwater regulations (5CCR 1002-61) in place. These regulations require specific types of industrial facilities that discharge stormwater associated with industrial activity (industrial stormwater), to obtain a CDPS permit for such discharge. The regulations specifically include construction activities that disturb one acre of land or more as industrial facilities. Construction activities that are part of a larger common plan of development which disturb one acre or more over a period of time are also included.

A. General Permits

The Division has determined that the use of general permits is the appropriate procedure for handling most of the thousands of industrial stormwater applications within the State.

B. Permit Requirements

This permit does not impose numeric effluent limits or require submission of effluent monitoring data in the permit application or in the permit itself. The permit instead imposes practice-based effluent limitations for stormwater discharges through the requirement to develop and implement a Stormwater Management Plan (SWMP). The narrative permit requirements include prohibitions against discharges of non-stormwater (e.g., process water). See Part I.D.3 of the permit.

The permit conditions for the SWMP include the requirement for dischargers to select, implement and maintain Best Management Practices (BMPs) at a permitted construction site that adequately minimize pollutants in the discharges to assure compliance with the terms and conditions of the permit. Part I.D.2 of the permit includes basic design standards for BMPs implemented at the site. Facilities must select, install, implement, and maintain appropriate BMPs, following good engineering, hydrologic and pollution control practices. BMPs implemented at the site must be adequately designed to control all potential pollutant sources associated with construction activity to prevent pollution or degradation of State waters. Pollution is defined in CDPS regulations (5CCR 1002-61) as man-made or man-induced, or natural alteration of the physical, chemical, biological, and radiological integrity of water. Utilizing industry-accepted standards for BMP selection that are appropriate for the conditions and pollutant sources present will typically be adequate to meet these criteria, since construction BMPs are intended to prevent the discharge of all but minimal amounts of sediment or other pollutants that would not result in actual pollution of State waters, as defined above. However, site-specific design, including ongoing assessment of BMPs and pollutant sources, is necessary to ensure that BMPs operate as intended.

The permit further requires that stormwater discharges from construction activities shall not cause, have the reasonable potential to cause, or measurably contribute to an excursion above any water quality standard, including narrative standards for water quality. This condition is the basis for all CDPS Discharge permits, and addresses the need to ensure that waters of the State maintain adequate water quality, in accordance with water quality standards, to continue to meet their designated uses. It is believed that, in most cases, BMPs can be adequate to meet applicable water quality standards. If water quality impacts are noted, or the Division otherwise determines that additional permit requirements are necessary, they are typically imposed as follows: 1) at the renewal of this general permit or through a general permit specific to an industrial sector (if the issue is sector-based); 2) through direction from the Division based on the implementation of a TMDL (if the issue is watershed-based); or 3) if the issue is site-specific, through a revision to the certification from the Division based on an inspection or SWMP review, or through an individual permit.

III. BACKGROUND (cont.)

Some construction sites may be required to comply with a Qualifying Local Program in place of meeting several of the specific requirements in this permit. Sites covered by a Qualifying Local Program may not be required to submit an application for coverage or a notice of inactivation and may not be required to pay the Division's annual fee. See Section VII of the rationale.

C. Violations/Penalties

Dischargers of stormwater associated with industrial activity, as defined in the CDPS regulations (5CCR 1002-61), that do not obtain coverage under this or other Colorado general permits, or under an individual CDPS permit regulating industrial stormwater, will be in violation of the Federal Clean Water Act and the Colorado Water Quality Control Act, 25-8-101. For facilities covered under a CDPS permit, failure to comply with any CDPS permit requirement constitutes a violation. As of the time of permit issuance, civil penalties for violations of the Act or CDPS permit requirements may be up to \$10,000 per day, and criminal pollution of state waters is punishable by fines of up to \$25,000 per day.

IV. STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY

The stormwater regulations (CDPS regulations (5CCR 1002-61)), require that stormwater discharges associated with certain industrial activities be covered under the permit program. Construction activity that disturbs one acre or more during the life of the project is specifically included in the listed industrial activities. This permit is intended to cover most stormwater discharges from construction facilities required by State regulation to obtain a permit.

A. Construction Activity

Construction activity includes ground surface disturbing activities including, but not limited to, clearing, grading, excavation, demolition, installation of new or improved haul and access roads, staging areas, stockpiling of fill materials, and dedicated borrow/fill areas. Construction does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility. (The maintenance exclusion is intended for projects such as road resurfacing, and where there will be less than one acre of additional ground disturbed. Improvements or upgrades to existing facilities or roads, where at least one acre is disturbed, would not qualify as "routine maintenance.")

Definitions of additional terms can be found in Part I.E of the permit.

Stormwater discharges from all construction activity require permit coverage, except for operations that result in the disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale. A "larger common plan of development or sale" is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules.

B. Types of Discharges/Activities Covered

1. **Stormwater:** *This permit is intended to cover most new or existing discharges composed **entirely** of stormwater from construction activities that are required by State regulation to obtain a permit. This includes stormwater discharges associated with areas that are dedicated to producing earthen materials, such as soils, sand, and gravel, for use at a single construction site. These areas may be located at the construction site or at some other location. This permit does not authorize the discharge of mine water or process water from borrow areas. This permit may also cover stormwater discharges associated with dedicated asphalt plants and concrete plants located at a specific construction site.*

IV. *STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY (cont.)*

2. **Process water:** *Under certain restrictions, discharges to the ground from construction dewatering, and from concrete washout activities, are also covered (see Parts I.C.3(c)(7), I.C.3(c)(8), I.D.3(c) and I.D.3(d) of the permit).*

C. *Types of Activities NOT Covered*

1. **Stormwater:** *Aside from the sources listed in subparagraph B.1, above, this permit does not cover stormwater discharged from construction sites that is mixed with stormwater from other types of industrial activities, or process water of any kind. Other types of industrial activities that require stormwater discharge permits pursuant to different sections of the regulations (Regulation 5 CCR 1002-61, Section 61.2(e)(iii)(A-I, K)], are not covered by this permit.*
2. **Process water:** *This permit also does not cover any discharge of process water to surface waters. If the construction activity encounters groundwater, in order to discharge this groundwater to surface waters, a Construction Dewatering Discharge Permit (permit number COG-070000) must also be obtained. An application for this permit can be obtained from the Division at the address listed in Part I.A.4(a) of the permit, or at the website in Section I of the rationale.*

V. *COVERAGE UNDER THIS GENERAL PERMIT*

Under this general permit, owners or operators of stormwater discharges associated with construction activity may be granted authorization to discharge stormwater into waters of the State of Colorado. This includes stormwater discharges associated with industrial activity from areas that are dedicated to producing earthen materials, such as soils, sand and gravel, for use at a single construction site, and dedicated asphalt plants and dedicated concrete plants.

This permit does not pre-empt or supersede the authority of other local, state or federal agencies to prohibit, restrict or control discharges of stormwater to storm drain systems or other water courses within their jurisdiction.

Authorization to discharge under the permit requires submittal of a completed application form and a certification that the SWMP is complete, unless the site is covered by a Qualifying Local Program. Upon receipt of all required information, the Division may allow or disallow coverage under the general permit.

VI. *APPLICATION AND CERTIFICATION*

*At least **ten days** prior to the commencement of construction activities, the owner or operator of the construction site shall submit an original completed application which includes the signed certification that the SWMP is complete. Original signatures are required for the application to be considered complete. For small construction sites only, if the site is covered by a Qualifying Local Program (see below), submittal of an application is not required.*

For the purposes of this permit, the “operator” is the person who has day-to-day control over the project. This can be the owner, the developer, the general contractor or the agent of one of these parties, in some circumstances. At different times during a construction project, different types of parties may satisfy the definition of “operator” and the certification may be transferred as roles change.

(Note - Under the Federal regulations, this application process is referred to as a Notice of Intent, or NOI. For internal consistency with its current program, the Division will continue to use the term “application.”) A summary of the permit application requirements is found in the permit at Part I.A.4(b).

If coverage under this general permit is appropriate, then a certification will be developed and the applicant will be certified under this general permit.

VII. QUALIFYING LOCAL PROGRAMS

For stormwater discharges associated with small construction activity (i.e., one to five acre disturbed area sites), the permit includes conditions that incorporate approved qualifying local erosion and sediment control program (Qualifying Local Program) requirements by reference. A Qualifying Local Program is a municipal stormwater program for stormwater discharges associated with small construction activity that has been formally approved by the Division. The requirements for Qualifying Local Programs are outlined in Part 61.8(12) of the Colorado Discharger Permit System Regulations (also see the Division's "Qualifying Local Programs for Small Construction Sites - Application Guidance"). Such programs must impose requirements to protect water quality that are at least as stringent as those required in this permit.

A. Approval Termination

A Qualifying Local Program may be terminated by either the Division or the municipality. Upon termination of Division approval of a Qualifying Local Program, any small construction activity required to obtain permit coverage under Section 61.3(2)(h) of the CDPS regulations (5CCR 1002-61), shall submit an application form as provided by the Division, with a certification that the Stormwater Management Plan (SWMP) is complete as required by Part I.A.3 of the permit, within 30 days of Division notification.

B. Approval Expiration

Division approval of a Qualifying Local Program will expire with this general permit on June 30, 2012. Any municipality desiring to continue Division approval of their program must reapply by March 31, 2012. The Division will determine if the program may continue as a approved Qualifying Local Program.

VIII. TERMS AND CONDITIONS OF PERMIT

A. Coverage under a Qualifying Local Program – For Small Construction Sites Only

For small construction sites (disturbing less than 5 acres) covered under a Qualifying Local Program (see Section VII, above), only certain permit requirements apply, as outlined below. The local program must have been formally designated by the Division to qualify. Most municipalities have some type of local program and may require permits and fees. However, simply having a program in place does not necessarily mean that it is a qualifying program and that a State permit is not required. The local municipality is responsible for notifying operators and/or owners that they are covered by a Qualifying Local Program. As of May 31, 2007, the only approved Qualifying Local Programs within the state are for Golden, Durango and Lakewood. An updated list of municipalities with Qualifying Local Programs, including contact information, is available on the Division's website at: <http://www.cdphe.state.co.us/wq/PermitsUnit/stormwater/construction.html>.

The Division reserves the right to require any construction owner or operator within the jurisdiction of a Qualifying Local Program covered under this permit to apply for and obtain coverage under the full requirements of this permit.

1. **Permit Coverage:** *If a construction site is within the jurisdiction of a Qualifying Local Program, the owner or operator of the construction activity is authorized to discharge stormwater associated with small construction activity under this general permit **without** the submittal of an application to the Division. The permittee also is not required to submit an inactivation notice or payment of an annual fee to the Division.*

VIII. TERMS AND CONDITIONS OF PERMIT (cont.)

2. **Permit Terms and Conditions:** *The permittee covered by a Qualifying Local Program must comply with the requirements of that Qualifying Local Program. In addition, the following permit sections are applicable:*
 - a) *Parts 1.A.1, 1.A.2, and 1.A.3: Authorization to discharge and discussion of coverage under the permit.*
 - b) *Part I.D.1: General limitations that must be met in addition to local requirements.*
 - c) *Parts I.D.2, I.D.3, I.D.4: BMP implementation, prohibition of non-stormwater discharges unless addressed in a separate CDPS permit, and requirements related to releases of reportable quantities.*
 - d) *Part I.D.11: Potential coverage under a Total Maximum Daily Load (TMDL).*
 - e) *Part I.E: Additional definitions.*
 - f) *Part II (except for Parts II.A.1, II.B.3, II.B.8, and II.B.10): Specifically includes, but is not limited to, provisions applicable in the case of noncompliance with permit requirements, and requirements to provide information and access.*

B. Stormwater Management Plans (SWMPs)

Prior to commencement of construction, a stormwater management plan (SWMP) shall be developed and implemented for each facility covered by this permit. A certification that the SWMP is complete must be submitted with the permit application. The SWMP shall identify potential sources of pollution (including sediment) which may reasonably be expected to affect the quality of stormwater discharges associated with construction activity from the facility. In addition, the plan shall describe the Best Management Practices (BMPs) which will be used to reduce the pollutants in stormwater discharges from the construction site. (Note that permanent stormwater controls, such as ponds, that are used as temporary construction BMPs must be adequately covered in the SWMP.) Facilities must implement the provisions of their SWMP as a condition of this permit. The SWMP shall include the following items:

1. *Site Description*
2. *Site Map*
3. *Stormwater Management Controls*
4. *Long-term Stormwater Management*
5. *Inspection and Maintenance*

(See Parts I.B. and I.C of the permit for a more detailed description of SWMP requirements.) The Division has a guidance document available on preparing a SWMP. The document is included as Appendix A of the permit application, and is available on the Division's website at www.cdphe.state.co.us/wq/PermitsUnit.

Some changes have been made to the SWMP requirements. See Section II.I of the rationale for a discussion on permittee responsibilities regarding those changes.

VIII. TERMS AND CONDITIONS OF PERMIT (cont.)

Master SWMP

Often, a large construction project will involve multiple smaller construction sites that are within a common plan of development, or multiple well pads under construction within an oil and gas well field. Pollutant sources and the types of BMPs used can be relatively consistent in such cases. A permittee could significantly streamline the SWMP development process through the use of a master SWMP. SWMP information must be developed and maintained for all construction activities that exceed one acre (or are part of a common plan of development exceeding one acre) conducted within the permitted area. By developing a single master plan, the permittee can eliminate the need to develop repetitive information in separate plans. Such a plan could include two sections, one containing a reference section with information applicable to all sites (e.g., installation details and maintenance requirements for many standard BMPs, such as silt fence and erosion blankets), and the second containing all of the information specific to each site (e.g., site BMP map, drainage plans, details for BMPs requiring site specific design, such as retention ponds).

As new activities begin, information required in the SWMP is added to the plan, and as areas become finally stabilized, the related information is removed. Records of information related to areas that have been finally stabilized that are removed from the active plan must be maintained for a period of at least three years from the date that the associated site is finally stabilized.

C. Total Maximum Daily Load (TMDL)

If the designated use of a stream or water body has been impaired by the presence of a pollutant(s), development of a Total Maximum Daily Load (TMDL) may be required. A TMDL is an estimate of allowable loading in the waterbody for the pollutant in question. Types of discharges that are or have the potential to be a significant source of the pollutant are also identified. If a TMDL has been approved for any waterbody into which the permittee discharges, and stormwater discharges associated with construction activity have been assigned a pollutant-specific Wasteload Allocation (WLA) under the TMDL, the Division will either:

- 1. Notify the permittee of the TMDL, and amend the permittee's certification to add specific BMPs and/or other requirements, as appropriate; or*
- 2. Ensure that the TMDL is being implemented properly through alternative local requirements, such as by a municipal stormwater permit. (The only current example of this is the Cherry Creek Reservoir Control Regulation (72.0), which mandates that municipalities within the basin require specific BMPs for construction sites.)*

See Part I.D.11 of the permit for further information.

D. Monitoring

Sampling and testing of stormwater for specific parameters is not required on a routine basis under this permit. However, the Division reserves the right to require sampling and testing on a case-by-case basis, in the event that there is reason to suspect that compliance with the SWMP is a problem, or to measure the effectiveness of the BMPs in removing pollutants in the effluent. See Part I.D.1(e) of the permit.

E. Facility Inspections

Construction sites typically must inspect their stormwater management controls at least every 14 days and within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. At sites or portions of sites where ground-disturbing construction has been completed but a vegetative cover has not been established, these inspections must occur at least once per month. (At sites where persistent snow cover conditions exist, inspections are not required during the period that melting conditions do not exist. These

VIII. TERMS AND CONDITIONS OF PERMIT (cont.)

conditions are only expected to occur at high elevations within the Colorado mountains.) For all of these inspections, records must be kept on file. Exceptions to the inspection requirements are detailed in Part I.D.6 of the permit.

F. SWMP Revisions

The permittee shall amend the SWMP whenever there is a change in design, construction, operation, or maintenance of the site, which would require the implementation of new or revised BMPs. The SWMP shall also be amended if it proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity. The timing for completion of SWMP changes is detailed in Parts I.D.5(c) and I.D.5(d) of the permit.

SWMP revisions shall be made prior to change in the field, or in accordance with Part I.D.5(d) of the permit.

G. Reporting

The inspection record shall be made available to the Division upon request. Regular submittal of an annual report is not required in this permit. See Part I.D.9 of the permit.

H. Annual Fee

The permittee is required to submit payment of an annual fee as set forth in the Water Quality Control Act. Permittees will be billed for the initial permit fee within a few weeks of permit issuance and then annually, based on a July 1 through June 30 billing cycle.

I. Responsibility for Permit

The permit certification for a site may be inactivated, once coverage is no longer needed. The certification may be transferred, if another party is assuming responsibility for the entire area covered by the certification. In addition, permit responsibility for **part** of the area covered by the certification may be reassigned to another party. These actions are summarized below. The Stormwater Program construction fact sheet explains these actions in further detail under the section on Multiple Owner/Developer Sites, and is available on the Division website at

<http://www.cdphe.state.co.us/wq/PermitsUnit/stormwater/ConstFactSheet.PDF>, Section F.

1. **Inactivation Notice:** When a site has been finally stabilized in accordance with the SWMP, the permittee shall submit an **Inactivation Notice** that is signed in accordance with Part I.F.1 of the permit. A summary of the Inactivation Notice content is described in Part I.A.6 of the permit. A copy of the Inactivation Notice form will be mailed to the permittee along with the permit certification. Additional copies are available from the Division.

For sites where all areas have been removed from permit coverage, the permittee may submit an inactivation notice and terminate permit coverage. In such cases the permittee would no longer have any land covered under their permit certification, and therefore there would be no areas remaining to finally stabilize. Areas may be removed from permit coverage by:

- reassignment of permit coverage (Part I.A.8 of the permit);
- sale to homeowner(s) (Part I.A.9 of the permit); or
- amendment by the permittee, in accordance with Division guidance for areas where permit coverage has been obtained by a new operator or returned to agricultural use.

VIII. TERMS AND CONDITIONS OF PERMIT (cont.)

2. **Transfer of Permit:** When responsibility for stormwater discharges for an *entire* construction site changes from one individual to another, the permit shall be transferred in accordance with Part I.A.7 of the permit. The permittee shall submit a completed **Notice of Transfer form**, which is available from the Division, and at www.cdphe.state.co.us/wq/PermitsUnit. If the new responsible party will not complete the transfer form, the permit may be inactivated if the permittee has no legal responsibility, through ownership or contract, for the construction activities at the site. In this case, the new owner or operator would be required to obtain permit coverage separately.
3. **Reassignment of Permit:** When a permittee no longer has control of a specific portion of a permitted site, and wishes to transfer coverage of that portion of the site to a second party, the permittee shall submit a completed **Notice of Reassignment of Permit Coverage form**, which is available from the Division, and at www.cdphe.state.co.us/wq/PermitsUnit. The form requires that both the existing permittee and new permittee complete their respective sections. See Part I.A.8 of the permit.

J. Duration of Permit

The general permit will expire on June 30, 2012. The permittee's authority to discharge under this permit is approved until the expiration date of the general permit. Any permittee desiring continued coverage under the general permit past the expiration date must apply for recertification under the general permit at least 90 days prior to its expiration date.

Kathleen Rosow
December 18, 2006

IX. PUBLIC NOTICE – 12/22/06

The permit was sent to public notice on December 22, 2006. A public meeting was requested, and was held on February 2, 2007. Numerous comments were received on the draft permit. Responses to those comments, and a summary of changes made to the draft permit, are in a separate document entitled "Division Response To Public Comments." The permit will be sent to a second public notice on March 23, 2007. Any changes resulting from the second public notice will be summarized in the rationale.

Kathleen Rosow
March 22, 2007

X. PUBLIC NOTICE – 3/23/07

The permit was sent to public notice for a second time on March 23, 2007. Numerous comments were received on the second draft permit. Responses to those comments, and a summary of the additional changes made to the draft permit, are contained in a separate document entitled "Division Response To Public Comments Part II". This document is part of the rationale. Any changes based on the Division response are incorporated into the rationale and permit. The response document is available online at <http://www.cdphe.state.co.us/wq/PermitsUnit/stormwater/construction.html>, or by emailing cdphe.wqstorm@state.co.us, or by calling the Division at 303-692-3517.

Kathleen Rosow
May 31, 2007

APPENDIX D

**CDPHE SECTION 5.5 (6 CCR 1007-2, PART 1, REGULATION PERTAINING TO
SOLID WASTE SITES AND FACILITIES, SECTION 5.5, SEPTEMBER 30, 2014**





Colorado Department
of Public Health
and Environment

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Hazardous Materials and Waste Management Division

6 CCR 1007-2, PART 1

REGULATIONS PERTAINING TO SOLID WASTE SITES AND FACILITIES

This Title Page does not constitute an official part of any regulation. Information contained in the chronology on this title page commences with amendments adopted by the Solid and Hazardous Waste Commission beginning in 2007 and is provided solely for informational and historical purposes.

AMENDED: 10/17/17 EFFECTIVE: 3/01/18
Repeal of Section 10.12 (Waste Tire End Users Fund) and Deletion of Section 1.2 Definition of Daily Cover

AMENDED: 10/17/17 EFFECTIVE: 1/01/18
Amendment of Section 1.7.6 – Waste Tire Fee

AMENDED: 2/21/17 EFFECTIVE: 4/14/17
Amendment of Section 9.1.2(B) – Elimination of Partial Exemption for Impoundments Managing Coal Combustion Residuals (CCR)

AMENDED: 11/15/16 EFFECTIVE: 12/30/16
Deletion and Replacement of Existing Section 14 Composting Regulations with New Section 14 Composting Regulations; and the Associated Additions and Revisions to Section 1.2 Definitions

AMENDED: 11/15/16 EFFECTIVE: 12/30/16
Amendment of Section 10 Waste Tire Regulations (Sections 10.4.2(J); 10.11.6; and 10.12.5)

AMENDED: 11/17/15 EFFECTIVE: 12/30/15
Amendment of Section 10.12.5 (Rebate Amount)

AMENDED: 5/19/15 EFFECTIVE: 6/30/15
Addition of Section 1.7.7 Regulations (Paint Stewardship Program Fees) and the Associated Additions to Section 1.2 Definitions

AMENDED: 11/18/14 EFFECTIVE: 1/14/15
(Deletion and Replacement of Existing Section 10 Regulation (Waste Tire Facilities and Waste Tire Haulers) with New Section 10 Regulations (Waste Tires); the Amendment of Section 16 (Materials Prohibited From Disposal); the Associated Additions and Revision to Section 1.2 Definitions; and the Repeal of 6 CCR 1007-2, Part 4 (Regulations Pertaining to the Waste Tire Processor and End User Reimbursement Program)

AMENDED: 8/19/14 EFFECTIVE: 9/30/14
(Deletion and Replacement of Existing Section 5.5 Regulations (Management of Asbestos-Contaminated Soil) with New Section 5.5 Regulations (Management of Regulated Asbestos Contaminated Soil (RACS)); the Addition of Appendix 5A (Sample Collection Protocols and Analytical Methodologies) and the Associated Additions and Revision to Section 1.2 Definitions

AMENDED: 8/19/14 EFFECTIVE: 9/30/14
(Addition of Section 1.7.6 (Waste Tire Fee))

AMENDED: 11/19/13 EFFECTIVE: 1/14/14
(Amendment of Section 16.4.2 Retail Disposal System)

AMENDED: 11/19/13 EFFECTIVE: 12/30/13
(Solid Waste User Fee (SWUF) Amendment to Section 1.7.4)

AMENDED: 2/19/13 EFFECTIVE: 4/14/13
(Amendment of Section 10 Regulations {Waste Tire Facilities and Waste Tire Haulers} and the Associated Revision of the Section 1.2 Definition of "End User")

AMENDED: 2/19/13 EFFECTIVE: 4/14/13
(Deletion and Replacement of existing Section 16 Regulations {Disposal of Motorized Equipment Wastes} with new Section 16 Regulations {Materials Prohibited from Disposal} and the Associated Additions and Revisions to Section 1.2 Definitions)

AMENDED: 11/20/12 EFFECTIVE: 12/30/12
(Amendment of Section 10 Regulations {Waste Tire Facilities and Waste Tire Haulers} and the Associated Revision of the Section 1.2 Definition of "End User")

AMENDED: 11/20/12 EFFECTIVE: 12/30/12
(Amendment of Section 18 Regulations {Waste Grease Transporters, Facilities, and Personal Users of Waste Grease} and the Associated Revision of the Section 1.2 Definitions of "Trap Grease" and "Waste Grease")

AMENDED: 5/15/12 EFFECTIVE: 6/30/12
(Amendment of Section 1.7.4(A) {Solid Waste User Fee})

AMENDED: 2/21/12 EFFECTIVE: 3/30/12
(Deletion and Replacement of Section 9 {Waste Impoundments} regulations and the Associated Revision of the Section 1.2 Definition of "Sludge")

AMENDED: 2/21/12 EFFECTIVE: 3/30/12
(Deletion of Section 8 {Recycling} regulations and Replacement with new Section 8 {Recycling and Beneficial Use} regulations; and Associated Additions and Revisions to Section 1.2 {Definitions})

AMENDED: 2/21/12 EFFECTIVE: 3/30/12
(Amendment of Section 1.7.4 {Solid Waste User Fee})

AMENDED: 12/16/11 EFFECTIVE: 1/30/12
(Addition of Section 18 {Waste Grease} and Section 1.7.5 {Waste Grease Annual Fees}; and Associated Additions to Section 1.2 {Definitions}; Section 1.5.2 {Waiver Processes and Procedures} and Section 1.7.3 {Annual Fees})

AMENDED: 11/15/11 EFFECTIVE: 12/30/11
(Amendment of Section 13.2.5(C) {Incorporation by Reference})

AMENDED: 8/16/11 EFFECTIVE: 9/30/11
(Deletion of Section 13 {Infectious Waste} regulations and Replacement with new Section 13 {Medical Waste} regulations; Associated Additions and Revisions to Section 1.2, Definitions; and Modification of Section 7.1(D), Transfer Stations)

AMENDED: 8/16/11 EFFECTIVE: 9/30/11
(Amendment of Section 1.7.4(C) {Solid Waste User Fee – Allowable expenditures and reporting})

AMENDED: 5/17/11 EFFECTIVE: 6/30/11
(Amendment of Section 1.7.2 {Document Review and Activity Fees}; and Amendment of Section 10 Regulations {Waste Tire Facilities and Waste Tire Haulers})

AMENDED: 2/15/11 EFFECTIVE: 3/30/11
(Deletion of Section 10 (Scrap Tire Facilities) and Replacement with new Section 10 (Waste Tire Facilities and Waste Tire Haulers); Deletion of Section 15 (Waste Motor Vehicle Tire Haulers) and Reservation of Section 15; and Associated Additions, Revisions and Deletions to Section 1.2, Definitions)

AMENDED: 11/16/10 EFFECTIVE: 12/30/10
(Revision of Section 1.7.1 and Section 1.7.4: Solid Waste User Fee (SWUF) Amendments)

AMENDED: 02/16/10 EFFECTIVE: 03/30/10
(Revision of Section 1.2 Definitions to modify “Agricultural wastes” definition and to add a definition of “All-hazards event”)

AMENDED: 08/18/09 EFFECTIVE: 09/30/09
(Revision of Section 1.5.2 and Revision of Section 1.9.2)

AMENDED: 11/18/08 EFFECTIVE: 12/30/08
(New Section 17, Commercial Exploration & Production Waste Impoundments; and associated additions to Section 1.2 Definitions, and revision of Section 9.1)

AMENDED: 11/18/08 EFFECTIVE: 12/30/08
(Repeal and Replacement of Section 14 Composting regulations)

AMENDED: 08/19/08 EFFECTIVE: 09/30/08
(Revision of Section 1.7.3)

AMENDED: 02/19/08 EFFECTIVE: 03/30/08
(Revision of Section 1.7 and Section 16.6.5)

AMENDED: 05/15/07 EFFECTIVE: 07/01/07
(New Section 16, Disposal of Motorized Equipment Wastes, and associated additions to Section 1.2, Definitions)

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

**Solid and Hazardous Waste Commission/Hazardous Materials and Waste
Management Division**

6 CCR 1007-2

PART 1 - REGULATIONS PERTAINING TO SOLID WASTE SITES AND FACILITIES

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DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

State Board of Health/Hazardous Materials and Waste Management Division

6 CCR 1007-2

PART 1 - REGULATIONS PERTAINING TO SOLID WASTE SITES AND FACILITIES

SECTION 1.0

ADMINISTRATIVE INFORMATION

Applicable to all existing or new solid waste facilities.

1.1 GENERAL INFORMATION

- 1.1.1 Authority These regulations are promulgated pursuant to the "Solid Wastes Disposal Sites and Facilities Act", Title 30, Article 20, Part 1, Colorado Revised Statutes (CRS), as amended. These regulations replace and supersede the "Solid Wastes Disposal Sites and Facilities Regulations", adopted February 16, 1972, and effective April 1, 1972.
- 1.1.2 Referenced materials This document may refer to documents produced by other agencies. All cited references are for that reference that is valid on the particular date of adoption of the pertinent section of these regulations and do not include later amendments or editions of the incorporated material. Copies of the referenced material may be reviewed during normal business hours at the Colorado Department of Public Health and Environment. Information on accessing the referenced documents may be obtained by contacting the:

Colorado Department of Public Health and Environment
Program Manager
Solid Waste Section
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530
Phone: (303) 692-3300

1.2 DEFINITIONS

“Abandoned facility” means facility in operation after the initial enactment of the Solid Waste Disposal Sites and Facilities Act in 1967 that has ceased operations without implementing a closure plan in accordance with the regulations that were in effect on the date of closure.

“Act” means the "Solid Wastes Disposal Sites and Facilities Act", Title 30, Article 20, Part 1, CRS, as amended.

“Active life” means the period of operation beginning with the initial receipt of solid waste, and ending at completion of closure activities in accordance with these regulations.

“Active operating area” means an area that includes all areas of unloading, bailing, compacting, storing and out loading.

“Active portion” means that part of a facility or unit that has received or is receiving wastes and that has not been closed in accordance with these regulations.

“Adequate cover” means:

- (a) Daily cover: At least six inches (6") of earthen material or other suitable material placed over the exposed solid waste at the end of each operating day, or at such frequencies as needed to prevent or minimize nuisance conditions, and
- (b) Intermediate cover: At least one foot (1') of earthen material or other suitable material placed over solid wastes in areas left temporarily unused for at least one month, but not finally closed; and
- (c) Final cover: Final cover design should be selected from alternatives presented in Subsection 3.5.3.

“Adequately wet” means sufficiently wet to minimize visible emissions of dust and/or debris within the regulated work area (RWA) and either:

- a. Prevent the release of visible emissions from leaving the RWA in accordance with Section 5.5 of these regulations; or
- b. Demonstrate that asbestos fibers are not leaving the RWA above risk-based air thresholds.

The observance of visible emissions, outside of the RWA, of dust and/or debris may be an indication that soils are not adequately wet.

“Adjacent Receptor Zone” means an area of uncontrolled access at a distance of 150’ or less from the nearest Regulated Work Area (RWA) boundary during active Regulated Asbestos Contaminated Soil (RACS) disturbance. For the purpose of this definition, highways, streets, and roads without sidewalks, where only vehicles are permitted, are considered to be areas of controlled access and therefore not adjacent receptor zones. For the purpose of this definition "vehicle" means a device that is capable of moving itself, or of being moved, from place to place upon wheels, including bicycles and electrical assisted bicycles. For the purpose of this definition, an area for which access is not ordinarily controlled that is closed to the public during soil disturbing activities in the adjacent RWA is considered to be an area of controlled access and therefore not an adjacent receptor zone.

“Agent of a wholesaler” as used in Sections 10 and 16 of these Regulations mean a person who is authorized by the Wholesaler to act for or in place of the Wholesaler to transact the Wholesaler’s business as it relates to the distribution of new tires, lubricating oil, or new lead-acid batteries to retailers and the transportation of waste tires, used oil, or used lead-acid batteries to a separate Wholesaler engaged in the business of recycling collection.

“Agricultural wastes” means all solid wastes resulting from the raising of crops or animals on land zoned agricultural by local requirements, including animal manures, that are returned to the soils as fertilizer, soil conditioners or compost or are composted to return to the soils. In addition, agricultural waste means all carcasses and carcass by-products resulting from any mass livestock mortality that is the result of an all-hazards event or depopulation ordered by the state veterinarian or other appropriately designated authority.

“Air Monitoring Specialist” (“AMS”) means a person trained and certified, in accordance with the requirements of Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B), for the collection of air samples to determine airborne particulate and/or asbestos concentrations.

“Air pollutant” means any fume, smoke, particulate matter, vapor, gas or any combination thereof which is emitted into or otherwise enters the atmosphere. “Air pollutant” includes, but is not limited to, any physical, chemical, biological, radioactive (including source material, special nuclear material, and by-product material) substance or matter. “Air pollutant” does not include water vapor or steam condensate.

“Air pollution” means any detectable concentration of one or more air pollutants in the ambient air that has caused, is causing, or if unabated may cause injury to human, plant or animal life, or injury to property, or which unreasonably interferes with the comfortable enjoyment of life or property.

“Airport” means an airport open to members of the public without prior permission and without restriction, within the physical capabilities of the facility.

“All-hazards event” means the occurrence of any catastrophic event or incident that is either natural, such as a blizzard, fire, flood, tornado, earthquake, or disease outbreak or man-made and that could be of biological, chemical, radiological, nuclear or explosive origin.

“Amended application” means a document which proposes modifications to an existing facility that constitutes a change in operations to that existing site or facility.

“Ancillary equipment” means any device such as, but not limited to, piping, fittings, flanges, valves, and pumps that is used to distribute, meter, or control the flow of material from its point of generation or transport to a storage or treatment tank(s), between material storage and treatment tanks to a point of disposal onsite, or to a point of shipment for disposal off-site.

“Ancillary Worker” means a worker that has not completed the training under Section 5.5.3(A) and (B) of these regulations.

“Animal Waste” means compostable materials generated by the customary and generally accepted activities, practices, and procedures that farmers and ranchers engage in during the production of poultry and livestock including manures and animal mortalities. Animal Waste also includes non-agricultural and non-human animal excreta. Animal waste does not include food processing residuals such as paunch.

“Antineoplastic” means acts to prevent, inhibit, or halt the growth of a tumor.

“Applicant” for the purposes of Section 10.12 means any person or business seeking a rebate from the Waste Tire End Users Fund.

“Application for a certificate of designation” means all documents, data and drawings which are submitted, for review, by an applicant to a governing body having jurisdiction. The application shall contain the site location, the type of facility, the engineering design and operations report which includes, but is not limited to, geological, hydrological, engineering and operational data for the design, operation, closure and post-closure of the facility. This information shall be prepared in accordance with these regulations and all local requirements.

“Approved site or facility” means a site or facility for which a certificate of designation has been obtained, pursuant to the Act.

“Aquifer” means a geologic formation, group of formations, portion of a formation or unit capable of yielding significant quantities of ground water of usable quantity to wells or springs.

“Architectural paint” means an interior or exterior architectural coating sold in a container of five gallons or less.

“Area of Contamination” (“AOC”) means a discrete, discernible area of known RACS.

“Areas susceptible to mass movement” means those areas of influence (i.e., areas characterized as having an active or substantial possibility of mass movement) where the movement of earth material at beneath, or adjacent to the facility because of natural or man-induced events, results in the downslope transport of soil and rock material by means of gravitational influence. Areas of mass movement include, but are not limited to, landslides, avalanches, debris slides and flows, soil flexion, block sliding, and rock fall.

“Asbestos” means the asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), amosite (cummingtonite-grunerite), anthophyllite, actinolite and tremolite.

“Asbestos-containing material” (“ACM”) means any material that contains more than one percent (1%) asbestos.

“Asbestos waste” means any asbestos-containing material whether it contains friable or non-friable asbestos, that is not intended for further use. This term includes but is not limited to asbestos mill tailings, asbestos from pollution control devices, and containers that contain asbestos.

“Asbestos waste disposal area” means an area approved for the disposal of asbestos waste at a solid waste facility, including, but not limited to, a trench or monofill.

“Ash” means the bottom ash, fly ash or air pollution control residues and other residues of the combustion process from the operation of an incinerator or energy recovery facility, including the combustion of any municipal, commercial or industrial solid waste.

“Authorized signature” means the signature of an individual who has authority to sign on behalf of and bind an individual or corporation.

“Autoclave” means a strong, pressurized, steam heated vessel used for sterilization. When used as a verb the term means the process of sterilization accomplished through the use of such a vessel.

“Backyard Composting” means composting on a residential property utilizing Type 1 and 2 feedstocks but with no more than 100 cubic yards in process at one time.

“Barrier layer” means a continuous layer of material designed and constructed to restrict horizontal and/or vertical migration of leachate from the facility. A “barrier layer” may contain both manufactured and natural materials. The term is also used in cap construction to prevent fluids from migrating vertically through the cap.

“Base flood” means a flood that has a one percent chance of recurring in any year, or a flood of a magnitude equalled or exceeded once in 100 years, on the average over a significantly long period.

“Beneficial use” means the use of solid waste as an ingredient in a manufacturing process, or as an effective substitute for natural or commercial products, in a manner that does not pose a threat to human health or the environment. Avoidance of processing or disposal cost alone does not constitute beneficial use.

“Beneficial user” means a person who uses solid waste as an ingredient in a manufacturing process or as an effective substitute for natural or commercial products, in a manner that does not pose a threat to human health or the environment. Avoidance of processing or disposal cost alone does not constitute beneficial use.

“Biohazardous waste” means solid waste containing or contaminated with organisms or viruses infectious to humans, animals or plants (e.g. parasites, viruses, bacteria, fungi, prions, or rickettsia).

“Biosolids” means the accumulated residual product resulting from a domestic wastewater treatment works. Biosolids does not include grit or screenings from a wastewater treatment works, commercial or industrial sludges (regardless of whether the sludges are combined with domestic sewage), sludge generated during treatment of drinking water, or domestic or industrial septage.

“Bird hazard” means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injuries to its occupants.

“Blood and body fluids” means all waste unabsorbed human and animal blood or blood products, components of blood or blood products, and other body fluids. Includes, but is not limited to, human blood; plasma; serum; platelets; other blood components and blood products; body fluids including exudates, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid and amniotic fluid; suction and irrigation fluids contaminated with

blood or body fluids; liquid residues or contaminated water resulting from the cleanup of a spill of medical waste; tattoo ink contaminated or potentially contaminated with blood or body fluids; and blood and body fluids from animals known to be infected with diseases that are contagious to humans. For purposes of this Part 13, it does not include saliva, nasal secretions, sweat, tears, or urine, feces, or vomitus unrelated to isolation wastes unless visible blood is present.

“Buffings” means the residual rubber material removed from the supporting structure of a waste tire or a retreaded or recapped tire.

“Cash plus marketable securities” means all the cash plus marketable securities held by the local government on the last day of the fiscal year, excluding cash and marketable securities designated to satisfy past obligations such as pensions.

“Certificate of designation” means a document issued by the governing body having jurisdiction to a person authorizing the use of land for a solid waste disposal site and facility pursuant to the Act. The "certificate of designation", which incorporates all information as may be required by the Department and the governing body having jurisdiction, is then issued by the governing body having jurisdiction if the Department has determined that the minimum standards are met.

“Certified Asbestos Building Inspector” (“CABI”) means a person trained and certified in accordance with Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B), for the identification of asbestos-containing materials and the collection of samples to determine asbestos content, including qualified Department personnel.

“Closed facility” means a solid waste site or facility that has been closed in accordance with provisions of the federal regulations pursuant to Subtitle D of the federal "Resource Conservation and Recovery Act of 1976", as amended, as published in 40 CFR Part 258.60 or in the manner specified in the approved certificate of designation application at the time of approval of the site or facility, or in a closure plan that has been approved by the Department or prior to the enactment of the Solid Waste Disposal Sites and Facilities Act (C.R.S. 30-20-100.5).

“Collect” as used in Sections 18 of these Regulations means to gather or acquire waste grease from sources of waste grease; except that “collect” does not include moving waste grease from one area or container to another area or container on the same premises.

“Collection facility” as used in Section 16 of these Regulations means any facility that accepts, aggregates and stores used oil, used lead-acid batteries, or

waste electronic devices generated elsewhere for transport to a location described in Sections 16.2, 16.3, 16.4, and 16.5 of these Regulations.

“Collect water volume” means to provide storage in channels or basins to allow for controlled discharge.

“Commercial Composting Facility” means any solid waste composting facility that accepts a fee for solid waste composting, or any solid waste composting facility that composts solid waste to create a compost or soil amendment and distributes the finished compost or soil amendment offsite for a fee.

“Commercial wastes” means all solid wastes generated by stores, hotels, markets, offices, restaurants, warehouses, and other non-manufacturing activities, excluding community and industrial wastes.

“Commission” means the solid and hazardous waste commission created in section 25-15-302, C.R.S.

“Community wastes” means all solid wastes generated by the noncommercial and nonindustrial activities of private individuals, including solid wastes from households, yards, streets, sidewalks and alleys.

“Composite liner” means a liner system consisting of two components: the upper component shall consist of a flexible membrane liner (FML) and the lower component shall consist of a compacted soil layer. The FML component must be installed in direct and uniform contact with the compacted soil component.

“Compost” means the material or product which is developed under controlled conditions and which results from biological degradation processes by which organic wastes decompose.

“Compostable Products” means containers, films or foodservice ware such as bowls, plates, cups, cutlery, composed of materials such as vegetable matter, paper, cardboard, and plastics that meet American Society for Testing and Materials (ASTM) Standard D6400-12, as amended (*Standard Specification for Labeling of Plastics Designed to be Aerobically Composted in Municipal or Industrial Facilities*) and ASTM Standard D6868-11, as amended (*Standard Specification for Labeling of End Items that Incorporate Plastics and Polymers as Coatings or Additives with Paper and Other Substrates Designed to be Aerobically Composted in Municipal or Industrial Facilities*). These products are labeled in accordance with US Composting Council (USCC) Labeling Guidelines.

“Compost facility” means a site where compost is produced.

“Compost Feedstock” or **“Feedstock”** means any decomposable organic material used in the production of compost or chipped and ground material including, but not limited to, green wastes, animal material, manure, biosolids, and solid waste.

“Composting” means the biological process of degrading organic materials that is facilitated and controlled through intentional and active manipulation of piles and windrows. These manipulations may include but are not limited to grinding, mixing of feed stocks and bulking materials, addition of liquids, turning of piles, or mechanical manipulation.

“Construction and demolition debris” means waste that is generated from construction, remodeling, repairs, or demolition of buildings, pavements, and other structures which includes but is not limited to, lumber, bricks, carpets, ceramics, sheetrock, metals, drywall, window glass, metal and plastic piping, paint and any other non-hazardous materials resulting from construction and demolition operations.

“Construction and demolition debris facility” means a discrete area of land or an excavation which is designed for the final disposal of solid waste which result from the construction or demolition of a building or structure, such as lumber, bricks, concrete, sheetrock and other similar materials.

“Consumer” as used in Section 16 of these regulations means a person who has purchased an electronic device primarily for personal or home business use.

“Consumer product” as used in Section 16 of these Regulations means any device that is primarily intended for personal or household use and is typically sold, distributed, or made available to the general population through retail or mail-order distribution. Such term does not include vehicles, motorcycles, wheelchairs, boats, or other forms of motive power. The term does include, but is not limited to, computers, games, telephones, radios, and similar electronic devices.

“Control water volume” means to discharge at a rate that will not exceed the discharge rate of historic flows at the discharge point or at an appropriate point in the receiving stream.

“Custom mill” means an operation or facility for the extraction of metals or minerals from ores. Such a facility receives its raw materials from one or more sources off-site of the mill property.

“Debris” means any discarded material that contains or consists of any of the following: construction, renovation and demolition debris (regardless of how it was generated), building or facility components, components of building systems (HVAC, plumbing, electrical, control, fire protection, roofing), components of pavement or drainage systems, industrial or machinery components, and/or mechanical components from motorized vehicles.

“Debt service” means the amount of principal and interest due on a loan in a given time period, typically the current year.

“Deficit” means the total annual revenues minus total annual expenditures.

“De minimis quantities of used oil” as used in Section 16 of these Regulations means small spills, leaks, or drippings from pumps, machinery, pipes, and other similar equipment during normal operations; except that the term shall not include used oil discarded as a result of abnormal operations resulting in substantial leaks, spills, or other releases.

“Department” means the Colorado Department of Public Health and Environment.

“Dewatered” means that the material has been subjected to a process that will remove free moisture from the material as determined by the paint filter test.

“Disease vector” means any animal, insect, bacterium or virus capable of transmitting disease, illness or harm to humans.

“Do-It-Yourselfer (DIY)” as used in Section 16 of these Regulations means an individual who residentially generates “do-it-yourselfer” used oil.

“Do-It-Yourselfer used oil collection center” as used in Section 16 of these Regulations means any site or facility that accepts, aggregates and stores residentially generated used oil collected only from do-it-yourselfers.

“Drop-off site” means a recycling consolidation site with no on-site processing; only collection of materials in a bin, roll-off, or other type of container.

“Dry Weight Basis” means weight calculated on the basis of material having been dried until reaching a constant mass, resulting in essentially a 100 percent solids content.

“Electronic Device” means a device that is marketed by a manufacturer for use by a consumer and that is a computer, peripheral, printer, facsimile machine, digital video disc players, video cassette recorder, or other electronic device

specified by rule promulgated by the commission; or a video display device or computer monitor including a laptop, notebook, ultrabook, or netbook computer, television, tablet, or slate computer, electronic book, or other electronic device specified by rule promulgated by the commission that contains a cathode ray tube or flat panel screen with a screen size that is greater than four inches, measured diagonally. "Electronic device" does not include a device that is part of a motor vehicle or any component part of a motor vehicle, including replacement parts for use in a motor vehicle; a device, including a touch-screen display, that is functionally or physically part of or connected to a system or equipment designed and intended for use in any of the following settings, including diagnostic, monitoring, or control equipment: industrial; commercial, including retail; library checkout; traffic control; security, sensing, monitor, or counterterrorism; border control; medical; or governmental or research and development; a clothes washer or dryer; a refrigerator, freezer, or refrigerator and freezer; a microwave oven or conventional oven or range; a dishwasher, a room air conditioner, dehumidifier, or air purifier; or exercise equipment; a device capable of using commercial mobile radio service, as defined in 47 CFR 20.3, that does not contain a video display area greater than four inches, measured diagonally; or a telephone.

"Emergency" means an unexpected situation or sudden occurrence of a serious and urgent nature that demands immediate action and that constitutes a threat to life or health, or that may cause major damage to property.

"Emission" means the discharge or release into the atmosphere of one or more air pollutants.

"Empty container" means a container or inner liner removed from a container that has been emptied by the generator as much as possible using methods commonly used to remove waste or material from containers (e.g., if the material was pourable, then no material can be poured or drained from the container; if the material was not pourable, then no material can reasonably be removed by scraping). In the case of a container that held an acute hazardous waste, the container is considered empty when the container or inner liner has been triple rinsed using a solvent capable of removing the product, the container or inner liner has been cleaned by another method that has been shown to achieve equivalent removal, or the inner liner that prevented contact of the product with the container has been removed.

"Encapsulation" means coating the surface of a solid waste with material such as resins or plastics to substantially reduce the amount of soluble, miscible or suspended contaminants leached from the waste.

"End User" means a person who uses a tire-derived product for a commercial or industrial purpose.

“End User” means a person who:

- (a) Uses a tire-derived product for a commercial or industrial purpose;
- (b) Uses a whole waste tire to generate energy or fuel; or
- (c) Consumes tire-derived product or uses tire-derived product in its final application or in making new materials with a demonstrated sale to a third party customer.

“Engineering design” means the analysis and design work prepared for construction, operation and closure of a solid waste disposal site or facility which may contain a preliminary report of design specifications, maps and plans drawn to a convenient and common scale, provides site or facility operation plans and site or facility closure plans, and contains all information and data otherwise specified by these regulations.

“Environmental Media” means earth materials including soil, sand, silt, gravel, rock, stone, sediment, and other naturally occurring solids.

“EP waste disposal facility” means a commercial solid wastes disposal site and facility that accepts the deposit of EP waste.

“Excluded scrap metal” means processed scrap metal, unprocessed home scrap metal, and unprocessed prompt scrap metal.

“Exemption” means, for the purposes of these regulations, that a facility shall be free or largely free of some permitting obligation as specifically provided in the Colorado Revised Statutes, 30-20-102.

“Existing landfill” means any landfill that has received solid waste as of the effective date of these regulation.

“Exploration and production waste” or **“EP waste”** means exploration and production waste, as that term is defined in section 34-60-103, C.R.S. EP waste is currently defined as wastes that are generated during the drilling of and production from oil and gas wells or during primary field operations and that are exempt from regulation as hazardous wastes under subtitle C of the federal "Resource Conservation and Recovery Act of 1976", 42 U.S.C. sec. 6901 to 6934, as amended.

“Explosive gas” means methane or other combustible gases, generated by decomposition in a facility for solid wastes disposal.

“Facility or solid waste disposal facility” means all contiguous land and structures, other appurtenances, and improvements on the land used for solid waste disposal.

“Facility component” for purposes of Section 5.5, means any part of a facility including equipment. For the purpose of this definition, “facility” means (as defined in Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B):

“any institutional, commercial, public, industrial, or residential structure, installation, or building (including any structure, installation, or building containing condominiums or individual dwelling units operated as a residential cooperative, but excluding: residential buildings having four or fewer dwelling units); any ship; and any active or inactive waste disposal site. For purposes of the definition, any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation, or building. Any structure, installation or building that was previously subject to this subpart is not excluded, regardless of its current use or function.”

“Facility structures” means any building, structure, or utility services trenches, temporary or permanent, at a facility for solid wastes disposal.

“Fault” means a fracture or a zone of fractures in any material along which strata on one side have been displaced with respect to strata on the other side.

“Fault displacement” means the relative movement of any two sides of a fault measured in any direction.

“Favorable geologic conditions” means that a site selection shall emphasize tight soils, distance from ground water, deep aquifers and similar natural features.

“Floodplain” means lowland areas adjacent to inland surface waters that are inundated by the base flood.

“Food Processing Residuals” means compostable materials generated as a by-product of the industrial food processing sector that are non-toxic, non-hazardous, and contain no sanitary wastewater. The term does not include fats, oil, grease and Dissolved Air Flotation (DAF) skimmings.

“Food Processing Vegetative Waste” means material generated in trimming, reject sorting, cleaning, pressing, cooking, and filtering operations from the processing of fruits and vegetables and the like in food processing and packaging operations or similar industries that process food products. Food processing vegetative wastes include, but are not limited to, tomato skins and seeds, pepper

cores, potato peels, cabbage, onion skins, celery pieces, cranberry hulls, cranberry tailings, rice hulls, carrot stems, and coffee grounds.

“Food Residuals” means pre- and post-consumer food discards from households and the commercial/institutional sector including but not limited to vegetables, fruits, grains, dairy products, meats, and compostable foodservice ware/packaging that may be commingled.

“Friable asbestos-containing material” (“Friable ACM”) means any material that contains asbestos and when dry can be crumbled, pulverized, or reduced to powder by hand pressure and that contains more than one percent asbestos by weight, area, or volume. The term includes non-friable forms of asbestos after such previously non-friable material becomes damaged to the extent that when dry it can be crumbled, pulverized, or reduced to powder by hand pressure as determined in the field by a CABI.

“Friable asbestos waste” means any asbestos waste that has been or can be pulverized or reduced to powder by hand pressure when dry.

“Gas condensate” means the liquid generated as a result of gas recovery process[es].

“Geofabric” for the purposes of Section 5.5 means a permeable fabric or synthetic material used for both visual and physical separation.

“Good faith effort” means the required actions for a county to perform and document before the county commissioners may vote to exempt itself from the residentially generated electronic waste landfill ban.

“Governing body having jurisdiction” means the board of county commissioners if a site and facility is located in any unincorporated portion of a county and means the governing body of the appropriate municipality if a site and facility is located within an incorporated area.

“Green Waste” means any plant material that is either separated at the point of generation, or separated at a centralized facility. Green waste includes, but is not limited to, yard waste, vegetative plant wastes from the vegetable food processing industry, untreated wood wastes, paper products and pre-consumer vegetative food waste.

“Ground water” means any water below the land surface in a zone of saturation.

“Ground water protection standard” means those standards established by following 40 CFR 258.55(H) and (I) methodology or standards established by this Department (5 CCR 1002-8).

“Hazardous constituent” means the list of chemical parameters described in Appendix IB and II of these regulations and 6 CCR 1007-3, Part 261.3 Appendix VIII.

“Hazardous waste” means those substances and materials defined or classified as such by the Hazardous Waste Commission pursuant to 25-15-302, C.R.S., as amended.

“Health departments” means the Colorado Department of Public Health and Environment and a local health department if such entity exists.

“High wind warning” means that sustained winds of forty miles per hour (40 MPH) or greater, or gust of fifty-five miles per hour (55 MPH) or greater, are expected to persist for one hour or longer, as defined by the National Weather Service.

“Holocene” means the most recent epoch of the quaternary period, extending from the end of the pleistocene epoch to the present.

“Home scrap metal” means scrap metal generated by steel mills, foundries, and refineries, including, but not limited to, turnings, cuttings, punchings, and borings.

“Household medical waste” means any medical waste generated by households. Does not include medical waste generated at health and residential care facilities regulated under the Standards for Hospitals and Health Facilities (6 CCR 1011-1).

“Household waste” means any solid waste generated by households, including single and multiple residences, and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas.

“Incineration” means the combustion of solid wastes in such a way as to:

- (a) Control the air mixture to maintain adequate temperature for efficient combustion; and
- (b) Contain the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion; and
- (c) Control the emission of combustion byproducts consistent with the standards, rules and regulations promulgated by the Department's Air Quality Control Commission.

“Incompatible wastes” means wastes which, when mixed, produce heat, pressure, fire, explosion, violent reaction, toxic mist, fumes or gases, or flammable fumes or gases.

“Incorporated into the soil” means the insertion of solid waste beneath the surface of soil or the mixing of solid wastes with the surface soil.

“Industrial recycling operation” means any site and facility operated for the purpose of processing, reclaiming, sorting, and recycling recyclable materials generated from industrial operations which includes but is not limited to construction and demolition debris, and other recyclable materials as determined by the Department.

“Industrial wastes” means all solid wastes, including mill tailings and mining wastes, resulting from the manufacture of products or goods by mechanical or chemical processes that are not a hazardous waste regulated under 6 CCR 1007-3, the Colorado Hazardous Waste Regulations. Such waste may include, but is not limited to, construction and demolition debris, and waste resulting from the following manufacturing processes: electric power generation; fertilizer/agricultural chemicals; food and related products/by products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing/foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. This term does not include oil and gas wastes regulated by the Colorado Oil and Gas Conservation Commission.

“Inert material” means non-watersoluble and non-putrescible solids together with such minor amounts and types of other materials as will not significantly affect the inert nature of such solids. The term includes, but is not limited to, earth, sand, gravel rock, concrete which has been in a hardened state for at least sixty days, masonry, asphalt paving fragments, and other inert solids.

“Inert material facility” means a site and facility that accepts for disposal exclusively those materials defined herein as inert material.

“Infectious waste” means waste containing pathogens or biologically active material which because of its type, concentration and quantity could present a potential hazard to human health when improperly handled, stored, processed, transported or disposed of. Wastes presumed to be infectious medical waste include blood and body fluids, potentially infectious waste, pathological waste, sharps, trauma scene waste, and any additional waste determined to pose a sufficient risk of infectiousness as determined by the Department on a case-by-

case basis. This also includes any residue or contaminated soil, water, or other debris resulting from the cleanup of a spill of any infectious medical waste. For purposes of these regulations, it does not include saliva, nasal secretions, sweat, tears, used feminine hygiene products, vomitus, urine or feces unrelated to isolation wastes, uncontaminated disposable bedding or garments, or lightly to moderately contaminated bandages, garments, etc. unless these wastes are soiled to the extent that the generator of the waste determines that they should be managed as infectious waste. Such wastes remain regulated under the provisions of Parts 1 through 3 of these regulations.

“Intermediate processing facility” means a facility designed to remove recyclables from unprocessed municipal solid waste, commonly referred to as a Dirty-MRF.

“Isolation waste” means contaminated material from humans or animals that are isolated because they are suspected or known to be infected with an infectious agent capable of causing a highly communicable, possibly lethal disease. National biosafety guidelines developed by agencies such as the U.S. Department of Health and Human Services, National Institutes of Health or the Centers for Disease Control and other medical professionals should be referenced when making this determination.

“Karst terrains” means areas that are characterized by surface and subterranean features, and that are developed as the result of dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features present in karst terrains include, but are not limited to sinkholes, sinking streams, caves, large springs, and blind valleys.

“Land application facility” means an area where solid wastes are applied onto or incorporated into the soil surface for the purposes of biological degradation, treatment, final disposal, or beneficial purposes.

“Land disposal” as used in Section 16 of these Regulations means placing, discarding, or otherwise disposing of residentially generated solid wastes:

- (a) In any solid wastes disposal site and facility, transfer station, or treatment, storage or disposal facility operated by the state, a local government, or a private entity;
- (b) In sewers, drainage systems, septic tanks, surface or ground waters, watercourses, or any body of water; or
- (c) On the ground.

“Landfill” means a discrete area of land or an excavation where solid wastes are placed for final disposal, which is not a land application unit, waste impoundment, or waste pile. Landfills include, but are not limited to, ash monofills, construction

and demolition landfills, industrial landfills, sanitary landfills, tire monofills and similar facilities where final disposal occurs.

“Landfill phase” means a subpart of a landfill.

“Lateral expansion” means any horizontal expansion of previously approved waste management unit boundaries for which the Department has not approved as-built construction documents.

“Leachate” means liquid that has passed through or had contact with solid wastes and may contain soluble, miscible, or suspended constituents removed from the wastes.

“Lead-acid battery” as used in Section 16 of these Regulations means a battery that:

- (a) Consists of lead and sulfuric acid;
- (b) Is used as a power source; and
- (c) Is not intended as a power source for consumer products.

“Leak tight” means that solids, liquids, or gases cannot escape or spill out. It also means dust tight.

“Liner” means a continuous layer of natural or man-made materials beneath and on the sides of a waste impoundment or landfill which restricts or prevents the downward or lateral escape of solid waste, its constituents, or leachate. A liner is also used in cap construction to prevent and control vertical movement of fluids.

“Liquid waste” means any waste material that is determined to contain “free liquid”.

“Lithified earthen material” means all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments. This term does not include man-made materials, such as fill, concrete, and asphalt, or unconsolidated earthen materials, soil, or regolith lying at or near the earth surface.

“Local governing authority” means the governing body having jurisdiction.

“Local requirements” means all zoning, laws, resolutions or ordinances related to or enforced on solid waste disposal promulgated by counties, municipalities or other political subdivisions of the state and the specifications and requirements identified as part of a certificate of designation.

“Low Emissions Methods” means soil disturbing activities that will not result in visible emissions without the use of wet methods.

“Lower explosive limit” means the lowest percent, by volume, of a mixture of explosive gas or gases in air that will propagate a flame at 25°C (77°F) and at standard atmospheric pressure.

“Lubricating oil” as used in Section 16 of these Regulations means the fraction of crude oil or synthetic oil used to reduce friction in motorized equipment. “Lubricating oil” includes rerefined oil.

“Management” means the handling, storage, collection, transportation and disposal of solid waste.

“Manifest” as used in Section 18 of these Regulations means the document for identifying the quantity, composition, origin, routing, and destination of waste grease during its transportation from the point of generation to the point of storage, treatment, or disposal.

“Manure” means accumulated animal excrement. This includes feces and urine, as well as any bedding material, spilled feed, or soil that is mixed with feces or urine.

“Material recovery facility (MRF)” means a facility consisting of structures, machinery, devices, or persons to sort, bale, or otherwise manage or process source separated recyclable materials prior to conveyance to end markets.

“Maximum horizontal acceleration in lithified earth material” means: (1) The maximum expected horizontal acceleration depicted on a seismic hazard map, with a 90 percent or greater probability that the acceleration will not be exceeded in 250 years; or (2) The maximum expected horizontal acceleration based on a site-specific seismic risk assessment.

“Mechanical” means operated or produced by mechanism, tool or machine.

“Medical Waste” means any infectious, pharmaceutical or trace chemotherapy waste generated in a health care setting in the diagnosis, treatment, immunization, or care of humans or animals; generated in autopsy or necropsy; generated during preparation of a body for final disposition such as cremation or interment, generated in research pertaining to the production or testing of microbiologicals; generated in research using human or animal pathogens; or related to accident, suicide, or other physical trauma. Medical waste does not include fluids, tissues or body parts removed from the whole body for the purposes of donation, research or other use, or those returned to the person from whom they were removed, or their

authorized representative, as long as the material is rendered safe for handling. For purposes of these regulations, this does not include medications reused in compliance with 6 CCR 1011-1 Chapter II Part 7.200 et. seq. or 6 CCR 1015-10.

“Medical waste generator” means any person, as defined in these regulations, whose act or process produces medical waste. This includes, but is not limited to, generators at hospitals, clinics (such as medical, dental and veterinary), surgery centers, dialysis centers, blood banks, long term care facilities, hospices, funeral homes, laboratories (such as clinical, diagnostic, pathological, veterinary and biomedical research), pharmacies, body art establishments (such as where body piercing, tattooing, branding, sculpting and scarification are performed), acupuncture facilities, trauma scene cleanup sites, facilities holding shot clinics or health fairs, other health-related facilities or events, educational and research facilities, and pet shops.

“Medical Waste Management Plan” means a document that must be developed and implemented by medical waste generators that designates all of the medical wastes generated by the facility, waste handling techniques to be used at the facility, contingency plans for spills or releases, staff training requirements, and designation of the person responsible for implementation of the management plan.

“Medical waste treatment” means any validated method, technique, or process designed to change the biological character or composition of a medical waste so as to minimize its potential to harm human health or the environment.

“Mill tailings” means an industrial solid waste generated by the mechanical or chemical processing of minerals for subsequent conversion into useable forms such as a metal, a metallic compound, an energy source, or raw material for manufacture.

“Minimum access” means the lack of infrastructure within a county as specified in Section 16 that would result in a county being able to pursue an exemption from the residentially generated electronics waste landfill ban.

“Mining waste” means overburden to be discarded and other industrial wastes directly related to the preparation, development and operation of mineral extraction facilities. Mining waste includes only waste material directly connected with the cleaning and preparation of substances mined by an operation are managed at the mine site where they are generated.

“Mixed Solid Waste” means a mixture of compostable and non-compostable discards and may contain household and other municipal solid wastes.

“Mobile Processor” means a person who processes waste tires at a location other than the location of the person’s certificate of registration.

“Monofill” means a landfill or section of landfill at which only one type of waste is accepted for disposal.

“Motor vehicle” means a self-propelled vehicle that is designed for travel on the public highways and that is generally and commonly used to transport persons and property over the public highways or a low speed electric vehicle. “Motor vehicle” includes automobiles, minivans, all trucks, motor homes, and motorcycles.

“Municipal solid waste” means solid waste from household, community, commercial and industrial sources that does not contain hazardous wastes as defined in Section 25-15-101(9) of the Colorado Hazardous Waste Act unless otherwise regulated by the Department.

“Municipal solid waste landfill (MSWLF)” means a sanitary landfill where one of the main waste streams accepted is municipal waste.

“Municipal solid waste incinerator ash” means the bottom ash, fly ash or air pollution control residues and other residuals of the combustion process from the operation of incinerator or energy recovery facilities managing municipal solid waste.

“Municipality” means a home rule or statutory city, town, or city and county, or territorial charter city.

“National Priorities List (NPL)” means the list, compiled by the U.S. Environmental Protection Agency pursuant to section 105 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9605, of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response. For the purposes of this regulation, this term also includes sites that have been deleted from the NPL following completion of the cleanup, but for which there are required, ongoing operation and maintenance activities (including the implementation of institutional controls).

“Noise pollution” means sound levels radiating from the site boundary, at a distance of twenty-five feet (25') or more, in excess of standards established in Sections 101 and 103 of the "Colorado Noise Abatement Act", Title 25, Article 12, Part 1, CRS, as amended.

“Noncommercial burning of trash” means the combustion of solid wastes in accordance with CRS 30-20-110 of the Act.

“Nonfriable asbestos waste” means any asbestos waste other than friable asbestos waste.

“Non-Regulated Asbestos Contaminated Soil” (“Non-RACS”) means soil or debris that contains only:

- 1) Intact non-damaged, non-friable asbestos-containing materials (ACM); or,
- 2) Damaged non-friable ACM(s) that do not have a high probability to release fibers based on the forces expected to act upon the material during disturbance as determined in the field by a CABI(s) through a “RACS Determination”. The following ACM(s) are predetermined to be Non-RACS:
 - a. Resin based materials including but not limited to phenolic-plastic (Bakelite), used in electrical and mechanical parts
 - b. Resilient flooring (vinyl, asphalt, rubber) excluding non-tar impregnated friable felt backing on sheet vinyl flooring (linoleum)
 - c. Tar impregnated or asphaltic materials in good condition that have not become brittle
 - d. Elastic, pliable, or rubberized materials, including but not limited to:
 - i. Pliable duct sealant
 - ii. Pliable fiberglass insulation sealant
 - iii. Pliable fire-stop caulking /sealants
 - iv. Pliable window and door caulking
 - e. Extremely hard materials, coatings and sealants including but not limited to:
 - i. Laboratory countertops and sinks
 - ii. Epoxy type Concrete Masonry Unit (CMU) coatings
 - iii. Epoxy type panel adhesive
 - iv. Duct sealant
 - v. Ceiling tile adhesive
 - f. Other ACM(s) as approved by the Department at the request of the owner or person disturbing debris, to not have a high probability to release fibers.

“Nuisance conditions” are those which may result from explosive gas, bird hazards, disease vectors, odors, windblown solid wastes or cover materials, open burning, water pollution, air pollution, noise pollution and traffic congestion.

“On-site recycling” means recycling operations where the processing of recyclable materials occurs on the same site or under the same ownership from where the recyclable materials are generated and that recycle and store only materials generated on site or under continuous ownership and meet the performance standards set forth in Section 8.

“Open burning” means the uncontrolled or unconfined combustion of solid wastes at a facility for solid waste disposal without the following: Control of combustion air to maintain adequate temperature for efficient combustion; containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion; and control of the emission of the combustion products.

“Operator” means the person(s) responsible for the overall operation of a facility or part of a facility.

“Other Compatible Materials” means the minimum quantity of materials necessary to achieve and maintain an appropriate porosity, moisture level or carbon to nitrogen (C:N) ratio for proper composting. Such materials are limited to Type 1 feedstocks, manure and green wastes as defined in Section 1 and Subsection 14.1.2 of these Regulations, or other materials approved by the Department and governing authority.

“Owner” means the person(s) who owns a facility or part of a facility.

“Paint producer” means an original producer of architectural paint that sells, offers for sale, or distributes architectural paint within or into Colorado under either the producer’s own name or a brand that the producer manufactures.

“Paint stewardship organization” means a corporation, nonprofit organization, or other legal entity created or contracted by one or more producers to implement a paint stewardship program.

“Paint stewardship program” means a program created in accordance with Section 25-17-405 C.R.S.

“Pathogens” means disease-causing organisms.

“Pathological waste” means all tissues, organs, limbs, products of conception, and other body parts removed from the whole body. Includes, but is not limited to, tissues; organs; body parts removed during surgery, autopsy or other medical procedures; and human anatomical remains. Also includes contaminated animal tissue (including animal carcasses and body parts) from animals known to have been exposed to infectious substances during research, production of biologicals, testing of pharmaceuticals, or other exposures and those known or suspected of being contaminated with infectious substances known to be contagious to humans. This does not include contaminated animal waste that is regulated under Section 14 of these regulations.

“Peripheral” as used in Section 16 of these regulations means a keyboard, mouse, or other device that is sold exclusively for external use with a computer and provides input or output into or from a computer.

“Person” means an individual, partnership, private or municipal corporation, firm, board of metropolitan district or other sanitation district, or other association of persons.

“Person” as used in Section 16 of these Regulations means an individual. “Person” shall not include waste haulers, as defined in this Section.

“Personal use of waste grease as biofuel” means that the person collecting or transporting the waste grease intends to use the waste grease as biofuel.

“Personal use of waste grease other than for use as biofuel” means that the person collecting or transporting the waste grease intends to use the waste grease for some other purpose than biofuel.

“Pharmaceutical” means any prescription or over-the-counter chemical product, vaccine or allergenic that is intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease in humans or animals. This includes, but is not limited to, drugs, pills or tablets; medicinal gums or lozenges; medicinal liquids, ointments and lotions; intravenous (IV) or other compounded solutions; live vaccines; non-hazardous attenuated vaccines; allergenics; medicinal shampoos; antiseptics; medicinal dermal patches; and any delivery devices with the primary purpose to deliver or dispense a medicinal chemical product, vaccine or allergenic.

“Pilot” or “Pilot Project” means a restricted composting operation at an existing or new facility where the specific purpose is to investigate an alternative feedstock or to research operational methods.

“Point of compliance” as referred to in Section 2.2, 3.2.5 and 3.5 shall be located on land owned by the owner of the site and facility and means either:

(1) For a landfill, a vertical surface which is not more than 150 meters from the waste management unit boundary as described in the engineering design and operations report: or (2) For other sites and facilities a vertical surface that is at the perimeter of the solid waste disposal site and facility boundary.

“Poor foundation conditions” means those areas where geological features exist which indicate that a natural or man-induced event may result in inadequate foundation support for the structural components of the facility.

“Potentially infectious waste” means any waste known or suspected to be contaminated with a transmissible infectious agent potentially capable of causing disease or injury. Includes, but is not limited to, cultures and stocks from pathological, medical, research, and industrial laboratories; wastes from the production of biologicals; devices used to transfer, inoculate, and mix cultures; isolation wastes; biohazardous waste, contaminated animal bedding from animals known to have been exposed to infectious substances during research, production of biologicals, testing of pharmaceuticals, or other exposures and those known or suspected of being contaminated with infectious substances known to be contagious to humans. This category also includes items that are capable of

releasing blood or body fluids in any form during handling or storage and items that are caked with dried blood or body fluids that could be released during handling or storage; wastes from surgery, autopsy or other medical or laboratory procedures such as visibly contaminated sponges, soiled dressings, drapes, surgical gloves, drainage sets, and dialysis wastes in contact with blood; unbroken blood vials, drainage sets, dialysis wastes, suction canisters, hemovacs, or IV bags and tubing (without needle attached) containing blood or body fluids. This does not include contaminated animal bedding that is regulated under Section 14 of these regulations.

“Practicable solid waste management alternative” means a materials or resource recovery facility, transfer station or any other alternative to the existing landfill, which the owner or operator has determined will, if utilized as an alternate disposal site to solid waste management alternative:

- (1) Increase customer's cost for solid waste management services by less than 100%; or
- (2) Not result in a solid waste management cost to the local government owner or operator which exceeds one percent of that local government's total annual budget.

“Preliminary report” means an initial report prepared by qualified professionals, including geologists, land surveyors, ground water specialists, engineers and others which contains technical information regarding geologic, engineering and hydrologic data and site information, and other data which the Department deems necessary.

“Process” means any physical, chemical, or biological treatment that is performed to make the waste grease more available for recycling or reuse, reduced for volume or toxicity, or produces a final residual material that is suitable for disposal. “Process” does not include the filtering of waste grease where such filtering takes place in an enclosed grease trap fitter with mechanisms for such filtering.

“Processed scrap metal” means scrap metal that has been manually or physically altered to separate it into distinct materials to enhance economic value or to improve the handling of materials. Processed scrap metal includes, but is not limited to:

- (a) Scrap metal that has been baled, shredded, sheared, chopped, crushed, flattened, cut, melted, or separated by metal type; and
- (b) Fines, drosses, and related materials that have been agglomerated.

“Processed Solid Waste” means the material from a post collection solid waste stream that has been separated for use in the composting process.

“Processing” means performing operations to solid waste and recyclable materials that allows for the purpose of proper solid waste disposal, recycling, composting, or incineration including but not limited to the operations of separating material by type, grade or color, sorting, crushing, grinding, shredding, baling, removing contaminants and modifying material properties.

"Product" means the material or the good generated as a result of processing source separated recyclable materials for which no further processing is required prior to final utilization.

"Project" means any soil disturbing activity that involves Regulated Asbestos Contaminated Soil (RACS) within a planned geographic area(s) of disturbance, as defined in the Notification of RACS Disturbance form submitted for that specific management or remediation scope, starting from the time of first RACS disturbance and continuing through final RACS removal or stabilization and final demobilization. A project may include one or more Regulated Work Areas (RWAs), and start dates and stabilization dates for individual RWAs within a project may be different.

“Project Specific RACS Management Plan” (“PSRMP”) means a Regulated Asbestos Contaminated Soil (RACS) management plan for a single project submitted in accordance with Section 5.5.5(A).

“Prompt scrap metal” means scrap metal generated by the metal working or fabrication industries, including, but not limited to, turnings, cuttings, punchings, and borings. “Prompt scrap metal” includes industrial metal scrap and new scrap metal.

“Public project” means:

- (a) A publicly funded contract entered into by a governmental body of the executive branch of this state that is subject to the “Procurement Code”, articles 101 to 112 of title 24, C.R.S.; and
- (b) A publicly funded contract entered into by a county, municipal government, or special district, including a school district or recreation district.

“Putrescible wastes” means those solid wastes that contain organic matter capable of being decomposed by microorganisms, and of such a character and proportion as to be capable of attracting or providing food for birds or disease vectors.

"Pyrolysis" means the thermochemical decomposition of material at elevated temperatures without the participation of oxygen.

“Qualified ground water scientist” is a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in ground water hydrology, and related fields as may be demonstrated by state registration, professional certifications, professional experience or completion of accredited university programs that enable that individual to make sound professional judgements regarding ground water monitoring, contaminant fate and transport, and corrective action.

“Qualified Project Monitor” (“QPM”) means an individual who has the training and/or experience necessary to identify materials suspected of containing asbestos and who has the authority to make prompt decisions relating to the management of such materials, and who meets the training requirements in Section 5.5.3.

“Recapped or retreaded tire” means a previously worn tire which has gone through a remanufacturing process designed to extend its useful service life.

“Recyclable materials” means any type of discarded or waste material that is not regulated under Section 25-8-205(1)(e), C.R.S., and can be reused, remanufactured, reclaimed, or recycled but not including recycled auto parts or excluded scrap metal that is being recycled, or scrap that is composed of worn out metal or metal product that has outlived its original use, commonly referred to as obsolete scrap.

“Recyclable material end user” includes all manufacturing operations that perform processing of municipal solid waste recyclable materials to be utilized as a raw material for fabrication of a product for normal business operations.

“Recyclable material generator” includes any business or institution that annually generates and consolidates over 100 tons of municipal solid waste recyclable material and ships directly to end markets or processing facilities out of state for recycling.

“Recycling facility” means a separate facility, or a part of a solid waste disposal facility, where recycling operations are conducted.

“Registrant” as used in Section 18 of these Regulations means a person registered under Section 18.

“Regulated Asbestos Contaminated Soil” (“RACS”) means soil, ash or debris (plus six (6) inches in all directions of surrounding soil or other matrix material) containing:

- 1) Friable asbestos-containing materials (ACM) as determined in the field by a Certified Asbestos Building Inspector (CABI) through a RACS determination;
- 2) Previously non-friable ACM(s) that have been rendered friable as determined in the field by a CABI(s) through a RACS determination;
- 3) Non-friable ACM(s) that have a high probability of releasing fibers based on the forces expected to act upon the material during soil disturbance as determined in the field by a CABI(s) through a RACS determination;
- 4) Deteriorated non-friable ACM(s) that are in poor condition resulting in a high probability to release fibers due to weathering, historical mechanical impact, fire damage (by evidence of ACM within an ash layer) or other factors as determined in the field by a CABI(s) through a RACS determination;
- 5) The following broken, resized, or damaged ACM(s) are RACS:
 - a. Asbestos cement materials
 - b. Plaster
 - c. Brittle caulking, glazing and sealants
 - d. Powdery Concrete Masonry Unit (CMU) sealant
 - e. Powdery floor leveling compound
 - f. Drywall/wallboard and associated joint compound material
 - g. Firebrick
 - h. Other material as determined by the Department, at the request of the owner or person disturbing debris, to have a high probability to release fibers.
- 6) Soil or ash known to contain non-visible asbestos based on documented evidence.

“RACS Determination” for the purpose of Section 5.5 means a determination, conducted in the field by a Certified Asbestos Building Inspector (CABI), of the friability of Asbestos Containing Material (ACM) and the probability of non-friable ACM to release fibers based on the condition of the material and the forces that are expected to act on it during disturbance. Determinations of friability shall be based on the requirements for such determinations set forth in Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B). Determinations of the

probability for non-friable ACM to release fibers during disturbance shall be based on the following:

- 1) The condition of the material prior to disturbance, based on observations of weathering, the integrity of the material, historical mechanical impact, or fire damage;
- 2) The potential for the material to be broken, resized or damaged during planned disturbance;
- 3) The material shall be considered RACS if the planned disturbance includes any of the following:
 - a. Augers
 - b. Rotary style trenchers
 - c. Driving on ACM lying on the surface (vehicles or equipment)
 - d. Blasting or other detonation
 - e. Intentional burning
 - f. Other types of direct mechanical impact which are:
 - i. In direct contact with ACM or result in observation of ACM after disturbance, and
 - ii. Causing damage to the ACM

“Regulated work area” (“RWA”) as used in Section 5.5 of these regulations means the portion(s) of a site at which soil disturbing activities involving RACS occur.

“Remediation” or “Remediate” means a cleanup or removal to prevent or minimize the possible current or future release of hazardous substances to prevent an unacceptable threat to present or future public health, welfare or the environment.

“Remedy” or “Remedial action” means those actions consistent with a permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health and welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection using dikes, trenches or ditches, clay cover, neutralization, cleanup of released hazardous substances and associated contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, on-site treatment or incineration, provision of alternative water supplies, any monitoring

reasonably required to assure that such actions protect the public health and welfare and the environment, and, where appropriate, post-removal site control activities. The term includes the costs of permanent relocation of residents and businesses and community facilities (including the cost of providing “alternative land of equivalent value” to an Indian tribe pursuant to CERCLA section 126(b)) where the U.S. Environmental Protection Agency determines that relocation is more cost-effective than, and environmentally preferable to, the transportation, storage, treatment, destruction, or secure disposition off-site of such hazardous substances, or may otherwise be necessary to protect public health or welfare; the term includes off-site transport and off-site storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials.

“Remove” or “Removal” means the cleanup or removal of released hazardous substances from the environment; such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment; such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing and other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under section 104(b) of CERCLA, post-removal site control, where appropriate, and any emergency assistance which may be provided under the Disaster Relief Act of 1974.

“Render non-infectious” means to treat infectious waste by inactivating pathogens and other biologically active material to a level that will no longer present a potential hazard of infection when managed, stored or disposed.

“Residentially generated” as used in Section 16 of these Regulations means used lead-acid batteries, or used oil generated by a person or by removal of said items from a personal vehicle not used primarily for a commercial or business purpose.

“Residual sludge” means solids, semi-solids or liquids remaining in a waste impoundment after final evaporative or other treatment or storage of the waste is completed, or which may be dredged out during the active life.

“Response activity” means remove, removal, remedy, or remedial action, including enforcement activities related thereto.

“Retailer” as used in Section 10 of these Regulations means a person who sells a small quantity of product to a consumer, as opposed to a wholesaler or supplier who typically sells large quantities of products to other businesses. Retailers of tire-derived product are persons who sell small quantities of tire-derived product to consumers.

“Retailer” as used in Section 16 of these Regulations means any corporation, limited liability company, partnership, individual, sole proprietorship, joint-stock company, joint venture, or other private legal entity that engages in the sale of new lead-acid batteries, electronic devices, or lubricating oil directly to the consumer.

“Reverse distributor” means a registrant with the US Drug Enforcement Administration (DEA) who receives controlled substances acquired from another DEA registrant for the purpose of returning unwanted, unusable, or outdated controlled substances to the manufacturer or the manufacturer's agent; or where necessary, processing such substances or arranging for processing such substances for disposal.

“Risk-Based Air Threshold” for the purpose of Section 5.5 means one of the following thresholds based on project duration and receptor population, or as approved by the Department, as determined based on the sampling, analytical, and data evaluation procedures provided in Appendix 5A:

- a. an average of 0.003 fibers per cubic centimeter (f/cc) for projects with durations of thirty (30) working days or less with child receptors;
- b. an average of 0.0003 f/cc for projects with durations between thirty (30) working days and one calendar year with child receptors;
- c. an average of 0.006 f/cc for projects with durations of thirty (30) working days or less with only adult receptors, including commercial workers and non-OSHA workers;
- d. an average of 0.0006 f/cc for projects with durations between thirty (30) working days and one calendar year with only adult receptors excluding commercial workers and non-OSHA workers;
- e. an average of 0.0009 f/cc for projects with durations of between thirty (30) working days and one calendar year with only commercial worker receptors;
- f. an average of 0.001 f/cc for projects with durations between 30 days and one year with only non-OSHA worker receptors;

- g. if the total duration of the project exceeds, or is anticipated to exceed, one year, the owner/operator shall contact the Department for a project specific risk-based threshold.

“Run-off” means any precipitation or surface water that has not contacted solid waste material and that drains over land from any part of a facility.

“Run-on” means any precipitation or surface water that drains over land on to any part of a facility.

“Sanitary landfill” means a discrete area of land or an excavation for which the final disposal of solid waste employs a method to obtain the most dense volume practicable of the waste and covering with earth or other suitable material. A sanitary landfill may receive household waste, community waste, municipal solid waste, commercial waste, and industrial waste.

“Saturated zone” means that part of the earth's crust in which all voids are filled with water.

“Secondary lead smelter” as used in Section 16 of these Regulations means a facility that recycles lead-bearing scrap materials into elemental lead or lead alloys by smelting.

“Seismic impact zone” means an area with a ten percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull will exceed 0.10G in 250 years.

“Self-certification checklist” means a checklist of regulatory requirements applicable to entities affected by one or more Sections of these Regulations.

“Sharps” means any discarded article that may purposely or accidentally puncture or cut the skin or mucosa. Includes, but is not limited to, used needles; scalpel blades; syringes (with attached needle); pen needles; lancets; pasteur pipettes; broken blood vials; needles with attached tubing; suture needles; razor blades; tattoo pens and toothpicks; broken culture tubes and culture dishes, regardless of presence of infectious substances; broken and unbroken glassware that were in contact with infectious substances (e.g., used slides and cover slips); disposable trocars; and discarded unused or expired hypodermic needles, suture needles, syringes, and scalpel blades.

“Sharps container” means a container that is closable, puncture resistant, leakproof on the sides and bottom, and labeled or color coded in accordance with the Occupational Safety and Health Administration (OSHA) requirements.

“Shredded circuit boards” means shredded electronic circuit boards that:

- (a) Are stored in containers that are sufficient to prevent any release to the environment prior to recovery; and
- (b) Do not contain mercury switches, mercury relays, nickel-cadmium batteries, or lithium batteries.

“Significant” means, in the context of differentiating between liquid or semisolid waste streams, a difference of one order of magnitude in the concentration of any constituent.

“Site” or “solid waste disposal site” means the location for a facility chosen based upon geologic, hydrogeologic and operational considerations. For the purpose of Section 5.5 of this regulation, “site” means the area or areas where soil-disturbing activities are occurring or will occur.

“Site boundary” means the outermost perimeter of a solid waste disposal site and facility, as designated pursuant to the Act.

“Sludge” means any solid or semi-solid waste generated by a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility.

“Soil-disturbing activities” means digging, excavating, staging, loading, stockpiling, backfilling, compacting, grading, tilling, drilling, intrusive sampling, and equipment or vehicle movement or any other mechanical activity, that when used, disturbs the surface and/or subsurface soil. For the purposes of Section 5.5 disturbance or removal of debris and/or RACS is considered a soil disturbing activity. For the purposes of Section 5.5 hand disturbance or removal of RACS is subject to this regulation, but is not considered to be a mechanical disturbance.

“Solid waste” means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, air pollution control facility, or other discarded material; including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations, commercial operations or community activities. “Solid waste” does not include any solid or dissolved materials in domestic sewage, or agricultural wastes, or solid or dissolved materials in irrigation return flows, or industrial discharges which are point sources subject to permits under the provisions of the "Colorado Water Quality Control Act", Title 25, Article 8, CRS or materials handled at facilities licensed pursuant to the provisions on “Radiation Control Act” in Title 25, Article 11, CRS. “Solid waste” does not include: (a) Materials handled at facilities licensed pursuant to the provisions on radiation control in Article 11 of Title 25, C.R.S.; or (b) Excluded scrap metal that is being recycled; or (c) Shredded circuit boards that are being recycled.

“Solid waste disposal” means the storage, treatment, utilization, processing, or final disposal of solid wastes.

“Solid waste disposal site and facility” means the location and/or facility at which the deposit and final treatment of solid wastes occur.

“Solid waste incinerator ash” means the bottom ash, flyash or air pollution control residues and other residuals of the combustion process from the operation of incinerator or energy recovery facilities managing solid waste.

“Source of waste grease” means the location at which waste grease was initially generated.

“Source Separated” means solid waste segregated at the point of generation for special handling, disposal, composting or recycling.

“Source Separated Organics” means compostable material that has been separated from non-compostable material at the point of generation, including but not limited to yard waste, food residuals, vegetative waste, woody materials, and compostable products.

“Stabilization” means mixing of a solid waste with Portland cement, or a combination of Portland cement and fly ash or cement kiln dust, to substantially reduce the amount of soluble, miscible or suspended contaminants leached from the waste.

“Staging” for the purposes of Section 5.5, means the accumulation of RACS in the RWA for twelve (12) hours or less.

“Standard Operating Procedure” (“SOP”) means a RACS management plan for multiple projects submitted in accordance with Section 5.5.5(B).

“Stockpiling” for the purposes of Section 5.5, means the accumulation of RACS that will exist for more than twelve (12) hours, up to and including ten (10) calendar days.

“Storage” for the purposes of Section 5.5, means the accumulation of RACS greater than ten (10) days, but not exceeding six (6) months unless a longer timeframe is approved by the Department and complies with local governing authority requirements.

“Store” as used in Section 18 of these Regulations means to possess, impound, contain, or control waste grease; except that “store” does not apply to the

temporary retention of waste grease on the premises where the waste grease was initially generated.

“Structural component” means liner, leachate collection system, final cover, run-on/run-off control system, or any other component which is used in the construction and operation of the facility and are necessary for protection of human health and the environment.

“Structurally rigid container” means a container capable of maintaining its shape when unsupported.

“Surface water” means water that flows on the land surface, or is tributary to such water.

“Tank” means a stationary device, designed to contain an accumulation of material, that is constructed primarily of non-earthen materials (e.g. wood, concrete, steel, plastic) that provide structural support.

“Tank system” means storage or processing tank(s) and associated ancillary equipment and containment system(s).

“Three year rolling average” means for an existing recycling facility an arithmetical average of the quantity (by weight or volume) of recyclable materials recycled at the facility during the previous three calendar years. This average shall be at least 75% by weight or volume (determined using a consistent measure) of the total amount of recyclable materials accumulated and currently in storage over a 3-year rolling average.

“Tire” means a rubber cushion that fits around a wheel.

“Tire-Derived Product” means matter that:

- (a) Is derived from a process that uses whole tires as a feedstock, including shredding, crumbing, and chipping;
- (b) Adheres to established engineering or other appropriate specifications or to established product end user specifications or customer conditions of acceptance.
- (c) Has a demonstrated benefit associated with the end use;
- (d) Can be used as a substitute for, or in conjunction with, a commercial product or raw material; and
- (e) Has either been sold and removed from the facility of a processor or has been used on site by the processor.

“Total expenditures” means all expenditures excluding capital outlays and debt repayment.

“Total revenues” means revenues from all taxes and fees but does not include the proceeds from borrowing or asset sales, excluding revenue from funds managed by the local government on behalf of a specific third party.

“Trace chemotherapy waste” means any empty container used to hold an antineoplastic drug (except P-listed hazardous waste), and contaminated items used with these drugs, such as gowns, wipes, or gloves.

“Trailer” means a wheeled vehicle, without motive power, that is designed to be drawn by a motor vehicle.

“Transfer station” means a facility at which refuse, awaiting transportation to a disposal site, is transferred from one type of containerized collection receptacle and placed into another or is processed for compaction.

“Transport” as used in Section 18 of these Regulations means to use a vehicle to haul, ship, carry, convey, or transfer waste grease from one place to another. “Transport” does not include moving waste generated on site into another on-site container, whether indoors or outdoors.

“Transportation” means transport of persons or property by motor vehicle, bus, truck, railroad, light rail, mass transit, airplane, bicycle, or any other form of transport. Transportation includes pedestrian transportation.

“Trap grease” means the residual yellow grease, waste water, debris principally derived from food preparation or processing, or other waste that is intercepted by and contained in grease traps or grease interceptors.

“Trauma scene waste” means waste generated by the decontamination of accident scenes, crime scenes, suicides and other scenes of serious human injury or death. Trauma scene waste is a special category of medical waste that is comprised of other categories of medical waste, including blood and body fluids, pathological waste, pharmaceutical waste, potentially infectious waste and various types of sharps. This waste stream includes, but is not limited to, contaminated flooring, furniture, drywall, clothing, bedding, cleaning solutions, personal protective equipment (PPE), wipes and absorbents, and sharps contaminated with blood and body fluids or other potentially infectious material.

“Treatment” means performing a type of solid waste disposal, which includes but is not limited to, shredding, baling, liquid evaporation, and nonbeneficial sludge landspreading.

“Underground source of drinking water” means an aquifer or its portion:

- (a) Which supplies any public water system, or which contains a sufficient quantity of ground water to supply a public water system; and
- (b) Currently supplies drinking water for human consumption, or contains fewer than 10,000 mg/l total dissolved solids.

“Unstable area” means a location that is susceptible to natural or man-induced events or forces capable of impairing the integrity of some or all of the landfill structural components which are necessary for the prevention of releases from a landfill. “Unstable areas” can include poor foundation conditions, areas susceptible to mass movements, and karst terrains.

“Uppermost aquifer” means the aquifer nearest the ground surface as well as other aquifers which are hydraulically connected with this aquifer within the facility boundary or adjacent to the facility boundary.

“Used lead-acid battery” as used in Section 16 of these Regulations means any lead-acid battery that is no longer functional or no longer used for its primary purpose.

“Used oil” as used in Section 16 of these Regulations means any residentially generated motor oil, refined from crude oil or a synthetic oil, that has been used and as a result of that use is contaminated by physical or chemical impurities.

“Used tire” means a tire that was previously used as a tire and is graded and classified for reuse as a tire based on specifications and criteria maintained pursuant to section 30-20-1410(1)(a), C.R.S.

“Vegetative Waste” means compostable materials generated by the production, harvesting and processing of agricultural or horticultural plants. These residues include but are not limited to stalks, stems, leaves, seed pods, husks, bagasse, and roots. Vegetative waste also includes woody materials and yard waste. Vegetative waste does not include food processing residuals, oil, grease or dairy wastes.

“Vermicomposting” means an activity that produces earthworm castings through earthworm activity associated with consumption of organic materials.

“Visible” means capable of being seen with the unaided eye.

“Visible emissions” means any airborne or liquid emissions, coming from, or having come into contact with RACS, which are visually detectable without the aid of instruments. Proper disposal of appropriately filtered decontamination water does not constitute a visible emission.

“Visual Inspection” for the purposes of Section 5.5 means observation with sufficient proximity to identify discrete visible materials, while maintaining the safety of the inspector.

“Waiver” for the purposes of these regulations shall mean a formalized process whereby an applicant may request to be excused from specific portions of these regulations. In general a defensible technical argument must be presented and verified before a waiver may be granted.

“Washout” means the carrying away of solid waste by waters of the base flood.

“Waste electronic device” means a residentially generated device managed or deemed as solid waste, originally marketed by a manufacturer that is a computer, printer, facsimile machine, digital video disc player, video cassette recorder, peripheral, radio, stereo, video game console or a video display device or computer monitor including a laptop, television, computer monitor, notebook, ultrabook, netbook, tablet, or electronic book that contains a cathode ray tube or a flat panel screen with a screen size greater than four inches measured diagonally; but does not include any type of telephone.

“Waste grease” means trap grease in a quantity in excess of 25 gallons.

“Waste grease facility” as used in Section 18 of these Regulations means any real property location used for the collection, transportation, storage, processing, or disposal of waste grease, including, without limitation, a processing plant, transfer station, or trans-shipment location. “Facility” does not include a domestic wastewater treatment works as defined in section 25-8-103, C.R.S., that processes waste grease as part of its operations that are regulated by the Department pursuant to Article 8 of Title 25, C.R.S. Facility does not include the real property of a personal user of waste grease.

“Waste grease generator” means a person who initially generates waste grease.

“Waste grease transporter” means a person who transports waste grease.

“Waste hauler” means any individual or any employee or agent of a partnership, private, county, or municipal corporation, firm, board of a metropolitan district, or other association of persons that haul waste under contract, agreement, or as otherwise provided by law, to solid wastes disposal sites and facilities.

“Waste impoundment or impoundment” means a facility or part of a facility that is a natural topographic depression, excavation, pit, pond, lagoon, trench, or diked area. An impoundment, which may be lined with earthen material or synthetic material, is designed for storage, treatment or final disposal of solid waste. Examples of impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons.

“Waste management unit boundary” means a vertical surface located at the hydraulically downgradient limit of the area to be filled. This vertical surface extends down into the uppermost aquifer.

“Waste pile or pile” means any noncontainerized accumulation of solid, non-flowing waste that is used for treatment or storage or processing.

“Waste stream” means a relatively uniform solid waste, produced by the same or a similar process or generator over time. Different waste streams are distinguished by significantly larger or smaller concentrations of one or more constituents as determined by standard test methods or inspection.

“Waste Tire” means a tire that is modified from its original specifications but not processed into a tire-derived product, is no longer being used for its initial intended purpose as a tire, and is not a used tire.

“Waste Tire Bale” means waste tires that are mechanically compressed and bound into block form and are secured using stainless steel or heavy gauge baling wire.

“Waste Tire Cleanup Program” means the program created by part 14 of article 20 of title 30, C.R.S.

“Waste Tire Collection Facility” means a facility at which waste tires are stored awaiting pickup by a registered waste tire hauler for transportation to a registered waste tire processor or registered waste tire monofill.

“Waste Tire Generator” means a person who generates motor vehicle or trailer waste tires. The term includes new tire retailers, used tire retailers, automobile dealers, automobile dismantlers, public and private vehicle maintenance shops, garages, service stations, car care centers, automotive fleet centers, local government fleet operators, and rental fleet operators.

“Waste Tire Hauler” means a person who transports ten or more waste tires in any one load.

“Waste Tire Monofill” means part or all of a solid waste disposal site and facility that has been issued a certificate of designation and at which only waste tires are accepted.

“Waste Tire Processor” means a person who processes a waste tire into a tire-derived product.

“Water pollution” means the manmade or man-induced alteration of the background physical, chemical, biological or radiological integrity of ground water or surface water.

“Water treatment plant sludge disposal” means the final disposal of the accumulated solids from the processing of raw water in a treatment plant of a municipality or industry.

“Wetlands” means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. “Wetlands” generally include swamps, marshes, bogs, and similar areas.

“Wholesaler” as used in Section 16 of these Regulations means any corporation, limited liability company, partnership, individual, sole proprietorship, joint-stock company, joint venture, or other private legal entity that sells new lead-acid batteries, electronic devices, or lubricating oil for resale.

“Within-Vessel Composting” means a process in which compostable material is enclosed in a drum, silo, bin, tunnel, reactor, bag, or other container for the purpose of producing compost.

“Woody materials” means residuals and of cutting trees, including but not limited to tree stumps, sawdust, pallets, and dimensional lumber that has not been treated chemically or with adhesives and coatings such as paint, glue, or any other visible contaminant.

“Working day” means Monday through Friday and including holidays that fall on any of the days Monday through Friday.

“Working face” means that portion of a facility for solid wastes disposal where solid wastes are actively unloaded, placed, compacted and covered, at any time of operation.

“Yard Waste” means waste generated from yard maintenance, including garden waste, grass clippings, leaves and branches. Yard waste can also include vegetative materials resulting from the use of commercial products, including but not limited to discarded flowers, potted flowers, or grave blankets that do not include plastic, metal, polystyrene foam, or other nonbiodegradable material.

“Yards per day” means the cubic yardage of material a facility receives at the gate, for each 24 hour period.

“Yellow grease” means used cooking oil, spent shortenings, or other inedible kitchen grease or waste vegetable oil produced by restaurant and food facilities.

“100-Year flood” means a flood that has a 1-percent or greater chance of recurring in any given year or a flood of a magnitude equalled or exceeded once in 100 years, also called (base flood).

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1.3 SCOPE AND EFFECTIVE DATE

1.3.1 These regulations are based on the authorities defined and established in the Solid Waste Act, 30-20-100.5, et seq. C.R.S. Under that statute, the siting, permitting and regulation of solid waste disposal sites and facilities is an area of dual jurisdiction; that is, both the Department and local governing bodies having jurisdiction have assigned roles and responsibilities. Due to the dual nature of this process, effective coordination and communication are important to both governmental agencies involved in decisions, approvals and enforcement. The department recognizes that a cooperative relationship must be established with the governing bodies having jurisdiction or with the agency or agencies identified by such bodies as contacts for their jurisdiction. However, these regulations cannot and do not assign to any agency authorities not granted them in statute; nor can these regulations negate or change any authority granted to a local agency under any other statute, regulation or ordinance.

1.3.2 The effective date of these regulations shall be October 9, 1993, with these exceptions.

(A) The financial assurance requirements contained in Section 1.8 of these regulations shall be effective on the date specified in 30-20-104.5(4) C.R.S.

(B) The location, design, operation, closure and post-closure requirements, contained in Sections 3.1, 3.2, 3.3, 3.5 and 3.6 respectively:

(1) Shall be effective April 9, 1994, for existing municipal solid waste landfills that have accepted and continue to accept 100 tons of solid waste per day or less; and,

(2) Shall be effective October 9, 1995, for existing municipal solid waste landfills that, on or before April 9, 1994, submit an application for a waiver under Section 1.5.3.

(C) Provided no solid waste is accepted on or after April 9, 1994, the final cover requirements contained in Section 3.5 shall be effective October 9, 1994, for existing municipal solid waste landfills that have accepted and continue to accept 100 tons of solid waste per day or less.

(D) Provided no solid waste is accepted on or after October 9, 1995, the final cover requirements contained in Section 3.5 shall be effective October 9, 1996, for existing municipal solid waste landfills that, on or before April 9, 1994, submit an application for a waiver under Section 1.5.3.

(E) Unless a further extension is granted by the Department, the ground water monitoring and corrective action requirements contained in Section 2.2.:

(1) Shall be effective October 9, 1994, for existing units or lateral expansions of existing units at municipal solid waste landfills that have accepted and continue to accept 100 tons of solid waste per day or less; and,

(2) Shall be October 9, 1995 for new units or lateral expansions or existing units at municipal solid waste landfills that, on or before April 9, 1994, submit an application for a waiver under Section 1.5.3.

All extensions of the ground water and corrective action requirements, beyond the dates listed in (1) and (2) above, shall be based upon the criteria specified in 40 CFR 258.50 and shall in no way extend beyond October 9, 1996, or otherwise violate the requirements of Subtitle D of RCRA.

(F) In the event an application submitted under subsections (B) (2), (D) or (E) (2) is denied by the Department that municipal solid waste landfill shall comply with all applicable requirements within six (6) months of said denial.

- 1.3.3 No person shall operate a facility for solid waste disposal, where processing, treatment, or final disposal is performed, at any site without a certificate of designation obtained from the governing body having jurisdiction except as specified in 30-20-102 C.R.S. as amended.
- 1.3.4 Sites for new solid waste disposal sites and facilities shall comply with these regulations, unless compliance with specific standards is waived by the Department in accordance with Section 1.5 of these regulations.
- 1.3.5 The construction, operation and closure of all new facilities for solid waste disposal shall comply with designs, specifications and procedures outlined in the certificate of designation application, or in amendments to such applications approved after Department review, and with all applicable local requirements, and with the standards of these regulations.
- 1.3.6 The construction, operation and closure of all approved facilities for solid waste disposal that were granted a certificate of designation before there were requirements for an engineering design and operations report or that are in operation on the effective date of these regulations, shall comply as a minimum with standards in Section 2 of these regulations.

- 1.3.7 Solid waste disposal sites and facilities that are exempted from certificate of designation requirements under provisions of Section 1.4 of these regulations shall comply with the applicable standards of these regulations, unless permitted or operated in compliance with regulations pursuant to the "Colorado Mined Land Reclamation Act", Title 34, Article 32, Section 101, et seq., CRS, as amended; or the "Hazardous Waste Act", Title 25, Article 15, Parts 1, 2, and 3, CRS, as amended.
- 1.3.8 Technical guidelines, including specific technical factors, may be developed and issued by the Department to assist applicants, local governments, and the public.
- 1.3.9 (A) All solid waste disposal sites and facilities are reviewed and approved for a specific owner/operator; a specific waste stream; a specific design; a specific operation plan. Significant changes to the above are required to be approved by the Department. Such approval or denial shall become a part of the operating record. The information describing changes relating to the above items shall be submitted and described in appropriate detail and in a clear and concise format. This is required in order to maintain current information and status on sites and facilities for monitoring and enforcement purposes.
- (B) Sites and facilities subject to 40 CFR Part 258 shall submit a compliance information applicable to their site for the compliance plan per Section 3.0.
- (C) Nothing in this section shall preclude any review action by the local governing authority under 30-20-100.5 et seq. or appropriate local ordinance or rule.
- 1.3.10 Statements of the basis and purpose for these regulations have been prepared and adopted by the board of health, and hereby incorporated into these regulations by reference, pursuant to the "Colorado Administrative Procedures Act", Title 24, Article 4, Section 103, C.R.S. 1973, as amended. A statement of basis and purpose for each change in the regulations is drafted to give the reasons for the regulatory change enacted. Copies are on file with the Department.
- 1.3.11 These regulations shall apply to all solid waste disposal sites and facilities as provided for in CRS 30-20-100.5 and herein.
- (A) The minimum standards (Section Two) shall apply to all sites and facilities.

(B) Section 3.0 shall apply to all solid waste disposal landfills and facilities.

(C) Sections 4 through Section 13 are specific to specific waste streams and facilities.

Section Two is meant to be used in conjunction with all other sections. The Department recognizes that all the criteria may not be applicable to all sites, facilities or waste streams.

1.4 EXEMPTIONS Notwithstanding the provisions in Section 1.3 of these regulations, the following facilities for solid wastes disposal shall be approved sites and/or facilities for which obtaining a certificate of designation under provisions of these regulations shall not be necessary for:

1.4.1 Those sites and facilities at which any person, other than a governmental unit, disposes of his own solid wastes on his own property; provided that the Department has determined, based upon review of an engineering design and operations report prepared and submitted by the operator in accordance with Sections 3.1, 3.2, and 3.3 of these regulations, that the disposal operation will comply with the Act and the applicable regulations of the Department.

1.4.2 Those facilities for solid waste disposal at which any person engaged in mining operations permitted by the Colorado Mined Land Reclamation Board, pursuant to the "Colorado Mined Land Reclamation Act", Title 34, Article 32, Section 101, et seq., CRS 1973, as amended, and its regulations, performs solid waste disposal of mining or other solid wastes generated by such operations within the permitted area for such operations.

1.4.3 Any site and facility operated for the purpose of processing, reclaiming, or recycling recyclable materials shall not be considered a solid wastes disposal site and facility and shall not require a certificate of designation as a solid wastes disposal site and facility; however, a site or facility shall establish an initial accumulation period and shall maintain documentation that proves recyclable materials are being recycled at the site at a rate that approximately equals that rate at which recyclable materials are being collected. Regulations will specify what time periods and volumes of recyclable materials constitute operations that qualify for this exemption and define what materials shall be deemed recyclable materials. Except that recyclable materials shall not include materials that are likely to contaminate ground water or create off-site odors as the result of processing, reclaiming, recycling, or storage prior to recycling.

- 1.4.4 Those sites where sludge is used beneficially as a fertilizer, soil conditioner, fuel or livestock feed, provided the sludge is certified to have met all applicable regulations of the Department and the Department of Agriculture. In addition, the use of manure as a fertilizer or soil conditioner or the composting on the site of generation of manure with other compatible materials necessary for effective composting as part of standard agricultural practice shall not require a certificate of designation.
- 1.4.5 Those facilities for hazardous waste disposal that have been issued a certificate of designation pursuant to Title 25, Article 15, Parts 1, 2, and 3, CRS, as amended, and its regulations.
- 1.4.6 Transfer stations, which shall not be deemed to be a solid waste disposal site and facility, shall not require a certificate of designation and shall meet standards as set forth in Section 7.

1.5 WAIVER PROCESSES AND PROCEDURES

- 1.5.1 If an applicant wishes to request a waiver of any provision of these regulations, written documentation requesting such waiver or waivers shall be submitted to the Department and the local governing authority. Waiver requests shall be site-specific and shall list those regulations or requirements for which a waiver is being requested. The waiver request shall supply sufficient technical information in a clear and concise format to justify the applicant's request.

Minimum information required for a waiver request shall consist of:

- (A) Name and address of the applicant and the owner
- (B) Site address and legal description
- (C) Site or facility name
- (D) County and township, range, section where the site is located.
- (E) Type, size, expected active life and operational history of the facility
- (F) Geological, hydrologic, and engineering and other such information necessary to support the applicants waiver request
- (G) The specific regulatory subsections for which the waiver request is being filed.

(H) Any alternative requirements or performance standards offered in place of the standards requested to be waived.

1.5.2 Based upon written specific waiver documentation, in their consideration of an application, and in the exercise of their regulatory authority to assure compliance with these regulations, the Department after consultation with the governing body having jurisdiction may waive compliance with standards in Sections 2 through 18 provided that the application satisfies criteria (A) and (B) and (C) and (D) below:

(A) The benefits derived from meeting a standard do not bear a reasonable relationship to the economic, environmental, and energy impacts or other factors which are particular to the facility; and

(B) Such waiver is consistent with the purposes of the Act and these regulations; and

(C) Such waiver is not deemed to constitute a major variation from the requirements of these regulations; and

(D) The waiver will not cause or allow the violation of any air or water quality standard or federal or local restrictions.

1.5.3 The Department after consulting with the governing body having jurisdiction, shall waive compliance with the requirements of Section 3.2, "Design Criteria" and Section 2.2, "Ground Water Monitoring and Corrective Action", by owners or operators for new municipal solid waste landfill units, existing MSWLF units and lateral expansions for which the owner or operator has submitted written specific waiver documentation that adequately demonstrates that:

(A) Such owners or operators dispose of less than twenty (20) tons of municipal solid waste daily. The twenty tons per day shall be measured as an annual aggregate average; and

(B) Certification that the hydrogeologic characteristics of the media beneath the site area are such that migration of contaminants from the facility into off-site ground water are unlikely. A minimum criteria will be that the soils beneath the site have a minimum permeability of at least 1×10^{-6} cm/sec and the distance to the nearest aquifer is such that ground water contamination is unlikely; or

(C) There is no evidence of existing ground water contamination from the MSWLF unit indicated by contamination of a well utilizing the uppermost aquifer and located at or adjacent to the mswlf unit boundary.

Documentation to fulfill this characterization requirement can consist of independent field study, or

(1) That no evidence of leachate was indicated through tests utilizing a piezometer at the point of compliance, or

(2) That no evidence of leachate was indicated through a test utilizing a wet/dry monitor at the point of compliance, or

(3) Ground water contamination from the unit is determined not to exist or not likely to occur through use of any other test agreed to by the applicant and department; and

(4) The MSWLF unit serves a community that experiences an annual interruption of at least three consecutive months of surface transportation that prevents access to a regional waste management facility; or

(5) The MSWLF unit serves a community that has no practicable waste management alternative and the landfill unit is located in an area that annually receives less than or equal to 25 inches of precipitation.

1.5.4 A waiver is granted based upon data and information submitted at a given point in time. Anytime that the facility which has been operating under a waiver granted by the Department can no longer meet the waiver criteria, the waiver is void and ceases to exist.

1.6 APPLICATION FOR CERTIFICATE OF DESIGNATION

1.6.1 Any person proposing to operate a facility for solid wastes disposal within the unincorporated portion of any county shall apply to the commissioners of the county in which the site is to be located for a certificate of designation and any person proposing to operate a facility for solid waste disposal within the corporate boundaries of a municipality shall apply to the governing body of that municipality for a certificate of designation.

1.6.2 On the date of its submittal, the application shall be accompanied by a non-refundable fee which has been established by the governing body having jurisdiction and which is based on the costs incurred by that body in the

application review and approval processes. The application shall be accompanied by at least five (5) copies or as many additional copies as specified by local requirements, of an engineering design and operations report prepared in accordance with these regulations, unless the proposed solid waste disposal facility is a privately operated Solid Waste-to-Energy Incineration facility not under contract to a county and/or municipality or is a solid waste incineration facility, in which case Sections 1.6 and 11.2 through 11.5 shall apply. The application shall also include all other documents specified by local requirements. After receipt of an application, the governing body having jurisdiction shall forward copies of the application and at least five (5) copies of the engineering design and operations report to the Department for review and a recommendation for approval or disapproval.

1.6.3 Recommendations on certificate of designation applications, including the engineering design and operations report, shall be based upon compliance with the Act and these regulations.

1.6.4 The Department shall conduct a technical review of each application for a certificate of designation for a solid waste disposal site and facility. This review shall have two parts which are defined in the following subsections.

1.6.5 An application for a certificate of designation for a proposed solid wastes disposal site and facility shall be reviewed by the Department to determine if the contents of the application are complete as submitted.

(A) The Department shall make an initial decision concerning the completeness of the application and its associated technical documents within thirty (30) days of the receipt of the application as a referral from the local governing body having jurisdiction. The Department shall base this decision on the content of the application, as submitted. The Department shall notify the applicant and local governing body having jurisdiction whether or not the comprehensive technical evaluation of the application will proceed. This notice shall be provided in writing to both the applicant and the local governing body having jurisdiction.

(B) If the Department fails to provide the applicant and the local governing body having jurisdiction with its written decision concerning the completeness of the application within the specified thirty (30) day period, the application will proceed through the comprehensive review described in Subsection 1.6.6 below.

(C) This initial decision from the Department concerning the completeness of the application will be based only on the completeness of the application

as submitted and shall not imply nor indicate anything about the outcome of the subsequent comprehensive technical review. An affirmative decision concerning completeness shall not prevent the Department from asking that the applicant provide additional information or clarifications of the information contained in the application as submitted during the comprehensive technical review described in Subsection 1.6.6 below.

1.6.6 (A) An application for a certificate of designation for a proposed solid wastes disposal site and facility and associated technical documents which have been determined to be acceptable with regard to completeness shall, then, undergo a comprehensive technical evaluation to determine whether the site and facility, as proposed and documented in the submitted information, can meet the requirements of these regulations and the statute under which the regulations were adopted. This comprehensive technical review shall be the basis for the recommendations of the Department to the local governing body having jurisdiction concerning approval or disapproval of the proposed site and facility. Any technical conditions of approval made by the Department in its final report shall be incorporated as requirements in the certificate of designation.

(B) The Department shall complete the comprehensive technical review of each application for a solid waste disposal site and facility within one hundred and fifty (150) days after the completeness review period, specified in Subsection 1.6.6 above, has elapsed.

1.6.7 (A) For each application, upon the completion of the review discussed in Subsection 1.6.6 above, the Department shall evaluate the work load already assigned to solid waste application review staff and the approximate length of time needed to complete these assignments. If it is determined that a comprehensive technical review of an additional application can not be completed within one hundred and fifty (150) days, the Department shall select a contractor from a list of qualified contractors to participate in the review of the application.

(B) Upon selection for participation in the comprehensive technical review of an application for a certificate of designation for a specific solid waste disposal site and facility, the contractor selected shall receive from the Department a copy of all documents submitted as part of the application and shall provide to the Department within seven (7) days of selection: (1) A written statement which verifies that no conflict of interest exists with regard to contractor's previous or current activities and the site or applicant in question in that comprehensive technical review; (2) A work plan which identifies the personnel and schedule for the technical review of the specific application and technical documents submitted as part of that

application; and (3) And estimate of the cost for that review based on the contractor's current hourly rates and estimates of work required to participate in the technical evaluation of the application.

(C) Upon receipt of the information identified in (B) above, the applicant shall be notified of the contractor selected and shall indicate whether or not that contractor is acceptable based on the information provided in (B) above. The applicant shall provide to the Department in writing the decision to accept or reject the contractor within two (2) working days after the contractor's submittal is received. If no such decision is received, the contractor selected will be assigned the work.

(D) If the first contractor is rejected by the applicant, a second and final contractor will be selected from the list of qualified contractors and the process contained in Subsection 1.6.8 (B) and (C) above will be repeated.

(E) If neither of the two contractors proposed is accepted, the applicant shall be deemed to have waived the one hundred fifty (150) day review period and the Department will review the application as quickly as the existing work load allows.

(F) An applicant may request that the Department conduct the technical review of an application rather than submit it for review to a contractor. In this case the one hundred fifty (150) day time frame for the technical review is deemed to have been waived and the Department will complete the review as quickly as the existing work load allows.

1.7 SOLID WASTE AUTHORIZATION AND FEES

1.7.1 Authorization The Department is authorized per Section 25-16-104.5, C.R.S. and Section 30-20-109, C.R.S., as amended, to collect solid waste user fees, hourly activity fees and annual facility fees.

1.7.2 Document Review and Activity Fees:

(A) **Applicability:** All "Facilities" and "Solid waste disposal sites and facilities", as defined in Section 1.2 of these regulations, and all facility types listed in Section 1.7.3 of these regulations are subject to the following fees:

- (1) **Document Review Fees:** The document review fees shall provide reimbursement to the Department for professional staff and administrative personnel time spent reviewing, evaluating and responding to documents submitted or required to be submitted in connection with open, closed, new, or existing solid waste sites and facilities including, but not limited to, the following:
 - (a) New applications for solid wastes disposal site and facilities;
 - (b) Amendments to an original application upon which a certificate of designation has been issued;
 - (c) Remediation activities concerning open, closed, or old disposal sites or spill and incident cleanups;
 - (d) Monitoring reports from open or closed facilities requiring monitoring;
 - (e) Design and operations plans and amendments or modifications thereto;
 - (f) Closure and post-closure plans and modifications;
 - (g) Environmental Covenants or associated documents required under § 25-15-320, C.R.S., and
 - (h) Construction submittals subject to review.

- (2) **Activity Fees:** The activity fees shall provide reimbursement to the Department for professional staff and administrative personnel time spent on open, closed, new, or existing solid waste sites and facilities including the following activities related to (A)(1)(a-h) above:
 - (a) Pre-operation site visit/investigation of solid waste disposal sites and facilities;
 - (b) The attendance of Department staff at meetings and hearings concerning such applications or amendments meetings;
 - (c) Preparing for meetings;
 - (d) Negotiations;
 - (e) Responding to questions or information requested at meetings with the facility or the facility's representatives;

- (f) Preparation for and attendance at public meetings or hearings; and
 - (g) Responding to questions or information requested at public meetings or hearings.
- (3) For purposes of this section, the following terms shall have these meanings:
- (a) "Evaluating" includes time spent determining whether the document is complete and adequate for its intended purpose and/or complies with regulatory requirements and may include time spent on site visits, as appropriate;
 - (b) "Responding" includes Department determinations to, approve with conditions or modifications, request additional information, or disapprove, revoke, reissue, terminate or deny the permit, closure plan or other document;
 - (c) "Reviewing" includes reviews of information submitted to the Department by the facility or its agents, regardless of whether the documents require a determination by the Department;
 - (d) "Public meeting" means a hearing that has been publicly noticed.
- (4) Upon receipt from the local governing body of an application or amended application for a solid waste disposal site and facility, with the referral for review, the Department will notify the applicant of the Department's:
- (a) Receipt of the application or amended application;
 - (b) The assigned project manager and their contact information;
 - (c) The availability of two meetings prior to initiating billing; and
 - (d) The document review and activity fees, project type and billing ceiling.
- (5) If a facility requests to meet with the Department prior to filing a permit application, the Department shall do so. For purposes of this section, the Department will begin charging the facility for pre-permit application meetings and review of documents beginning with the third meeting between the Department and the facility consistent with paragraph (4) above, regardless of whether the facility files a permit application.

- (6) The Department will provide written notification to applicants or others that have submitted documents pursuant to paragraph (1) above:
 - (a) When 30 hours of billable time has been accumulated working on any application, amendment, or other document;
 - (b) The amount of the document review completed based on the sections reviewed versus those not yet reviewed; and
 - (c) That the Department shall continue work on the review unless the applicant directs the Department in writing to cease work on the project.
 - (7) If the applicant directs the Department to cease work, the applicant will still be responsible for reimbursing the Department for the hours of accumulated review time.
 - (8) In addition to the document review and activity fees specified above, the facility will reimburse the Department for any legal fees incurred by the Department associated with (1) and (2) above, in the amount the Department is then paying for legal representation to the Colorado Attorney General.
 - (9) The document review and activity fee shall be reviewed annually by the Director and a report shall be provided to the Solid and Hazardous Waste Commission including information supporting that the fee is both equitable to the regulated community and is sufficient to recover reasonable program expenses incurred thereby.
- (B) **Schedule:** Solid waste sites and facilities that are subject to the document review and activity fees under paragraph (A) of this section shall pay an hourly charge of \$125 for departmental staff and administrative time. The Director shall establish a time-keeping system and shall make available to the owner/operator of the facility a record of those activities for which the owner/operator has been charged.
- (1) The document review and activity fee of each type of regulated unit shall not exceed the ceilings noted in the schedule below. For facilities with more than one regulated unit, the maximum document review and activity fee is the sum of the ceiling fees for each unit at the facility.

- (2) The department may, on a case-by-case basis and upon demonstration of need consistent with section 25-15-301.5, request a waiver of the ceiling fee from a solid waste site and facility subject to the document review and activity fee.

DOCUMENT REVIEW AND ACTIVITY FEES SCHEDULE	
Task	Ceiling Fee
Notification/Registration/Bonds	\$1,000
Certificate of Designation Application	\$35,000
Design and Operation Plan Modification	\$25,000
Construction CQA Report	\$5,000
Ones Own Waste Design & Operation Plan	\$35,000
Audit Reports	\$5,000
Financial Assurance – Annual	\$3000
Financial Assurance – 5 yr	\$5000
Monitoring Reports (e.g., groundwater landfill gas, remediation's)	\$3,000
Corrective Action, Remediation & Pilot Project Plans (e.g., gas, groundwater, geotechnical, storm-water, site visit, meetings etc.)	\$10,000/calendar year
Closure Plans and modifications	\$5,000
Post-Closure Plans and modifications	\$5,000
Transfer Station Operating Plan	\$10,000
Asbestos Contaminated Soil Facilities	\$15,000/area/calendar year
Compost Facility Design & Operation Plan	\$15,000
General Correspondence	\$500
Special Requests	\$10,000

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1.7.3 ANNUAL FEES

(A) Applicability:

- (1) An operating fee of \$1,000 per year shall be paid annually by solid waste sites and facilities regulated under the following Parts that are not subject to the Solid Waste User Fee, except Part 8 as noted below:
 - a. Part 7 (Transfer Stations),
 - b. Part 8 Recycling: Facility annual fee is \$150/facility/year,
 - c. Part 9 (Surface Impoundment Facilities)
 - d. Part 11 (Solid Waste Incinerator Facilities),
 - e. Part 13 (Medical Waste Facilities),
 - f. Part 14 (Compost Facilities),
 - g. Part 18 (Waste Grease Transporters, Facilities, and Personal Users of Waste Grease): Annual fee per Section 1.7.5 of these regulations, and
 - h. Unattended facilities regulated under Parts 1 and 2 of these regulations that do not pay fees under section 25-16-104.5, C.R.S., including:
 - i. Surface Impoundments,
 - ii. Landfills, and
 - iii. Monofills
- (2) The facilities listed in Section 1.7.3(A)(1) above are subject to the annual operating fee from the time such facilities first begin operating until final closure is certified and shall provide payment to provide reimbursement to the Department for those costs incurred in tracking, compliance monitoring, compliance assistance, plan review, enforcement, and other recurring activities that are reasonable and necessary to ensure compliance with these regulations.
- (3) A post-closure fee of \$1,000 per year shall be paid annually by solid waste sites and facilities regulated under the following Parts that are not subject to the Solid Waste User Fee, except Part 8 as noted below:

- a. Part 2,
- b. Part 3,
- c. Part 7 (Transfer Stations),
- d. Part 8 Recycling: annual fee is \$150/facility/year,
- e. Part 9 (Surface Impoundment Facilities),
- f. Part 11 (Solid Waste Incinerator Facilities),
- g. Part 13 (Medical Waste Facilities),
- h. Part 14 (Compost Facilities),
- i. Part 18 (Waste Grease Transporters, Facilities, and Personal Users of Waste Grease): Annual fee per Section 1.7.5 of these regulations, and
- j. Unattended facilities regulated under Parts 1 and 2 of these regulations, including:
 - i. Surface impoundments,
 - ii. Landfills, and
 - iii. Monofills

(4) The facilities listed in Section 1.7.3(A)(3) above are subject to the post-closure fee for the duration of the post-closure care period and shall provide payment to provide reimbursement to the Department for those costs incurred in tracking, compliance monitoring, compliance assistance, plan review, enforcement, and other recurring activities that are reasonable and necessary to ensure compliance with these regulations.

(B) **Payment:** All owners and operators of facilities subject to the fees of this section shall provide timely payment of the annual fees to the Treasurer of the State of Colorado, as provided in this section. All annual fees shall be credited to the Solid Waste Management Fund created in section 30-20-118, C.R.S. A late payment fee of 2% per month or portion thereof shall be assessed on any unpaid balance subject to the limitations of 24-79.5-101, et seq. C.R.S.

1.7.4 Solid Waste User Fee

A. Beginning July 1, 2012 the operator of each attended solid waste disposal site shall, at the time of disposal, collect a solid waste user fee from waste producers or other persons disposing of solid waste at the following rates:

	Solid Waste User Fee	Cubic Yard Rate	Ton Rate
1) Thirteen cents (\$0.13) per cubic yard or forty-three cents (\$0.43) per ton on each load transported into the solid waste disposal site for disposal by any vehicle, or an equivalent amount determined using the conversion factors in subsection 1.7.4(A)(4) to support the costs described in § 25-16-104.5(1.7)(a)(I), C.R.S.;	Solid Waste Program § 25-16-104.5(1.7)(a)(I)	\$0.13	\$0.43
2) Five cents (\$0.05) per cubic yard or seventeen cents (\$0.17) per ton on each load transported into the solid waste disposal site for disposal by any vehicle, or an equivalent amount determined using the conversion factors in subsection 1.7.4(A)(4) to support the costs described in § 25-16-104.5(1.7)(a)(II), C.R.S.; and	Hazardous Substance Response Fund § 25-16-104.5(1.7)(a)(II)	\$0.05	\$0.17
	Department of Law § 25-16-104.5(1.7)(a)(III)	\$0.03	\$0.10
3) Three cents (\$0.03) per cubic yard or ten cents (\$0.10) per ton on each load transported into the solid waste disposal site for disposal by any vehicle, or an equivalent amount determined using the conversion factors in subsection 1.7.4(A)(4) to support the costs described in § 25-16-104.5(1.7)(a)(III), C.R.S.	Total SWUF Note: Does not include RREO fee as defined in § 25-16-104.5(3.9)	\$0.21	\$0.70

4) Conversion factors: Any solid waste disposal facility or jurisdiction may use the following conversion factors when calculating Solid Waste User Fees :

- a. 0.333 cubic yards/passenger car
- b. 0.666 cubic yards/light duty truck/suv
- c. 3.333 cubic yards/ton for municipal solid waste
- d. 5.000 cubic yards/1,000 gallons
- e. 0.75 cubic yards/ton for soil

A facility may request that the Department approve an alternate conversion rate, based on the material specific density for a given waste stream. This request must include data that validates the density of the material.

B. Equivalent rate structure: A facility may request that the Department approve an equivalent rate structure for the facility that is based upon the population of the defined service area for the facility. The service area population shall be based upon official Colorado demographic figures that are established under the most recent national census. Each facility using an equivalent rate structure must update its demographic data every five years to ensure that its service area population remains subject to the equivalent rate structure.

- 1. The equivalent rate structure will only be available to facilities that have a service area population of no more than 3500 people. All other facilities must utilize the fee structure set forth in § 25-16-104.5, C.R.S.
- 2. A facility must request an equivalent rate structure in writing. The facility shall submit the applicable population data, and a map and/or description of the service area to the Department as part of its request.

3. The equivalent rate structure shall be based on the following formula:

$$4.5 \text{ lbs./person/day} \times 365 \text{ days/year} \text{ divided by } 2,000 \text{ lbs./ton} = X \text{ tons/year}$$

$$(X \text{ tons/year} \times 3.333 \text{ cubic yards/ton}) \times (\text{the cubic yard rate that is established in current statute}) = \text{the dollar amount to be paid per annum.}$$

C. Allowable expenditures and reporting: Local jurisdictions operating disposal facilities and collecting user fees are allowed to use these fees to cover their expenses in performing response activities at National Priority List (NPL)

sites, pursuant to § 25-16-104.5(2)(a.5), C.R.S. The following provisions set forth the reporting requirements, allowable expenses, and other aspects of fee collection and retention or use under this citation.

1. A jurisdiction must obtain approval from the Department to use or retain for future use, fees as provided in statute. The jurisdiction shall submit a written request including the name of the site, what response activities are to be taken, the requirement for taking such action (e.g., a Record of Decision, Consent Decree or an Order), and estimates of how much money will be expended and over what period of time. The information provided must demonstrate compliance with the provisions of § 25-16-104.5, C.R.S. and these regulations, which shall be the criteria for approval or disapproval by the Department. The Department will use its best efforts to complete its review of such requests within 30 days.
2. A jurisdiction may retain fees pending the Department's decision and any appeal thereof; however, the jurisdiction may not expend such fees until approval is granted by the Department. The Department shall provide a jurisdiction with a written statement of reasons for any disapproval or partial disapproval. A jurisdiction may appeal the Department's determination in accordance with the Colorado Administrative Procedures Act, Section 24-4-105 C.R.S.
3. A jurisdiction that expends fee monies on designated sites listed on the NPL shall be subject to quarterly reporting requirements. The jurisdiction shall report to the Department all fee monies collected, monies remitted to the solid waste management fund, and monies expended pursuant to statute to fund response activities at NPL sites during the previous quarter. The jurisdiction shall further describe the expended funds on a site specific and activity specific basis, including the site name and the nature of the expenditure. If credits are requested against future expenditures as per paragraph 6 of this subsection, the jurisdiction shall specify the amount, site name and proposed activities. The jurisdiction shall also report the amount of interest or dividend gained on any retained fees and how it was retained, used or remitted on a site-specific basis.
4. A jurisdiction shall remit any fees and accrued interest not retained or used for allowable expenses as described herein to the Department on a quarterly basis.
5. If a jurisdiction has received settlement monies for response activities from other responsible parties, the jurisdiction must first use such settlement monies for those response activities before using retained fees. In order to obtain Department approval to retain and spend

retained fees on NPL sites where such settlement monies have been received, the jurisdiction must submit information on the settlement to the Department, with an accounting of these monies to show that they have been expended.

6. Only the costs of response activities at sites on the NPL where the local jurisdiction is required to perform such activities as a consequence of being a potentially responsible party (as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan) or as a result of a Record of Decision, Order, Consent Decree, Consent Agreement, or other agreement between the local jurisdiction and the U.S. Environmental Protection Agency, qualify for retention and expenditure of collected fees. Allowable expenses include, but are not limited to: the costs of producing required documents such as Remedial Investigations, Feasibility Studies, Records of Decision, and Remedial Designs; the cost of constructing remedial or removal actions; and legal costs associated with the negotiation of orders with the U.S. Environmental Protection Agency. Allowable expenses do not include, without limitation: certain litigation costs, including cost recovery; costs incurred as a regulatory oversight agency that are not required by the U.S. Environmental Protection Agency; additional actions taken at the discretion of the jurisdiction that are not required by the U.S. Environmental Protection Agency; and costs associated with sites that are not on the NPL.
7. Upon approval from the Department, a jurisdiction may be credited fees for future allowable expenses, if it can be shown that the expenditure and remittance of fees as described above will not cover the estimated allowable expenses. This need must be demonstrated by showing projected allowable expenditures against expected revenues from retained fees. The approval of the Department will be based on compliance with § 25-16-104.5, C.R.S. and these regulations regarding allowable expenses. In addition, the Department may consider other factors such as the time period of retention, in assessing such a request.

D. Audit: The Department may audit a facility in order to ascertain whether or not the facility is in compliance with these regulations and the governing statute.

1. An operator of a solid waste disposal facility shall retain all records regarding the collection and remittance of solid waste user fees for a period of three years.

2. A jurisdiction shall retain all records relating to its retention and/or expenditure of solid waste user fees for a minimum of three years, at which time it may request that the records no longer be retained.

1.7.5 Waste Grease Transporters, Facilities, and Personal Users of Waste Grease Annual Fees

- (A) **Authorization:** The Department is authorized per Section 30-20-123(9)(a.5), C.R.S. as amended, to collect an annual registration fee for Waste Grease Transporters, Facilities and Personal Users of Waste Grease.
- (B) **Applicability:** Beginning January 30, 2012 all “Waste Grease Transporters”, “Waste Grease Facilities” and “Personal Users of Waste Grease Other than For Use as Biofuel”, as defined in Section 1.2 of these regulations are subject to the following annual fees as noted below:
 1. Waste Grease Transporter: \$570 per vehicle per year, and \$25 per set of five (5) temporary decals
 2. Waste Grease Facility: \$1,140 per year
 3. Personal Users of Waste Grease Other than For Use as Biofuel: \$96 per year.
- (C) The fees must be paid to the Treasurer of the State of Colorado by remitting to:

Hazardous Materials and Waste Management Division
Solid Waste and Materials Management Program
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

1.7.6 Waste Tire Fee

Retailers must collect a fee of \$0.55 on the sale of each new motor vehicle tire and new trailer tire. Retailers must submit to the Department all fees collected from the sale of each new motor vehicle tire and new trailer tire. The fees collected each month are due to the Department no later than the 20th day of the following month.

1.7.7 Paint Stewardship Program Fees

(A) **Authorization:** The Department is authorized per Section 25-17-404 (4), C.R.S. and Section 25-17-408, C.R.S. as amended, to collect fees for oversight of the paint stewardship program.

(B) **Applicability:** A paint stewardship organization or one or more paint producers as defined in Section 1.2 of the regulations shall pay to the Department an annual fee of \$120,000 on or before July 1, 2015 and annually on or before July 1 of each calendar year thereafter for the paint stewardship program plan fee, revised plan fee and paint stewardship annual report fee.

1. From within the paint stewardship program plan fee, revised plan fee; and paint stewardship annual report fee total, \$9,108 or as much as necessary will be appropriated to the Department of Law for the purchase of legal services.
2. The annual fee shall be prorated if there is more than one paint stewardship organizations or paint producers by the number of approved plans.

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SECTION 1.8 FINANCIAL ASSURANCE CRITERIA

1.8.1 (A) The owner or operator of any solid waste disposal site/facility shall maintain in written documented form current cost estimates for hiring a third party to close such site and facility and to conduct post-closure care of such site/facility. The owner or operator of any solid wastes disposal site and facility shall establish financial assurance sufficient to ensure payment of such costs. No solid wastes disposal site/facility shall operate without being in compliance with these financial assurance requirements. The ultimate responsibility for financial assurance rests with the owner of the facility, however, the operator or lessee may provide financial assurance for the facility under these rules, if approved.

(B) A detailed written estimate of the cost of hiring a third party to close the largest area of a site and facility that may require closure shall be the basis for the closure estimate. The closure cost estimate must equal the cost of closing the largest area requiring closure during the active life of the site and facility when the extent and manner of its operation would make closure the most expensive, as indicated by its closure plan.

(C) A third party shall be a party who is neither a parent nor a subsidiary of the owner or operator.

1.8.2 (A) No governing body having jurisdiction shall require an applicant for a certificate of designation to obtain any financial assurance mechanism or amount in addition to that required by the provisions of C.R.S. 30-20-104.5.

(1) All owners and operators shall provide, concurrently, to the Department and the local governing body having jurisdiction, proof of sufficiency of financial assurance per the requirements set forth in these regulations and 30-20-104.5. C.R.S. as amended. The Department shall consult with the governing body having jurisdiction prior to accepting an applicant's financial assurance. Consultation may consist of telephone conversations, written communications or meetings, dependent upon the particular circumstance.

(2) Local recommendations shall be considered in establishing the amount of financial assurance to be posted.

(3) In the case where a site and facility is owned or operated by the local governing body having jurisdiction, the Department may consult the local governing body having jurisdiction on matters concerning financial assurance but shall retain final decision making and approval authority.

(B) The owner or operator of any solid wastes disposal site/facility that is required to undertake a corrective action program pursuant to these regulations and/or Subpart E of the federal regulations promulgated pursuant to the provisions of Subtitle D of the federal "Resource Conservation and Recovery Act of 1976", as amended and/or C.R.S., 30-20-104.5 et seq., as amended, shall maintain a detailed written estimate of the cost of hiring a third party to perform such corrective action. This estimate, and proof of financial assurance to undertake corrective action, will not be required until such time as a known release has occurred.

(C) The owner or operator of any solid wastes disposal site/facility shall maintain:

(1) A detailed written estimate of the cost of hiring a third party to close such site/facility.

(2) A detailed written estimate of the cost of hiring a third party to conduct post-closure care at such site and facility.

1.8.3 The owner or operator of any solid waste disposal site and facility shall:

(A) Notify the Department when the required cost estimates have been placed in the operating file for such site and facility.

(B) Express the required cost estimates in current dollars.

(C) Annually adjust such cost estimates to account for inflation or deflation by using the implicit price deflator for the gross domestic product or its successor as published by the U.S. Department of Commerce.

(D) Owners or operators of a site and facility must replace original cost estimates with new cost estimates every five (5) years unless otherwise required by the Department.

(E) Cost estimates for closure, post-closure or corrective action may be increased or decreased. Justification for changing the financial assurance must be presented to the Department and the local governing body having jurisdiction, and must be acceptable to Department. Such justification shall be made a permanent part of the operating record of the site and facility.

(F) Financial assurance coverage must be provided continuously until a release is granted by the Department.

1.8.4 (A) On or before April 9, 1997 for facilities accepting greater than 20 tons per day and October 9, 1997 for facilities accepting less than twenty tons per day the owner or operator of each existing solid waste disposal site and facility shall establish financial assurance for the site and facility. An extension to the above dates up to April 9, 1998 may be requested. The owner or operator of each new solid waste disposal site and facility which proposes to begin operation on or after this date shall establish financial assurance for the solid waste disposal site and facility on that date or sixty (60) days prior to initial receipt of waste by the site and facility whichever date is later. Future updated filings must be submitted six months after the close of the governmental or corporate fiscal year if the corporate financial test, local government financial test, or the corporate guarantee is used. All other update filings must be submitted by the anniversary date of the other mechanisms or as established by the Department.

(B) Such financial assurance shall remain in effect until a release is granted by the Department.

(C) Subject to approval by the Department and the governing body having jurisdiction, the owner or operator of a solid wastes disposal site and facility shall use one or more of the following financial mechanisms to financially assure full payment of all closure, post-closure, and if applicable, corrective action estimated costs.

- (1) Trust fund
- (2) Letter of credit
- (3) Surety bond
- (4) Insurance
- (5) Corporate financial test
- (6) Local government financial test
- (7) Corporate guarantee
- (8) Local government guarantee
- (9) State approved mechanism
 - (a) Certificate of Deposit
 - (b) Multiple financial mechanisms
 - (c) Other methods as approved

(D) A certificate of designation may not be transferred to a new owner or operator unless, as part of the process, the assignment or transfer of the financial instrument(s) or alternate financial assurance has been reviewed and approved by the Department and the governing body having jurisdiction.

(E) The Department after consultation with the governing body having jurisdiction will give written consent to the owner or operator that he may terminate the financial assurance mechanism identified in paragraph C of this Section when:

(1) The owner or operator provides alternate financial assurance as specified in this section; or

(2) The Department, after consultation with the local governing body having jurisdiction, releases the owner or operator from the requirements of Section 1.8.1 through 1.8.4; or

(3) All closure, post closure, and if applicable, corrective action requirements, have been completed to the Department satisfaction.

(4) In the event that the owner and operator are separate parties, both will be a part of any discussions prior to the release of the financial instrument.

1.8.5 (A) The Department shall assess a fee per Subsection 1.7.2 to offset the costs of the Department's review of the financial assurance information (per C.R.S. 30-20-104.5, as amended).

(B) If at any time the Department shall determine that an owner or operator has insufficient financial assurance or otherwise is not in full compliance with these regulations or 30-20-104.5 C.R.S., as amended, it shall so notify the owner or operator. If the deficiency or other non-compliance is not corrected within sixty (60) days of this notice, the Department and governing body having jurisdiction may suspend the owner or operator's certificate of designation or the owner or operator's authority to operate all affected sites and facilities until it is satisfied that the deficiency or violation has been satisfactorily corrected.

(C) No release or reimbursement of funds will be made if a known release has occurred at a site/facility and the owner or operator does not then have sufficient financial assurance to implement the corrective action plan for such release. Further, if within ninety (90) days of a known release an owner or operator has not established sufficient financial assurance for that release, the Department shall recommend that the local governing body having jurisdiction suspend or revoke the certificate of designation for the site and facility of the known release. The Department, after consultation with the local governing body having jurisdiction, may then apply closure and post closure trust funds to implement the corrective action plan, and assess the

owner or operator for any deficiency in the closure and post closure trust funds which results.

(D) The Department is authorized to contract with one or more private contractors to conduct the third-party closure, post-closure care, or corrective action at a solid waste disposal site and facility, as may be necessary. The Department is authorized to expend such monies for the third party closure, post-closure, or corrective action as available to the Department from the financial assurance mechanisms provided by the owner or operator of the solid wastes site disposal and facility. Any such contract shall be between the Department and the private contractor and the owner or operator shall not be a party to such contract. The Department may disallow a contractor because of conflicts of interest or other reasons. The Department may contract with the local governing body that issued the certificate of designation to conduct such third party closure, post-closure care, or corrective action.

1.8.6 Trust Fund for Closure and Post Closure

(A) An owner or operator may satisfy the closure and post-closure requirements of this section by establishing a closure and post-closure trust fund which conforms to the requirements of this paragraph. The trustee must be an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency. All trust agreements must be submitted to the Department for prior approval. An owner or operator of a new or existing facility must submit an originally signed duplicate of the trust agreement to the Department per Section 1.8.4(A). The trust agreement shall be approved by the Department only after consultation with the governing body having jurisdiction. A trust fund must contain, at the end of the operating life of the facility, or within twenty years of its approval, sufficient funding to cover the estimated costs of closure and post-closure care.

(B) The trustee, to be validated by the comptroller or banking commission, shall be the trust department of a federal or state chartered bank with capital and surplus of not less than \$10,000,000, selected by the operator and acceptable to the Department. Said bank must be located and legally chartered to operate in one of the fifty (50) states. The trustee shall direct the investment of funds in the trust, using the standard of care of a fiduciary. No funds shall be released, disbursed, or transferred by the trustee from this trust without the express written authorization of the Department after consultation with the governing body having jurisdiction.

(C) The wording of the trust agreement must be identical to the wording specified in Appendix A, and no changes are to be allowed without Department approval, after consultation with the governing body having jurisdiction. The trust agreement must be accompanied by a formal certification of acknowledgment [Appendix A]. Schedule A of the trust agreement must be updated within sixty (60) days after a change in the amount of the current cost estimate covered by the agreement.

(D) Payments into the trust fund by the owner or operator must, at a minimum, be made quarterly over the term of the operating life of the facility or eighty consecutive quarters, whichever period is shorter, as estimated in the closure and post closure plan. This period is hereafter referred to as the "pay-in period". The payments into the trust fund must be made as follows:

(1) For a new facility, the first payment must be made before the initial receipt of waste. A receipt from the trustee for this payment must be submitted by the owner or operator to the Department and local governing body having jurisdiction before this initial receipt of waste.

(2) A receipt for the initial payment must be submitted to the Department by the trustee for both new and existing sites/facilities. The first payment for both new and existing facilities must be at least equal to the current closure and post-closure cost estimate, divided by the number of quarters in the pay-in period.

The amount of each subsequent payment must be determined by this formula:

$$\text{NEXT PAYMENT} = \frac{\text{CE}-\text{CV}}{\text{Y}}$$

Where CE is the current closure and post-closure cost estimate, CV is the current value of the trust fund, and Y is the number of quarters remaining in the pay-in period. After the first four quarters, and annually thereafter, the CE shall be multiplied times the preceding year's annual rate of inflation before subtracting CV.

(3) In lieu of using the formula expressed in Section 1.8.6(D)(2) the equivalent quarterly payments into the trust fund may be determined by calculating the net present value of CE.

(E) The owner or operator may accelerate payments into the trust fund or may deposit the full amount of the current closure and post-closure cost estimate at the time the fund is established, or at any time thereafter.

However, the value of the fund must be maintained at no less than the value that the fund would have if quarterly payments were made as specified in 1.8.6(D).

(F) If the owner or operator establishes a closure and post-closure trust fund after having used one or more alternate mechanisms specified in Section 1.8.4, the first payment must be in at least the amount that the fund would contain if the trust fund were established initially and all quarterly payments had been made.

(G) Whenever the current closure and post-closure cost estimate increases, and is approved by the Department, the owner or operator must recalculate the payments into the trust fund based on the new cost estimate (new CE), retroactive to the first payment into the trust fund. The amount which would have been paid to date into the trust fund, as recalculated with the new CE, must be compared to the trustee's most recent annual valuation of the trust fund. If the current valuation of the fund is less than the amount which would be required when recalculated using the new CE, the owner or operator must, within sixty (60) days of the approval of the new estimate, either deposit an amount into the fund so that its value after this deposit at least equals the amount as calculated with the new CE, or obtain other financial assurance as specified in this section to cover the difference.

(H) During the operating life of the facility, and post-closure care period, if the value of the trust fund is greater than the total amount of the current closure and post-closure cost estimate, the owner or operator may submit a written request with appropriate documentation justifying the request to the Department and the governing body having jurisdiction for the release of the amount in excess of the current closure and post-closure cost estimate. If the Department concurs with the accuracy of the justification, the amount in the trust fund in excess of the current closure and post-closure cost estimates shall be released.

(I) If an owner or operator substitutes other financial assurance as specified in this section for all or part of the trust fund, the owner or operator may submit a written request to the Department for release of the amount in excess of the current closure and post-closure cost estimate covered by the trust fund. The Department will consult with the governing body having jurisdiction before approval of the change.

(J) Within sixty (60) days after receiving a request from the owner or operator for release of funds as specified in this section, the Department will instruct the trustee to release to the owner or operator such funds as the Department specifies in writing.

(K) Closure and Post-Closure Care Reimbursements

(1) After beginning partial or final closure, an owner or operator or another person authorized to conduct partial or final closure may request reimbursements for partial or final closure expenditures by submitting itemized receipts to the Department. The owner or operator may request reimbursements for partial closure only if sufficient funds are remaining in the trust fund to cover the maximum costs of closing the facility over its remaining operating life. Within 60 days after receiving receipts for partial or final closure activities, the Department will instruct the trustee to make reimbursements in those amounts as the Department determines that the partial or final closure expenditures are in accordance with the approved closure plan, or otherwise justified. If the Department has reason to believe that the maximum cost of closure over the remaining life of the facility will be significantly greater than the value of the trust fund, it may withhold reimbursements of such amounts as is deemed prudent until it determines, that the owner or operator is no longer required to maintain financial assurance for final closure of the facility. If the Department does not instruct the trustee to make such reimbursements, it will provide the owner or operator with a detailed written statement of reasons.

(2) An owner or operator or any other person authorized to conduct post-closure care may request reimbursements for post-closure care expenditures by submitting itemized bills to the Department. Within sixty (60) days after receiving bills for post-closure care activities, the Department will instruct the trustee to make reimbursements in those amounts as the Department specifies in writing, if the Department determines that the post-closure care expenditures are in accordance with the approved post-closure plan or otherwise justified. If the Department does not instruct the trustee to make such reimbursements, it will provide the owner or operator with a detailed written statement of reasons.

(3) Where there is one trust fund for both closure and post-closure care, then there will not be any reimbursement for closure costs if there are not sufficient funds to cover both the remaining closure and post-closure care costs.

(L) The Department, after consultation with the local governing body having jurisdiction, shall agree to termination of the trust fund when the requirements of Section 1.8.4(E) have been satisfied and shall release all monies to the owner or operator .

1.8.7 Letter-of-Credit for Closure and Post-Closure

(A) An owner or operator may satisfy the requirements of this section by obtaining an irrevocable standby letter-of-credit which conforms to the requirements of this paragraph. An owner or operator of a new facility must submit the letter of credit to the Department per Section 1.8.4(A) . The letter of credit must be effective before this initial receipt of waste. The issuing institution must have the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency.

(B) A letter-of-credit must be in full conformance with Article 5 of the uniform commercial code, C.R.S. 4-5-101 et seq., as amended.

(C) The wording of the letter-of-credit must be identical to the wording specified in Appendix A.

(D) An owner or operator who uses a letter-of-credit to satisfy the requirements of this section must also establish a standby trust fund, unless an alternate mechanism has been established by the state of Colorado to directly receive monies, or the owner or operator has previously established a trust fund under Section 1.8.6. Under the terms of the letter-of-credit, all amounts paid pursuant to a draft by the Department will be deposited by the issuing institution directly into the standby trust fund, or trust fund, in accordance with instructions from the Department. This standby trust fund must meet the requirements of the trust fund, Subsection 1.8.6, Except that:

- (1) Payments into the trust fund as specified in 1.8.6.
- (2) Updating of Schedule A of the trust agreement to show current closure and post-closure cost estimates.
- (3) Annual valuations as required by the trust agreement; and
- (4) Notices of nonpayment as required by the trust agreement.

(E) The letter-of-credit must be accompanied by a letter from the owner or operator referring to the letter of credit by number, issuing institution, and date, and providing the following information: the EPA identification number, if available, name, and address of the facility, and the amount of funds assured for closure and post-closure of the facility by the letter of credit.

(F) The letter of credit must be irrevocable and issued for a period of at least one (1) year. The letter of credit must provide that the expiration date will be automatically extended for a period of at least one (1) year unless, at least one hundred twenty (120) days before the current expiration date, the issuing institution notifies the owner or operator and the Department and the governing body having jurisdiction by certified mail of a decision not to extend the expiration date. Under the terms of the letter of credit, the one hundred twenty (120) days will begin on the date when the owner or operator and the Department and the local governing body having jurisdiction have received the notice, as evidenced by the return receipts.

(G) The letter of credit must be issued in an amount at least equal to the current closure and post-closure cost estimate, less any amount covered by alternative assurance mechanisms.

(H) Whenever the current closure and post-closure cost estimate increases to an amount greater than the amount of the letter of credit during the term of the letter of credit, the owner or operator, within sixty (60) days after the increase, must either cause the amount of the credit to be increased so that it at least equals the current closure and post-closure cost estimate and submit evidence of such increase to the Department, or obtain other financial assurance as specified in Section 1.8.4 to cover the increase. Whenever the current closure and post-closure cost estimate decreases during the operating life of the facility, the amount of the credit may be reduced to the amount of the current closure and post-closure cost estimate following written approval by the Department after consultation with the local governing body having jurisdiction providing sufficient documentation to justify this action has been submitted to the Department.

(I) Following a determination that the owner or operator has failed to perform final closure or post-closure or corrective action in accordance with the closure or post-closure or corrective action plan and other permit requirements when required to do so, the Department may draw on the letter of credit.

(J) If the owner or operator does not establish alternate financial assurance as specified and obtain written approval of such alternate assurance from the Department, written after consultation with the governing body having jurisdiction within ninety (90) days after receipt by both the owner or operator and the Department of a notice from issuing institution that it has decided not to extend the letter of credit beyond the current expiration date, the Department will draw on the letter of credit. The Department may delay the drawing if the issuing institution grants an extension of the term of the credit. During the last thirty (30) days of any

such extension the Department will draw on the letter of credit if the owner or operator has failed to provide alternate financial assurance as specified in this section and obtain written approval of such assurance from the Department.

(K) The Department will return the letter of credit to the issuing institution for termination when the requirements of Section 1.8.4(E) have been satisfied

1.8.8 Surety Bond Guaranteeing Performance or Payment into a Closure and Post-Closure Trust Fund

(A) An owner or operator may satisfy the requirements of Section 1.8.1 through 1.8.3 by obtaining a surety bond which conforms to the requirements of this paragraph, and submitting the bond to the Department and the local governing body having jurisdiction on or before the effective date of these regulations. An owner or operator of a new facility must submit the bond to the Department and the local governing body having jurisdiction at least ninety (90) business days before the date on which waste is first received. The bond must be effective before this initial receipt of waste. The surety company issuing the bond and any co-sureties must, at a minimum, be among those listed as acceptable sureties on federal bonds in Circular 570 of the U.S. Department of the Treasury, and should be conducting business in Colorado and issue the bond subject to the laws and jurisdiction of the state of Colorado. If the surety is using reinsurance, a treasury reinsurance form must be submitted with the bond or within forty-five (45) days thereafter. If co-sureties are being used, the original bond must reflect that fact.

(B) The wording of the surety bond must be identical to the wording in Appendix A.

(C) The owner or operator who uses a surety bond to satisfy the requirements of this section must also establish a standby trust fund, unless there has been an alternate mechanism established by the State of Colorado to directly receive monies, or the owner or operator has previously established a trust fund under 1.8.6. Under the terms of the bond, all payments made thereunder will be deposited by the surety directly into the standby trust fund, or other trust fund, in accordance with the instructions from the Department. This standby trust fund must meet the requirements of the trust fund, Section 1.8.6, except that:

(1) Payments into the trust fund as specified in 1.8.6.

- (2) Updating of Schedule A of the trust agreement to show current closure and post-closure cost estimates.
 - (3) Annual valuations as required by the trust agreement; and
 - (4) Notices of nonpayment as required by the trust agreement.
- (D) The bond must guarantee that the owner or operator will:
- (1) Fund the applicable trust fund in an amount equal to the penal sum of the bond before the beginning of final closure of the facility; or
 - (2) Fund the standby trust fund in an amount equal to the penal sum within fifteen (15) days after an order to begin closure is issued by the Department or local governing body having jurisdiction or state court or other court of competent jurisdiction; or
 - (3) Provide alternate financial assurance as specified in Section 1.8.4, and obtain the approval of the Department within (90) days after receipt by the owner or operator and the Department of a notice of cancellation of the bond from the surety. Prior to approving the alternate financial assurance, the Department shall consult with the local governing body having jurisdiction.
- (E) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond.
- (F) The penal sum of the bond must be in an amount at least equal to the current closure and post-closure cost estimate, less amounts covered by alternative mechanisms.
- (G) Whenever the current closure and post-closure cost estimate increases to an amount greater than the penal sum, the owner or operator, within sixty (60) days after the increase, must either cause the penal sum to be increased to an amount at least equal to the current closure and post-closure cost estimate and submit evidence of such increase to the Department and local governing body having jurisdiction or obtain other financial assurance as specified in this section to cover the increase.
- (H) Whenever the current closure and post-closure cost estimate decreases, the penal sum may be reduced to the amount of the current closure and post-closure cost estimate following the submittal of sufficient justification to the Department and local governing body having jurisdiction

and written approval by the Department.

(I) Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the owner or operator and to the Department and the governing body having jurisdiction. Cancellation may not occur until one hundred twenty (120) days after the notice of cancellation has been received by both the owner or operator and the Department, as evidenced by the return receipts.

(J) Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the owner or operator and to the Department and the governing body having jurisdiction. Cancellation may not occur until one hundred twenty (120) days after the notice of cancellation has been received by both the owner or operator, the Department, and the local governing body having jurisdiction, as evidenced by the return receipts.

(K) The owner or operator may cancel the bond if the Department after consultation with the governing body having jurisdiction have given prior written consent.

1.8.9 Insurance for Closure and Post-Closure

(A) An owner or operator of a facility may satisfy the requirements of this section by obtaining closure and post-closure insurance which conforms to the requirements of this paragraph and submitting a certificate of such insurance to the Department and the governing body having jurisdiction upon the effective date of these regulations. An owner or operator of a new facility must submit the certificate of insurance to the Department and the local governing body having jurisdiction at least ninety (90) business days before the date on which waste is first received. The insurance must be effective before this initial receipt of waste. At a minimum, the insurer must be licensed to transact the business of insurance or be eligible to provide insurance as an excess or surplus lines insurer, and comply with the Title 10 Insurance Code, C.R.S., as amended. The insurance company must be conducting business in Colorado and assure the policy is subject to the laws and jurisdiction of the State of Colorado.

(B) The wording of the certificate of insurance must be identical to the wording specified in Appendix A.

(C) The closure and post-closure insurance policy must be issued for a face amount at least equal to the current closure and post-closure cost estimate. The term "face amount" means the total amount the insurer is

obligated to pay under the policy. Actual payments by the insurer will not change the face amount, although the insurer's future liability will be lowered by the amount of the payments.

(D) The Closure and Post-Closure Insurance Policy

(1) Must guarantee that funds will be available to close and provide post-closure care of the facility whenever final closure and post-closure occurs. The policy must also guarantee that once final closure and post-closure begins, the insurer will be responsible for paying out funds, up to an amount equal to the face amount of the policy, upon the direction of the Department, after consultation with the local governing body having jurisdiction to such party or parties as the Department specifies.

(2) If the owner or operator wishes to pay for closure and post-closure activities directly, without accessing the insurance coverage, this may be done after receiving written approval by the Department after consultation with the local governing body having jurisdiction. All terms, limits and other applicable information must accompany this approval.

(E) Closure and Post-Closure Care Reimbursements

(1) After beginning partial or final closure and post-closure, an owner or operator or another person authorized to perform closure and/or post-closure may request reimbursements for closure and/or post-closure expenditures by submitting itemized receipts to the Department. The owner or operator may request reimbursements for partial closure only if the remaining value of the policy is sufficient to cover maximum costs of closing the facility over its remaining operating life. Within sixty (60) days after receiving receipts for closure activities, the Department will instruct the insurer to make reimbursements in such amounts as the Department specifies in writing if the Department after consultation with the local governing body having jurisdiction determines that the partial or final closure expenditures are in accordance with the approved closure plan, or otherwise justified. If the Department has reason to believe that the maximum cost of closure over the remaining life of the facility will be significantly greater than the face amount of the policy, it may withhold reimbursements of such amounts as it deems prudent until it determines, that the owner or operator is no longer required to maintain financial assurance for final closure of the facility. If the Department does not instruct the insurer to make such reimbursements, it will provide the owner or operator with a detailed written statement of reasons.

(2) An owner or operator or any other person authorized to conduct post-closure care may request reimbursements for post-closure care expenditures by submitting itemized receipts to the Department. Within sixty (60) days after receiving receipts for post-closure care activities, the Department will instruct the insurer to make reimbursements in those amounts as the Department specifies in writing, if the Department after consultation with the local governing body having jurisdiction determines that the post-closure care expenditures are in accordance with the approved post-closure plan or otherwise justified. If the Department does not instruct the insurer to make such reimbursements, he will provide the owner or operator with a detailed written statement of reasons.

(F) Where there is one insurance policy for both closure and post-closure care, then there will not be any reimbursement for closure costs if there are not sufficient funds to cover both the remaining closure and post-closure care costs.

(G) The owner or operator must maintain the policy in full force and effect until the Department in consultation with the governing body having jurisdiction consents to termination of the policy by the owner or operator as specified in this section. Failure to pay the premium, without substitution of alternate financial assurance as specified in this section, will constitute a violation of these regulations, warranting such remedy as the Department in consultation with the local governing body having jurisdiction deems necessary. Such violation will be deemed to begin upon receipt by the Department and the local governing body having jurisdiction of a notice of future cancellation, termination, or failure to renew due to nonpayment of the premium, rather than upon the date of expiration.

(H) Each policy must contain a provision allowing assignment of the policy to a successor owner or operator. Such assignment may be conditional upon consent of the insurer, provided such consent is not unreasonably refused.

(I) The policy must provide that the insurer may not cancel, terminate, or fail to renew the policy except for failure to pay the premium. The automatic renewal of the policy must, at a minimum, provide the insured with the option of renewal at the face amount of the expiring policy. If there is a failure to pay the premium, the insurer may elect to cancel the policy by sending notice of cancellation by certified mail to the owner or operator and the Department or governing body having jurisdiction one hundred twenty (120) days in advance of cancellation.

(J) If the insurer cancels the policy the owner or operator must obtain financial assurance as determined in 1.8.4. Cancellation, termination, or failure to renew may not occur and the policy will remain in full force and effect in the event that on or before the date of expiration:

(1) The Department after consultation with the local governing body having jurisdiction deems the facility abandoned; or

(2) The certificate of designation is terminated or revoked or a new permit is denied; or

(3) Closure is ordered by the Department or the local governing body having jurisdiction or a State or other court of competent jurisdiction; or

(4) The owner or operator is named as debtor in a voluntary or involuntary proceeding under Title 11 (bankruptcy), U.S. Code; or

(5) The premium due is paid.

(K) All premiums shall be paid annually and proof of payment shall be supplied to the Department and to the governing body having jurisdiction.

(L) Whenever the current closure and post-closure cost estimate increases to an amount greater than the face amount of the policy during the operating life of the facility, the owner or operator, within sixty (60) days after the increase, must either cause the face amount to be increased to an amount at least equal to the current closure and post-closure cost estimate and submit evidence of such increase to the Department and the local governing body having jurisdiction, or obtain other financial assurance as specified in this section to cover the increase. Whenever the current closure and post-closure cost estimate decreases during the operating life of the facility, the face amount may be reduced to the amount of the current closure and post-closure cost estimate following written approval by the Department after consultation with the local governing body having jurisdiction, providing that sufficient justification has been submitted to the Department and the local governing body having jurisdiction.

(M) Commencing on the date that liability to make payments pursuant to the post-closure insurance policy accrues, the insurer will thereafter annually increase the face amount of the policy. Such increase must be equivalent to the face amount of the policy, less any payments made, multiplied by an amount equivalent to 85 percent of the most recent investment rate or of the equivalent coupon-issue yield announced by the U.S. Treasury for 26-week treasury securities.

(N) The Department will give written consent to the owner or operator that he may terminate the insurance policy when the requirements of Section 1.8.4(E) have been satisfied.

1.8.10 Corporate Financial Test

An owner or operator that satisfies the requirements of paragraphs 1.8.10(A) through 1.8.10(c) of this section may demonstrate financial assurance up to the amount specified in paragraph c of this section:

(A) Financial component.

(1) The owner or operator must satisfy one of the following three conditions:

(a) A current rating for its senior unsubordinated debt of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A or Baa as issued by Moody's; or

(b) A ratio of less than 1.5 comparing total liabilities to net worth; or

(c) A ratio of greater than 0.10 comparing the sum of net income plus depreciation, depletion and amortization, minus \$10 million, to total liabilities.

(2) The tangible net worth of the owner or operator must be greater than:

(a) The sum of the current closure, post-closure care, corrective action cost estimates and any other environmental obligations, including guarantees, covered by a financial test plus \$10 million except as provided in paragraph 1.8.10(A)(2)(b) of this section.

(b) \$10 million in net worth plus the amount of any guarantees that have not been recognized as liabilities on the financial statements provided all of the current closure, post-closure care, and corrective action costs and any other environmental obligations covered by a financial test are recognized as liabilities on the owner's or operator's audited financial statements, and subject to the approval of the Department.

(3) The owner or operator must have assets located in the United States amounting to at least the sum of current closure, post-closure care, corrective action cost estimates and any other environmental obligations covered by a financial test as described in paragraph 1.8.10 (c) of this section.

(B) Record keeping and reporting requirements.

(1) The owner or operator must place the following items into the facility's operating record:

(a) A letter signed by the owner's or operator's chief financial officer that:

(i) Lists all the current cost estimates covered by a financial test, including, but not limited to, cost estimates required for solid waste management facilities under 1.8 of these regulations and cost factors for all other environmental obligations, if applicable; and

(ii) Provides evidence demonstrating that the owner/operator meets the conditions of either paragraph 1.8.10(A)(1)(a), or (b), or (c) of this section and paragraphs 1.8.10(A)(2) and 1.8.10(A)(3) of this section.

(b) A copy of the independent certified public accountant's unqualified opinion of the owner's or operator's financial statements for the latest full fiscal year. To be eligible to use the financial test, the owner's or operator's financial statements must receive an unqualified opinion from the independent certified public accountant. An adverse opinion, disclaimer of opinion, or other qualified opinion will be cause for disallowance, with the potential exception for qualified opinions provided in the next sentence. The Department may evaluate qualified opinions on a case-by-case basis and allow use of the financial test in cases where the Department deems that the matters which form the basis for the qualification are insufficient to warrant disallowance of the financial test. If the Department does not allow use of the test, the owner or operator must provide alternate financial assurance that satisfies the requirements of this section.

(C) If the chief financial officer's letter providing evidence of financial assurance includes financial data showing that owner or operator satisfies paragraph 1.8.10(A)(1)(b) or (c) of this section that are different from data in the audited financial statements referred to in paragraph 1.8.10(B)(1) and (2) of this section or any other audited financial statement or data filed with the Securities and Exchange Commission, then a special report from the owner's or operator's independent certified public accountant is required. The special report shall be based upon an agreed upon procedures of engagement in accordance with professional auditing standards and shall describe the procedures performed in comparing the data in the chief financial officer's letter derived from the independently audited, year-end financial statements for the latest fiscal year with the amounts in such financial statements, the findings of that comparison, and the reasons for any differences.

(D) If the chief financial officer's letter provides a demonstration that the solid waste disposal site and facility has provided financial assurance for environmental obligations as provided in paragraph 1.8.10(A)(2)(b) of this section, then the letter shall include a report from the independent certified public accountant that verifies that all of the environmental obligations covered by a financial test have been recognized as liabilities on the audited financial statements, how these obligations have been measured and reported, and that the tangible net worth of the firm is at least \$10 million plus the amount of any guarantees provided.

(2) An owner or operator must place the items specified in paragraph 1.8.10(B)(1) of this section in the operating record and send a copy to the Department indicating that these items have been placed in the operating record before the initial receipt of waste or before the effective date of the requirements of this section, whichever is later in the case of closure, and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of these regulations.

(3) After the initial placement of items specified in paragraph 1.8.10(B)(1) of this section in the operating record, the owner or operator must annually update the information and place updated information in the operating record and send a copy to the Department within 90 days following the close of the owner or operator's fiscal year. The Department may provide up to an additional 45 days for an owner or operator who can demonstrate that 90 days is insufficient time to acquire audited financial statements. The updated information must consist of all items specified in paragraph 1.8.10(B)(1) of this section.

(4) The owner or operator is no longer required to submit the items specified in this paragraph 1.8.10(B) or comply with the requirements of this paragraph 1.8.10 when:

(a) The owner or operator substitutes alternate financial assurance as specified in this section that is not subject to these record keeping and reporting requirements; or

(b) the owner or operator is released from the requirements of this section in accordance with these regulations.

(5) If the owner or operator no longer meets the requirements of paragraph 1.8.10(A) of this section, the owner or operator shall, within 120 days following the close of the owner or operator's fiscal year, obtain alternative financial assurance satisfy the requirements of this section, place the required submissions for assurance in the operating record, and notify the Department that the owner or operator no longer meets the criteria of the financial test and that alternate financial assurance has been obtained.

(6) The Department may, based on a reasonable belief that the owner or operator no longer meet the requirements of paragraph 1.8.10(A) of this section, require at any time the owner or operator to provide reports of its financial condition in addition to or including current financial test documentation as specified in paragraph 1.8.10(B) of this section. If the Department finds that the owner or operator no longer meets the requirements of paragraph 1.8.10(A) of this section, the owner or operator must provide alternate financial assurance that meets the requirements of this section.

(7) Calculation of costs to be assured. When calculating the current cost estimates for closure, post-closure care, corrective action, or the sum of the combination of such costs to be covered, and any other environmental obligations assured by a financial test referred to in this section 1.8.10, the owner or operator must include cost estimates required for municipal solid waste management facilities under this part, as well as cost estimates required for other environmental obligations, if applicable.

1.8.11 Local Government Financial Test An owner or operator that satisfies the requirements of paragraphs A, B and c of this section may demonstrate financial assurance up to the amount specified in paragraph D of this section:

(A) Financial Component

(1) The owner or operator must satisfy one of the following:

(a) If the owner or operator has outstanding, rated, general obligation bonds, that are not secured by insurance, a letter of credit, or other collateral or guarantee, it must have a current rating of Aaa, Aa, A, or Baa, as issued by Moody's, or AAA, AA, A, or BBB, as issued by Standard and Poor's on all outstanding general obligation bonds; or,

(b) The owner or operator must satisfy each of the following financial ratios based on the owner or operator's most recent audited annual financial statement:

(i) A ratio of cash plus marketable securities to total expenditures greater than or equal to 0.05; and

(ii) A ratio of annual debt service to total expenditures less than or equal to 0.20; and

(2) The owner or operator must prepare its financial statements and have them audited in conformity with generally accepted accounting principles for

governments and have its financial statements audited by an independent certified public accountant.

(3) A local government is not eligible to assure its obligations under this paragraph 1.8.11(A) if it:

(a) Is currently in default on any outstanding general obligation bonds,

(b) Has an outstanding general obligation bond rated lower than Baa as issued by Moody's or BBB as issued by Standard and Poor's, or

(c) Operated at a deficit equal to five percent or more of total annual revenue in each of the past two fiscal years, unless the owner or operator demonstrates, through the submission of an auditor's statement to the Department, that the accedence of this deficit restriction was caused by expenditures from specific funds previously set aside and budgeted in prior fiscal years and not by general expenditures for the applicable fiscal year exceeding total annual revenue by an amount equal to or greater than five percent, or

(d) Receives an adverse opinion, disclaimer of opinion, or other qualified opinion from the independent certified public accountant (or appropriate State agency) auditing its financial statement as required under paragraph 1.8.11A(2) of this section. However, the Department may evaluate qualified opinions on a case-by-case basis and allow use of the financial test in cases where the Department deems the qualification insufficient to warrant disallowance of the test.

(B) Public Notice Component The local government owner or operator must place a reference to the closure, post-closure care, or corrective action costs assured through the financial test into its next comprehensive annual financial report (CAFR) or audited financial statement after the effective date of this section or prior to the initial receipt of waste at the facility, whichever is later. Disclosure must include the nature and source of closure and post-closure care requirements, the reported liability at the balance sheet date, the estimated total closure and post-closure care costs remaining to be recognized, the percentage of landfill capacity used to date, and the estimated landfill life in years. A reference to corrective action costs must be placed in the CAFR not later than 120 days after the corrective action remedy has been selected in accordance with the requirements of these regulations for the first year the financial test issued to assure costs at a particular facility, the reference may instead be placed in the operation record until issuance of the next available CAFR if timing does not permit the reference to be incorporated into the most recently issued CAFR or budget. For closure and post-closure costs, conformance with Government Accounting

Standards Board Statement 18 assures compliance with this public notice. The reference must include the amount of each cost-estimate and the year(s) in which the local government expects these costs to be incurred. References in the budget must occur as budgeted line items if the activities are to occur in the period covered by the budget, but may appear in a supplemental data section if the activities will not occur until after the period covered by the budget.

(C) Recordkeeping and Reporting Requirements

(1) The local government owner or operator must place the following items in the facility's operating record and deliver a copy to the Department:

(a) A letter signed by the local government's chief financial officer that:

(i) Lists all the current cost estimates covered by a financial test, as described in paragraph 1.8.11(B) of this section;

(ii) Provides evidence and certifies that the local government meets the conditions of paragraphs 1.8.11A(1), 1.8.11A(2), and 1.8.11A(3) of this section; and

(iii) Certifies that the local government meets the conditions of paragraph 1.8.11(D) of this section.

(b) The local government's independently audited year-end financial statements for the latest fiscal year, including the unqualified opinion of the auditor who must be an independent, certified public accountant or an appropriate State agency that conducts equivalent comprehensive audits; and

(2) The items required in paragraph 1.8.11(c)(1)(a) of this section must be placed in the facility operating record as follows:

(a) In the case of closure and post-closure care, either before April 9, 1997, or prior to the initial receipt of waste at the facility, whichever is later, or

(b) In the case of corrective action, not later than 120 days after the corrective action remedy is selected in accordance with the requirements of Section 2.2 and Appendix B6.

(3) After the initial placement of the items in the facility's operating record, the local government owner or operator must update the information and place the updated information in the operating record within six (6) months following the close of the owner or operator's fiscal year.

(4) The local government owner or operator is no longer required to meet the requirements of paragraph 1.8.11(c) of this section when:

(a) The owner or operator substitutes alternate financial assurance as specified in paragraph 1.8.11(c)(5) of this section; or

(b) The owner or operator is released from the requirements of this section in accordance with Sections 1.8.3(F) and 1.8.4(B).

(5) A local government must satisfy the requirements of the financial test at the close of each fiscal year. If the local government owner or operator no longer meets the requirements of the local government financial test it must, within 210 days following the close of the owner or operator's fiscal year, obtain alternative financial assurance that meets the requirements of section 1.8, place the required submissions for that assurance in the operating record, and notify the Department that the owner or operator no longer meets the criteria of the financial test and that alternate assurance has been obtained.

(6) The Department, based on a reasonable belief that the local government owner or operator may no longer meet the requirements of the local government financial test, may require additional reports of financial condition from the local government at any time. If the Department finds, on the basis of such reports or other information, that the owner or operator no longer meets the requirements of the local government financial test, the local government must provide alternate financial assurance in accordance with paragraph 1.8.11(C)c5) of this section.

(7) A report to the local government from the local government's independent certified public accountant (CPA) based on performing agreed upon procedures engagement relative to the financial ratios required by 1.8.11(A)(1)(B)(I) and (ii), if applicable, and the requirements of 1.8.11(A)(2) and 1.8.11(A)(3)(C) and 1.8.11(A)(3)(D). The CPA report should state the procedures performed and the CPA findings; and a copy of the comprehensive annual financial report (CAFR) used to comply with this section and (6) or certification that the requirements of General Accounting Standards Board Statement 18 have been met. The special report should state the auditor conducted the following agreed-upon procedures:

(a) Conduct a comparison between

(i) The data and statements contained in the CFO letter and

(ii) The data and statements contained in the local government's audited financial statements for the most recently completed fiscal year.

(b) Found that the data and statements presented in the CFO letter were taken directly, or appropriately derived, from the corresponding data in the audited financial statements.

(c) Recomputed totals and percentages used in calculating the conditions of the local government financial test.

(D) Calculation of Costs to be Assured The portion of the closure, post-closure, and corrective action costs for which an owner or operator can assure under this paragraph is determined as follows:

(1) If the local government owner or operator does not assure other environmental obligations through a financial test, it may assure closure, post-closure, and corrective action costs that equal up to 43 percent of the local government's total annual revenue.

(2) If the local government assures other environmental obligations through a financial test it must add those costs to the closure, post-closure, and corrective action costs it seeks to assure under this Section 1.8.11(D). The total must not exceed 43 percent of the local government's total annual revenue.

(3) The owner or operator must obtain an alternate financial assurance instrument for those costs that exceed the limits set in paragraphs 1.8.11(D)(1) and (2) of this section.

1.8.12 Corporate Guarantee.

(A) An owner or operator may meet the requirements of this section by obtaining a written guarantee. The guarantor must be the direct or higher-tier parent corporation of the owner or operator, a firm whose parent corporation is also the parent corporation of the owner or operator, or a firm with a "substantial business relationship" with the owner or operator. The guarantor must meet the requirements for owners or operators in section 1.8.10 and must comply with the terms of the guarantee. A certified copy of the guarantee must be placed in the facility's operating record along with copies of the letter from the guarantor's chief financial officer and accountants' opinions. If the guarantor's parent corporation is also the parent corporation of the owner or operator, the letter from the guarantor's chief financial officer must describe the value received in consideration of the guarantee. If the guarantor is a firm with a "substantial business relationship" with the owner or operator, this letter must describe this "substantial business relationship" and the value received in consideration of the guarantee.

(B) The guarantee must be effective and all required submissions placed in the operating record and a copy submitted to the Department before the initial receipt of waste or before the effective date of the requirements of these regulations whichever is later, in the case of closure and post-closure care, or in the case of corrective action no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of these regulations.

(C) The terms of the guarantee must provide that:

(1) If the owner or operator fails to perform closure, post-closure care, and/or corrective action of a facility covered by the guarantee, the guarantor will:

(a) Perform, or pay a third party to perform, closure, post-closure care, and/or corrective action as required (performance guarantee); or

(b) Establish a fully funded trust fund as specified in paragraph 1.8.6 of this section in the name of the owner or operator (payment guarantee).

(2) The guarantee will remain in force for as long as the owner or operator is required to comply with the applicable financial assurance requirements or unless the guarantor sends prior notice of cancellation by certified mail to the owner or operator and to the Department. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the Department, as evidenced by the return receipts.

(3) If notice of cancellation is given, the owner or operator must, within 90 days following receipt of the cancellation notice by the owner or operator and the Department, obtain alternate financial assurance, place evidence of that alternate financial assurance in the facility operating record, and notify the Department. If the owner or operator fails to provide alternate financial assurance within the 90-day period, the guarantor must provide that alternate assurance within 120 days of the cancellation notice, obtain alternative assurance, place evidence of the alternate assurance in the facility operating record, and notify the Department.

(D) If a corporate guarantor no longer meets the requirements of paragraph 1.8.10(A) of this section, the owner or operator must, within 90 days, obtain alternative assurance, place evidence of the alternate assurance in the facility operating record, and notify the Department. If the owner or operator fails to provide alternate financial assurance within the 90-day period, the guarantor must provide that alternate assurance within the next 30 days.

(E) The owner or operator is no longer required to meet the requirements of this 1.8.12 when:

(1) The owner or operator substitutes alternate financial assurance as specified in this section; subject to Department approval or

(2) The owner or operator is released by the Department from the requirements of this section in accordance with these regulations.

1.8.13 Local Government Guarantee

An owner or operator may demonstrate financial assurance for closure, post-closure, and corrective action, as required by Sections 1.8.1 through 1.8.5, by obtaining a written guarantee provided by a local government. The guarantor must meet the requirements of the local government financial test in paragraph 1.8.11 of this section, and must comply with the terms of a written guarantee.

(A) Terms of the Written Guarantee The guarantee must be effective before the initial receipt of waste or before the effective date of this section, whichever is later, in the case of closure, post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of Section 2.2 and Appendix B6. The guarantee must provide that:

(1) If the owner or operator fails to perform closure, post-closure care, and/or corrective action of a facility covered by the guarantee, the guarantor will:

(a) Perform, or pay a third party to perform, closure, post-closure care, and/or corrective action as required; or

(b) Establish a fully funded trust fund as specified in paragraph 1.8.6 of this section in the name of the owner or operator.

(2) The guarantee will remain in force unless the guarantor sends notice of cancellation by certified mail to the owner or operator and to the Department. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the Department, as evidenced by the return receipts.

(3) If a guarantee is canceled, the owner or operator must, within 90 days following receipt of the cancellation notice by the owner or operator and the Department, obtain alternate financial assurance, place evidence of that alternate financial assurance in the facility operating record, and notify the Department. If the owner or operator fails to provide alternate financial assurance within the 90-day period, the guarantor must provide that alternate assurance within 120 days following the guarantor's notice of cancellation, place

evidence of the alternative assurance in the facility operating record, and notify the Department.

(B) Recordkeeping and Reporting

(1) The owner or operator must place a certified copy of the guarantee along with the items required under paragraph 1.8.11(c) of this section into the facility's operating record before the initial receipt of waste or before the effective date of this section, whichever is later, in the case of closure, post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of Section 2.2 and Appendix B6.

(2) The owner or operator is no longer required to maintain the items specified in Section 1.8.13 when:

(a) The owner or operator substitutes alternate financial assurance as specified in this Section 1.8; or

(b) The owner or operator is released from the requirements of this section in accordance with Sections 1.8.3(F), 1.8.4(B) and 1.8.18.

(3) If a local government guarantor no longer meets the requirements of paragraph 1.8.11 of this section, the owner or operator must, within 90 days following the close of the guarantor's fiscal year, obtain alternative assurance, place evidence of the alternate assurance in the facility operating record, and notify the Department. If the owner or operator fails to provide alternate financial assurance within the 90-day period, the guarantor must provide that alternate assurance within next 30 days.

(4) A local government guarantor must satisfy the requirements for the local government guarantee at the close of each fiscal year. A demonstration that the local government meets all requirements of the local government guarantee under this section of the regulations must be placed in the operating records and with the Department within 180 days following the close of the guarantor's fiscal year.

1.8.14 Certificate of Deposit for Closure and Post-Closure

(A) An owner or operator may satisfy the requirements of this section by establishing a Certificate of Deposit which conforms to the requirements. An owner or operator of a new or existing facility must submit the original Certificate of Deposit to the Department per Section 1.8.4(A). The Certificate of Deposit must be effective before the initial receipt of solid waste. The issuing institution must have the authority to issue Certificate of Deposits and whose operations must be

regulated, insured, and examined by a federal or state agency.

(B) The issuing institution, to be validated by the comptroller or banking commission, shall be a federal or state chartered bank with capital and surplus of not less than \$10,000,000, selected by the operator and acceptable to the Department. Said bank must be located and legally chartered to operate in one of the fifty (50) states. The institution shall direct the investment of funds in the Certificate of Deposit, using the standard of care of a fiduciary. No funds shall be released, disbursed, or transferred by the institution from this Certificate of Deposit without the express written authorization of the Department after consultation with the local governing body having jurisdiction.

(C) The wording of the Certificate of Deposit must be identical to the wording specified in Appendix A, unless otherwise approved by the Department.

(D) Payments made with the Certificate of Deposit must comply with the provisions of Section 1.8.6(D), (E), (F), and (G) except for the following:

(1) The “pay-in period” shall be made yearly over the term of the operating life of the solid waste disposal site and facility or 20 consecutive years, whichever period is shorter, as estimated by the closure and post-closure plan.

(2) The Certificate of Deposit shall be issued for a period of one year and shall be automatically renewable with interest added to the principal.

(3) The owner or operator will notify the Department and the bank of the amount that the Certificate of Deposit will be increased to within thirty (30) days of the annual maturity of the Certificate of Deposit due to the annual payment and the inflationary adjustment as determined in Section 1.8.3(c).

(E) The owner or operator who uses a Certificate of Deposit to satisfy the requirements of this section must also establish a standby trust fund, unless the Department has approved the use of an alternate mechanism established by the State of Colorado to directly receive monies, or the owner or operator has previously established a trust fund under Section 1.8.6. Under the terms of the Certificate of Deposit, all amounts paid pursuant to a draft by the Department will be deposited by the issuing institution directly into the standby trust fund or authorized State fund, in accordance with instructions from the Department. This standby trust fund must meet the requirements of the trust fund, Section 1.8.6, except that:

(1) Payments into the trust fund as specified in 1.8.6.

(2) Updating of schedule a of the trust agreement to show current closure and post-closure cost estimates.

(3) Annual valuations as required by the trust agreement; and

(4) Notices of nonpayment as required by the trust agreement.

(F) The Certificate of Deposit must be accompanied by a letter from the owner or operator referring to the Certificate of Deposit by number, issuing institution, and date, and providing the following information: the EPA identification number, if available; name and address of the facility; and the amount of funds assured for closure and post-closure of the facility by the Certificate of Deposit.

(G) The Certificate of Deposit must provide that the expiration date will be automatically extended, at least sixty (60) days before the current expiration date, the issuing institution notifies the owner or operator and the Department and the governing body having jurisdiction by certified mail of a decision not to extend the expiration date. Under the terms of the Certificate of Deposit, the sixty (60) days will begin on the date when the owner or operator and the Department and the local governing body having jurisdiction have received the notice, as evidenced by the return receipts. The issuing institution shall give thirty (30) day notification of maturity of the Certificate of Deposit to the Department and the owner or operator.

(H) The issue amount of the Certificate of Deposit must be in an amount at least equal to the current closure and post-closure cost estimate, less amounts covered by alternative mechanisms.

(I) Whenever the current closure and post-closure cost estimate increases to an amount greater than the issued amount during the term of the Certificate of Deposit, the owner or operator, within sixty (60) days after the increase, shall increase the issued amount of the Certificate of Deposit so that it is at least equal to the current closure and post-closure cost estimate and submit evidence of such increase to the Department and local governing body having jurisdiction, or obtain other financial assurance as specified in this section.

(J) Whenever the current closure and post-closure cost estimate decreases during the operating life of the facility, the amount of the Certificate of Deposit may be reduced to the amount of the current closure and post-closure cost estimate following approval by the Department after consultation with the local governing body having jurisdiction and written approval by the Department. Reimbursements from the authorized State fund for closure, post-closure, or corrective action shall satisfy the requirements of Section 1.8.6(K).

(K) Following a determination that the owner or operator has failed to perform final closure or post-closure or corrective action in accordance with the closure or post-closure or corrective action plan and other permit requirements when required to do so, the Department may draw on the Certificate of Deposit.

(L) If the owner or operator does not establish alternate financial assurance as specified, and obtain written approval of such alternate assurance from the Department, after consultation with the local governing body having jurisdiction, within forty-five (45) days after receipt by both the owner or operator and the Department of a notice from issuing institution that it has decided not to extend the Certificate of Deposit beyond the current expiration date, the Department will draw on the Certificate of Deposit. The Department may delay the drawing if the issuing institution grants an extension of the term of the Certificate of Deposit. During the last thirty (30) days of any such extension the Department shall withdraw from the Certificate of Deposit if the owner or operator has failed to provide alternate financial assurance as specified in this section and obtain written approval of such assurance from the Department.

(M) The Department will return the Certificate of Deposit to the issuing institution for termination when the requirements of Section 1.8.4(E) have been satisfied.

1.8.15 Use of Multiple Financial Mechanisms An owner or operator may satisfy the requirements of this section by establishing more than one financial mechanism per facility. The mechanisms must be as specified in 1.8.4, of this section, except that it is the combination of mechanisms, rather than the single mechanism, which must provide full financial assurance for an amount at least equal to the current closure and post-closure cost estimates. If an owner or operator uses a trust fund in combination with a surety bond or a letter of credit, he may use the trust fund as the standby trust fund for the other mechanisms. A single standby trust fund may be established for two or more mechanisms. The amount of financial assurance for each financial mechanism shall be stated on each agreement per these regulations. When use of a financial mechanism for closure and post-closure care of the facility becomes necessary, the Department after consultation with the local governing body having jurisdiction may choose the order in which to use the mechanisms or may choose to use all concurrently.

1.8.16 Other Methods Approved by the Department The Department may, on a case by case basis, approve the use of a financial assurance mechanism other than those provided for in Sections 1.8.6, 1.8.7, 1.8.8, 1.8.9, 1.8.11 and 1.8.13 to assure payment of closure, post-closure and corrective action

costs, provided the alternative financial assurance mechanism proposed by the owner or operator of the facility provides equivalent or better financial assurance that the costs of closure, post-closure and corrective action will be completely covered. An owner or operator of a facility requesting approval of an alternative financial assurance mechanism must provide all information in support of its request which the Department finds necessary to adequately evaluate the alternative financial assurance mechanism.

- 1.8.17 Use of a Financial Mechanism for Multiple Facilities An owner or operator may use a financial assurance mechanism specified in Section 1.8.4. to meet the requirements of more than one facility; provided, however, that all solid waste facilities are located in Colorado and the owner and operator are the same.

All solid waste facilities under a multiple financial instrument must be located in Colorado. The owner and operator must be the same for all facilities unless special approval of the Department after consultation with the governing body having jurisdiction is first obtained. Evidence of financial assurance submitted to the Department and the local governing body having jurisdiction must include a list showing, for each facility, the EPA identification number, name, address, and the amount of funds for closure assured by the mechanism. The amount of funds available through the mechanism must be no less than the sum of funds that would be available if a separate mechanisms have been established and maintained for each facility. In directing funds available through the mechanism for closure and post-closure of any of the facilities covered by the mechanism, the Department after consultation with the local governing body having jurisdiction may direct only the amount of funds designated for that facility, unless the owner or operator agrees to the use of additional funds available under the mechanism.

- 1.8.18 Release of the Owner or Operator from the Requirements of this Section After receiving certifications from the owner or operator and an Colorado registered professional engineer that final closure and post-closure has been completed in accordance with the approved closure plan the Department shall verify that the closure/post-closure meets the requirements as established. The Department and the governing body having jurisdiction will consult prior to the decision of the Department that financial assurance is no longer required. Notification shall be in writing.

If there is reason to believe that the closure/post-closure activities have not been made in accordance with the approved plan(s), the Department shall

provide the owner or operator with a detailed written statement of any deficiencies.

- 1.8.19 No certificate of designation shall be effective unless and until the required financial assurance mechanism has been fully implemented as required by this Subsection 1.8. Failure to properly maintain financial assurance as required by this Subsection 1.8 and the certificate of designation may result in the suspension or revocation of the certificate of designation.

1.9 INSPECTIONS - ENFORCEMENT - CIVIL PENALTY

1.9.1 Inspections of Solid Waste Disposal Sites and Facilities. Solid waste disposal sites and facilities as well as any property, premises or place where the Department reasonably believes that solid waste may be located, based on information provided to the Department, discovered by the Department during inspection, or otherwise in the possession of the Department, may be inspected by authorized representatives of the Department to evaluate compliance with the Solid Waste Disposal Act, Sections 30-20-100.5 et seq, C.R.S. ("the Act"), any subsequent rule or regulation, or the approved design and operations report issued as part of the certificate of designation or a previously issued compliance order.

(A) Authorized representatives of the Department shall have access to all such sites and facilities during normal business hours.

(B) Inspections shall be made upon consent or pursuant to a search warrant issued by the Colorado District Court in the judicial district where the site or facility is located, when it is demonstrated to the court that entry to such a facility is required to verify compliance with the Act.

(C) No prior notification is required for such inspections.

1.9.2 Enforcement. Whenever the Department determines that any site or facility as well as any property, premises or place where the Department reasonably believes, based on information provided to the Department, discovered by the Department during an inspection, or otherwise in the possession of the Department that solid waste may be located is not or has not been in compliance with the Act, any subsequent rule or regulation, the terms of a certificate of designation issued under Section 30-20-104, C.R.S. or with previously issued Compliance Orders, the Department may issue a Compliance Advisory and/or Compliance Order to such site or facility (the respondent). Further, the Department may request that the Attorney General bring suit for injunctive relief or penalties.

(A) A Compliance Advisory may be issued when the Department deems it appropriate to notify the respondent that a violation has occurred or is occurring. It shall include the factual basis for the violations. It does not constitute an agency action subject to appeal, but does constitute notice to the respondent of the violation(s).

(1) Compliance Advisories may be resolved by:

(a) A Compliance Conference that shall be available to the respondent. The Compliance Conference may be either by telephone, in person or by mail. The respondent shall be given the opportunity to submit additional materials addressing the basis for the Department's belief that a violation has occurred or is occurring.

(b) A No Violations Letter shall be issued by the Department, if, after receipt of the facility's response, the Department determines that some or all of the violations did not occur. It shall inform the respondent in writing and attach a copy of the correspondence to the Compliance Advisory in the respondent's file.

(c) A No Further Action Letter shall be issued by the Department to the respondent, if, after the Compliance Conference or submittal of additional information, the Department finds, based upon the available information, that compliance with some or all of the violations in the Compliance Advisory has been achieved. A copy of the No Further Action Letter shall be attached to the Compliance Advisory in the respondent's file.

(i) A No Further Action letter shall serve to document which violations have been remedied as of the date of issuance of such letter, and shall inform the respondent that no further action regarding those violations is necessary by the respondent to come into compliance with the specified requirements.

(ii) The issuance of such No Further Action letter shall not preclude the Department from issuing an Administrative Enforcement Action in accordance with Section 1.9.3 below or from bringing a civil action or seeking a civil penalty pursuant to section 30-20-113, C.R.S. for the violations cited in the Compliance Advisory.

(d) If, in the case of a Compliance Advisory, no Compliance Conference is held or if after the Compliance Conference the Department determines that some or all the violations cited in the Compliance Advisory are correct, it may issue a Compliance Order.

(B) Administrative Enforcement Actions

(1) A Compliance Order may be issued whenever the Department finds, based upon information provided to the Department, discovered by the Department during an inspection or otherwise in the possession of the Department, that the respondent is or has been in violation of the Act, any subsequent rule or regulation or any certificate of designation, or previously issued Compliance Order.

(2) All Compliance Orders shall be served upon the respondent by registered mail, return receipt requested, or via personal service.

(3) A Compliance Order shall identify the factual and legal elements of each violation. A Compliance Order may be prohibitory or mandatory in effect and may state what steps the respondent must take to prevent or remediate any violations.

(C) Resolution of Compliance Orders

(1) A Compliance Conference shall be available to the respondent to whom a Compliance Order has been issued. The Compliance Conference may be either by telephone, in person or by mail.

(2) The respondent may offer any evidence or argument concerning the existence or gravity of the violations alleged in the Compliance Order at a Compliance Conference.

(3) The respondent may also discuss the terms of the order and may request further explanation of the violations.

(4) The respondent need not be represented by legal counsel at the Compliance Conference, although the respondent may choose to do so.

(5) A respondent's acceptance of an offer for a Compliance Conference does not stay the effectiveness of any provision of a Compliance Order pursuant to 24-4-105, C.R.S. that is specified to be effective immediately unless otherwise agreed to in writing by the Department. Failure to accept an offer to attend a Compliance Conference shall not preclude a respondent from filing an appeal of the Compliance Order.

(6) Following the Compliance Conference, the Department may reissue the Compliance Order as originally issued, modify the order, or withdraw the order. A modified or reissued Compliance Order shall become effective upon receipt by the respondent unless provided otherwise in such Compliance Order and is subject to appeal in accordance with Section 1.9.3 below.

(7) Unless otherwise provided for in a Compliance Order, if no Compliance Conference is held or if a Compliance Order is originally issued as fully effective, the Compliance Order shall be subject to appeal in accordance with section 1.9.3 below.

(D) A No Violations Letter shall be issued by the Department if, after a response from the facility, the Department determines that some or all of the violations did not occur.

(1) A copy of the No Violations Letter shall be attached to the Compliance Order in the respondent's file.

(E) A No Further Action Letter shall be sent to the respondent and attached to the Compliance Order in the respondent's file, if, after an Compliance Conference, the Department determines that the facility has come into compliance with respect to some or all of the violations.

(1) A No Further Action Letter shall serve to document which violations have been remedied as of the date of the letter.

(2) The issuance of such No Further Action letter shall not preclude the Department from issuing a Compliance Order in accordance with section 1.9.2 above or from bringing a civil action or seeking a civil penalty pursuant to section 30-20-113, C.R.S. for the violations cited in the Compliance Order.

(F) In accordance with Section 30-20-113(5)(b), C.R.S. of the Act, the Department may settle claims for civil penalties of up to \$2000 per violation per day through settlement agreements or compliance orders on consent. Such a settlement may include, but is not limited to, payment or contribution of the penalty amount to state or local agencies or for other environmentally beneficial purposes. Penalties collected by the Department shall be paid to the state treasurer.

1.9.3 Appeals of Compliance Orders

(A) After the Compliance Order is effective, but within thirty (30) calendar days of the effective date, the respondent may file a notice of appeal requesting an adjudicatory hearing pursuant to provisions of section 24-4-105, C.R.S., with the Division of Administrative Hearings and the Department. Failure to file such notice of appeal within thirty (30) calendar days shall terminate the respondent's right to challenge the Compliance Order.

(1) The filing of a notice of appeal shall not stay the respondent's obligation to comply with an effective Compliance Order.

(2) All Compliance Orders are effective upon receipt unless provided otherwise in the Compliance Order.

(B) Within thirty (30) calendar days of the date that the administrative law judge issues his/her decision, the Executive Director of the Department shall review the decision and make a determination regarding the final agency action. The respondent's obligations under the Compliance Order shall not be stayed pending determination of the final agency action by the Executive Director.

(C) All appeals of determinations of final agency action by the Executive Director shall be filed with the Denver District Court no later than thirty (30) calendar days after the respondent's receipt of the determination.

1.9.4 Judicial Enforcement Actions

(A) The Department may, at any time that the Department finds that the respondent is or has been in violation of the Act, commence a civil action for injunctive relief, in accordance with section 30-20-113(2) C.R.S. in the district court of the judicial district in which the violation occurs.

(1) The Department may file a civil action for injunctive relief in addition to, or as an alternative to, the issuance of a Compliance Order.

(B) In accordance with the Act, the Department may seek a civil penalty for each violation of the Act in the district court of the judicial district in which the violation occurs. The district court may impose a civil penalty of no more than \$2000 per violation per day.

[RESERVED]

Pages 77-81 are Reserved

SECTION 2

MINIMUM STANDARDS

2.1 **SITE AND FACILITY STANDARDS** All solid waste disposal sites and facilities shall comply with the following standards:

2.1.1 Sites and facilities shall comply with the health laws, standards, rules, and regulations of the Department, the Water Quality Control Commission, the Air Quality Control Commission, and all applicable local laws and ordinances.

2.1.2 (A) Sites and facilities shall not knowingly receive any hazardous waste.

(B) Owners and operators of all solid waste disposal sites and facilities shall implement a program at the facility for detection and the prevention of the disposal of polychlorinated biphenyl (PCB) wastes and hazardous wastes. This program must include:

(1) Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain such wastes;

(2) Records of any inspections;

(3) Training of facility personnel to recognize these wastes; and

(4) Notification of the Department if these wastes are discovered at the site and facility. Upon receipt of such notification, the Department, after consultation with the local governing body having jurisdiction, may require that the ground water monitoring program of the site and facility be altered to include adequate monitoring for parameters that would detect the release of the hazardous waste or wastes disposed of on site.

(C) All sites and facilities, requiring a certificate of designation, shall have a waste characterization and disposal plan approved by the Department and in use for such site and facility . The plan shall outline waste screening methodologies, appropriate waste handling procedures, and waste exclusion procedures which shall be implemented at each facility. The plan shall:

(1) Describe the responsibility of the waste generator in determining if the generator's waste is a hazardous waste pursuant to the Colorado

Hazardous Waste Regulations, 6 CCR 1007-3, Part 261. Such determination may be made by:

(i) Testing the waste according to the methods set forth in Subpart C of Part 261 or according to an equivalent method approved by the Department under Section 260.21; or

(ii) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.

(2) Include the site and facility's owner or operator's evaluations, screening methods, and documentation procedures regarding the generator's waste characterization determination.

(3) Include an identification of the waste streams requiring specific waste handling and/or disposal methods; and

(4) Include a contingency plan developed for handling any hazardous waste that is inadvertently discovered.

(D)(1) Existing sites and facilities for which a certificate of designation has been obtained by [the effective date of these regulation amendments] must submit a waste characterization plan pursuant to the Section 2.1.2(c) within [three months after the effective date of this amendment] for approval by the Department. Such plan shall also be provided to the local governing body having jurisdiction within [three months of the effective date of this regulation]. Nothing in this Subsection (D), including the Department's approval of any such waste characterization plan, shall affect the terms or conditions of any existing certificate of designation, and such existing terms and conditions shall remain enforceable by the local governing body having jurisdiction.

Note: March 30, 1999 effective date for 2.1(D)(1).

(2) However, all approved sites and facilities with a certificate of designation before {the effective date of this regulation} that have submitted a plan or other document containing information required by subsection 2.1.2(C) to the Department prior to the [effective date of this regulatory proposal and subsequent to October 9, 1993] and received approval from the Department for such plan or document prior to [the effective date of this regulatory proposal] shall not be required to submit a new waste characterization plan pursuant to this Subsection (D). The Department may require such a site and facility to amend any such previously approved plan or submit a new waste characterization plan if the definition of solid waste in Section 1.2 of these regulations or the definition of hazardous waste pursuant to 6 CCR 1007-3, Part 261 is revised.

(E) All waste characterization plans for new facilities shall incorporate the waste characterization plan into the engineering design and operation report included in the site and facility's application for a certificate of designation pursuant to the procedures described in Section 1.6 of these regulations.

- 2.1.3 Nuisance conditions shall not exist at or beyond the site boundary. All reasonable measures shall be employed to collect, properly contain, and dispose of scattered litter including frequent policing of the area, and the use of wind screens where necessary. The facility shall be managed in such a manner that noise, dust and odors do not constitute a hazard to human health. The facility shall be managed in such a manner that the attraction, breeding and emergence of birds, insects, rodents and other vectors do not constitute a health hazard.
- 2.1.4 Water pollution shall not occur at or beyond the point of compliance.
- 2.1.5 No significant aquifer recharge areas, as may be designated by the Colorado State Engineer's office or the Department's Water Quality Control Commission, shall be adversely impacted by solid waste disposal.
- 2.1.6 Sites and facilities shall, design, construct, and maintain: (a) A run-on control system to prevent flow onto the active facility during the peak discharge from a 25-year, 24-hour storm, and (b) A run-off control system to: (1) collect the water volume resulting from a 25-year, 24-hour storm event and (2) control the water volume resulting from a 100-year, 24-hour storm event. (See also Section 2.5.7).

- 2.1.7 Sites and facilities shall be adequately fenced or secured to prevent waste material and debris from leaving the site. Waste material and debris shall not accumulate along the fence line and shall be collected regularly and placed into the fill.
- 2.1.8 Sites and facilities shall control public access, prevent unauthorized vehicular traffic, provide for site security both during and after hours, and prevent illegal dumping of wastes. Effective artificial barriers, or natural barriers, or both may be used in lieu of fencing.
- 2.1.9 Solid wastes deposited at any site and facility shall not be burned, other than by incineration in accordance with a certificate of designation issued pursuant to C.R.S. 30-20-110(f) of the Act. The Department may authorize, in extreme emergencies, the supervised burning of large quantities of combustible materials, such as agricultural wastes, silvicultural wastes, land clearing debris, diseased trees, or debris from emergency cleanup operations.
- 2.1.10 Sites and facilities for final disposal shall provide adequate cover as described in Section 3.3.5, prevent ponding of water, wind erosion and water pollution. In the operation of a site and facility, the solid wastes shall be distributed in the smallest area consistent with handling traffic to be unloaded. The solid wastes shall be placed in the most dense volume practicable using compaction or another method approved by the Department.
- 2.1.11 Sites and facilities shall have a minimum of windblown debris. The facility shall cease operations during periods when high wind warnings as defined in Section 1.2 are verified on-site. If the facility has no wind velocity measuring device, closure decisions shall be based on readings obtained hourly by the facility operator from the nearest national weather service office or other location approved by the Department with concurrence from the local governing body having jurisdiction.
- 2.1.12 Landfills shall not accept raw sludges from wastewater treatment plants, septic tank pumpings, or chemical toilet wastes, without approval from the governing body having jurisdiction and the Department.
- 2.1.13 Sludges shall not be co-disposed with other solid wastes at the working face of sanitary landfills without approval from the governing body having jurisdiction and the Department.

- 2.1.14 No facility may accept for disposal, liquid wastes or wastes containing free liquids without approval from the governing body having jurisdiction and the Department.
- 2.1.15 Solid waste disposal sites and facilities shall comply with the ground water protection standards at the relevant point of compliance as defined in Section 1.2 and the owner/operator shall make a demonstration of compliance.
- 2.1.16 Sites and facilities where final disposal is performed shall, upon being filled, be left in a condition of orderliness and good aesthetic appearance and capable of blending with the surrounding area.
- 2.1.17 Solid waste disposal sites and facilities shall not place wastes below or into surface or ground water. This practice is prohibited on and after the effective date of these regulations.
- 2.1.18 (A) If the owner or operator of a solid waste disposal site and facility observes, or is made aware of a condition or event which is likely to cause a release or has caused a release of a substance containing a parameter identified in the facility detection monitoring program pursuant to Appendix B4 and that such condition or event is likely to cause a statistically significant increase over background, the owner or operator shall notify the department and the local governing body having jurisdiction in writing within ten (10) days.
- (B) Notifications made under this subsection shall be made part of the operating record of each solid waste disposal site and facility.
- (C) The procedure and timing for activities after the initial notification per 2.1.18(A) shall follow Appendix B4(C) and Appendix B5."

2.2 GROUND WATER MONITORING

- 2.2.1 A solid waste disposal site and facility which has not received a specific waiver from ground water monitoring requirements of these regulations as provided in Appendix B or Section 1.5, shall implement a ground water monitoring program in conformance with Appendix B, Sections B1 through B8 of these regulations. The monitoring requirements shall be developed and implemented at the solid waste disposal site and facility. After consultation with the local governing body having jurisdiction, the Department shall review and may approve or deny the monitoring program developed as a result of the requirements set forth in Appendix B. Once

approved, the owner or operator shall implement the monitoring plan at the site.

(A) A ground water monitoring system shall be installed in conformance with Appendix B, Section B2.

(B) The ground water shall be sampled and analyzed in conformance with Appendix B, Section B3.

(C) A detection monitoring system shall be implemented in conformance with Appendix B, Section B4.

(D) If statistically significant increases over background have been determined, in conformance with Appendix B, Section B3, assessment monitoring shall be implemented in conformance with Appendix B, Section B5.

(E) Statistically significant increases of Appendix I and Appendix II constituents shall trigger an assessment of interim measures and corrective measures in conformance with Appendix B, Section B6.

(F) Selection of remedy and implementation of the corrective action program shall be implemented in conformance with Appendix B, Sections B7 and B8.

(G) The list of chemical constituents which shall form the basis of monitoring and analyses during detection, assessment and corrective action at solid waste disposal sites and facilities other than MSWLFs will be determined on a case-by-case basis depending on the wastes received by the facility. To have an alternate list of chemical constituents approved for a site and facility, the owner or operator must demonstrate to the Department that the utilization of the alternate list during detection, assessment or corrective action will be as protective for that specific site and the waste streams received as the requirements specified for MSWLFs in these regulations.

2.3 EXPLOSIVE GASES The owners or operators of all solid waste disposal sites and facilities which may generate explosive gases shall monitor for explosive gases.

2.3.1 The concentration of explosive gases generated by the facility for solid waste disposal shall not exceed:

(A) Twenty-five percent [25%] of the lower explosive limit (LEL) (one percent [1%] by volume in air for methane) within facility structures

(excluding gas control or recovery systems); and

(B) At the boundary, the lower explosive limit which is five percent (5%) by volume in air for methane.

2.3.2 Owners or operators shall implement a routine monitoring program for explosive gases. The type and frequency of monitoring must be determined based on the following factors:

(A) Soil conditions;

(B) The hydrogeologic conditions surrounding the facility;

(C) The hydraulic conditions surrounding the facility; and

(D) The location of facility structures and property boundaries.

(E) The minimum frequency of monitoring shall be quarterly.

2.3.3 If explosive gas levels are detected exceeding the limits specified in Section 2.3.1, the owner or operator shall notify the Department and the local governing body having jurisdiction and:

(A) Immediately take all necessary steps to ensure protection of human health;

(B) Within seven (7) days of detection, place in the operating record documentation of the explosive gas levels detected and a description of the actions taken; and

(C) Within sixty (60) days of detection, implement an approved remediation plan, place an approved copy of the plan in the operating record, and notify the Department and the local governing body having jurisdiction that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

(D) The Department after consultation with the local governing body having jurisdiction may establish alternative schedules for demonstrating compliance with Subsection 2.3.1 (A) and (B) of this section.

2.3.4 All explosive gas monitoring points shall be installed in accordance with applicable rules and regulations of the "Water Well and Pump Installation Contractor's Act", Title 37, Article 91, Part 1, CRS as amended.

2.4 RECORDKEEPING

- 2.4.1 All operating records shall be part of the engineering design and operation report and shall be maintained at the facility, unless otherwise approved by the Department.
- 2.4.2 The owner or operator of a solid waste disposal site and facility shall record and retain in an operating record the following information as it becomes available:
- (A) Location restriction demonstration required under Subsection 3.1;
 - (B) Inspection records, and training procedures;
 - (C) Gas monitoring results from monitoring and any remediation plans required by Section 2.3;
 - (D) Design documentation for controlling leachate or gas condensate;
 - (E) Demonstrations, certifications, findings, data or documents required by Subsection 2.2;
 - (F) Closure and post-closure care plans and any monitoring, testing, or analytical data as required by Subsection 2.5 And 2.6;
 - (H) Cost estimates and financial assurance documentation required by Subsection 1.8; and
 - (I) Information demonstrating compliance with waivers as required by Section 1.5.
- 2.4.3 The owner or operator must notify the Department and the local governing body having jurisdiction when the documents required by this section have been placed or added to the operating record. All information contained in the operating record must be furnished upon request or be made available at all reasonable times for inspection by the governing body having jurisdiction or the Department.

2.5 CLOSURE OF SOLID WASTE DISPOSAL SITES AND FACILITIES

- 2.5.1 Sites and facilities shall be closed in accordance with the Act, and these regulations.
- 2.5.2 No person shall close a solid waste disposal site and facility without notifying the Department and the governing body having jurisdiction in writing at least sixty (60) days in advance of the closure date.
- 2.5.3 The operator of a solid waste disposal site and facility shall notify the general public at least sixty (60) days in advance of the proposed closure date by placing signs of suitable size at the entrance to the site and facility.
- 2.5.4 Precautions shall be taken to prevent further use of the site and facility for unauthorized disposal.
- 2.5.5 Water pollution shall not occur at or beyond the point of compliance after closure.
- 2.5.6 Nuisance conditions shall not exist at or beyond the site boundary after closure (see also 2.1.3).
- 2.5.7 Permanent surface water diversion structures remaining after closure shall control run-on and run-off from the 100 year, 24-hour storm event.
- 2.5.8 The owner or operator shall prepare a closure plan for approval by the Department after consultation with the local governing body having jurisdiction. The approved plan shall be placed in the operating record.
- 2.5.9 The owner or operator must begin closure activities of each disposal phase no later than thirty (30) days after final waste grades are reached. Extensions beyond the thirty (30) day deadline for beginning closure may be granted by the Department and the local governing authority if the owner or operator demonstrates that all steps necessary to prevent threats to human health and the environment from the active disposal phase will be taken.

2.6 POST-CLOSURE CARE AND MAINTENANCE STANDARDS

- 2.6.1 The owner or operator of all solid waste disposal sites and facilities shall prepare a written post-closure plan to be approved by the Department after consultation with the local governing body having jurisdiction and shall place it in the operating record.

- 2.6.2 For MSWLFs, the post-closure care period shall be established by the Department and the governing body having jurisdiction per Section 3.6, shall be based on the operating history of the site, and shall be at least thirty (30) years. The post-closure care period for solid waste disposal sites and facilities other than MSWLFs will be established by the Department and the governing body having jurisdiction.

[RESERVED]

Pages 92-96 are Reserved

PART B

SECTION 3

STANDARDS FOR SOLID WASTE DISPOSAL LANDFILL SITES AND FACILITIES

3.0 PURPOSE, SCOPE AND APPLICABILITY

- 3.0.1 It is the purpose and intent of these regulations as they apply to solid waste landfills (MSWLFs) to be equivalent to but not more stringent than the 40 CFR Part 258 while allowing the maximum flexibility of interpretation and application based upon the characteristics of the chosen site.
- 3.0.2 This Section 3 also applies to non-MSWLF sites and facilities. On a case-by-case demonstration basis, the application of these requirements to non-MSWLFs may be altered provided that the alternative standard is as protective of the environment and public health as the requirement specified in these regulations.

3.1 LOCATION RESTRICTIONS AND SITE STANDARDS

- 3.1.1 Landfills that accept putrescible wastes which occur within 10,000 feet (3048 meters) of any airport runway used by turbojet, or within 5,000 feet (1,523 meters) of any airport runway used only by piston-type aircraft shall not pose a bird hazard to aircraft. The applicant shall submit reasonable evidence regarding the ability to mitigate a bird hazard, to the Department and the local governing authority having jurisdiction for their review. Owners or operators proposing to site new facilities or expand existing facilities within a five (5) Mile radius of an airport runway that is used by turbojet or piston-type aircraft shall notify the Department and the local governing body having jurisdiction and the Federal Aviation Administration (FAA).
- 3.1.2 New landfills and expansions of existing landfills shall not be located in wetlands, unless the owner or operator can demonstrate that the proposed operation can meet the restrictions set forth in 40 CFR 258.12.
- 3.1.3 New landfills and expansions of existing landfills shall not be located within 200 feet (60 meters) of a fault that has had a displacement in

holocene time unless the owner or operator demonstrates to the Department that an alternate setback distance of less than 200 feet (60 meters) will be effective or equally effective in the prevention of damage to the structural integrity of the facility and will be protective of human health and the environment.

- 3.1.4 New landfills and expansion of existing landfills shall not be located in seismic impact zones, unless the owner or operator demonstrates to the Department that all components, including liners, leachate collection systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site. The owner or operator shall place the demonstration in the operating record of the facility and submit it to the Department and local governing body having jurisdiction.
- 3.1.5 Owners or operators of new landfills, existing landfills and expansions of existing landfills located in an unstable area must demonstrate that engineering measures have been incorporated into the facility's design to ensure that the integrity of the structural components of the facility will not be disrupted. The owner or operator shall place the demonstration in the operating record of the facility and submitted to the Department and the local governing body having jurisdiction. The owner or operator shall consider the following factors, at a minimum, when determining whether an area is unstable:
- (A) On-site or local soil conditions that may result in significant differential settling;
 - (B) On-site or local geologic or geomorphologic features; and
 - (C) On-site or local human-made features or events (both surface and subsurface).
- 3.1.6 The topography of the site shall maximize protection against prevailing winds on-site and minimize the amount of precipitation catchment area upgradient of the site.
- 3.1.7 Landfills shall not be located in a floodplain as defined herein.
- 3.1.8 Landfills shall isolate wastes from the public and the environment. Sites and facilities shall demonstrate suitable isolation to the Department and governing body having jurisdiction by, at a minimum, addressing all

Sections in 3.2 and CFR 258.40 in sufficient detail and clarity to justify to the Department and governing body having jurisdiction that wastes and any potential leachate will be controlled within the fill area. Emphasis will be placed on favorable geologic conditions over engineered improvements of marginal geological conditions.

3.1.9 Landfills shall not place wastes below or into surface water or ground water. The operation of sites and facilities that place waste into ground water after the effective date of these regulations is prohibited.

3.2 DESIGN REQUIREMENTS All portions of the facility design and investigations must be reviewed and sealed by a Colorado professional engineer or reviewed by a professional geologist, as appropriate.

3.2.1 Geologic data The engineering design and operations report shall include, as a minimum, the following geologic data:

- (A) Types and regional thickness of unconsolidated soils materials;
- (B) Types and regional thickness of consolidated bedrock materials;
- (C) Regional and local geologic structure, including bedrock strike and dip, and fracture patterns; and
- (D) Geologic hazards, including but not limited to slope stability, faulting, folding, rockfall, landslides, subsidence or erosion potential, that may affect the design and operation of the facility for solid wastes disposal.

3.2.2 Hydrologic data The engineering design and operations report shall include, as a minimum, the following hydrological data:

- (A) Lakes, rivers, streams, springs, or bogs, on-site or within two miles of the site boundary;
- (B) Depth to and thickness of perched zones and uppermost aquifers;
- (C) Ground water wells within one mile of the site boundary, including well depth, depth to water, screened intervals, yields and the aquifers tapped;
- (D) Hydrologic properties of the perched zones and uppermost aquifer, including flow directions, flow rates, porosity, coefficient of storage, permeability, and potentiometric surface;

- (E) Site location in relation to the base floodplain of nearby drainages;
- (F) An evaluation of the potential for impacts to existing surface water and ground water quality from the proposed facility for solid waste disposal; and
- (G) The existing quality of ground water beneath the proposed facility.

3.2.3 Engineering data The engineering design and operations report shall contain, as a minimum, the following engineering data:

- (1) The type, quantity and location of material that will be required for use as a daily and intermediate cover over the life of the site and facility;
- (2) The type and quantity of material that will be required for use as liner material or final cover, including its compaction density and moisture content specifications, and the design permeability;
- (3) Maps and plans, drawn to a convenient common scale, that show the following:
 - (a) The location and depth of cut for liners;
 - (b) The daily or intermediate cover, and final cover;
 - (c) The location and depths of proposed fill or processing areas;
 - (d) The location, dimensions, and grades of all surface water diversion structures;
 - (e) The location and dimensions of all surface water containment structures, including those designed to impound contaminated runoff leachate, sludge, or liquids for evaporative treatment;
 - (f) The spatial distribution of engineering, geologic and hydrologic data, and relationship to the proposed facility;
 - (g) The location of all proposed facility structures and access roads;
 - (h) The location of all proposed monitoring points for surface water and ground water quality and explosive gases;

- (i) The final contours and grades of the fill surface after closure;
- (j) The location of fencing to be placed on-site;
- (k) The location of each discrete phase of development; and
- (l) The design details of the final cap, liner and leachate collection system.

3.2.4 Construction details for all proposed monitoring points for surface water and ground water quality and explosive gases.

3.2.5 Liner/design components

(A) Demonstration shall be made, to the Department and the local governing body having jurisdiction, that the design developed for the facility will comply with Section 2.1.15 at the relevant point of compliance. The owner/operator shall consider at least the following factors:

- (1) Barrier layer permeability;
- (2) Barrier layer thickness;
- (3) Barrier layer porosity;
- (4) Slope of the barrier layer;
- (5) Hydraulic head on the barrier layer;
- (6) Distance to relevant point of compliance;
- (7) Distance and characteristics, including quality, of the uppermost aquifer or monitored unit;
- (8) Climatic factors;
- (9) The estimated volume, physical characteristics and chemical characteristics of the leachate, and
- (10) The chemical compatibility of the barrier layer to estimated leachate chemical characteristics;

(11) The distance ground water beneath the site would flow during the facility's operating life and post-closure care period. Distance to domestic wells or springs shown to tap the uppermost aquifer downgradient of the site shall be presented.

(B) The design shall consist of two components: the barrier layer and the leachate collection/removal system. When approving a design that complies with this section, the Department shall consider the ability of the design to comply with Subsection 2.1.15 at the relevant point of compliance taking into consideration site characteristics and site operations.

(C) Barrier layer: the barrier layer shall be an engineered improvement that meets the performance standard of 40 CFR Part 258.40(a)(1) and shall be one of the following:

(1) Natural lithology with recompaction:

natural lithology with recompaction can be used as a barrier layer when:

(a) A minimum thickness of 20 feet of soils and/or bedrock with in-situ hydraulic conductivity demonstrated through field testing to be less than or equal to 1.0×10^{-6} cm/sec, are present at the base of an excavation of a sanitary landfill; and

(b) The upper 12-inches is recompacted to achieve a hydraulic conductivity of less than or equal to 1×10^{-7} cm/sec.

(2) Soil liner: a soil liner shall consist of at least 3-foot of compacted soil with an adequate moisture content and with a hydraulic conductivity less than or equal to 1×10^{-7} cm/sec.

(3) Composite liner: a composite liner shall consist of two components: The upper component shall consist of a minimum 30-mil flexible membrane line (FML), and the lower component shall consist of at least a two-foot layer of compacted soil with a hydraulic conductivity less than or equal to 1×10^{-7} cm/sec. FML components consisting of high density polyethylene (HDPE) shall be at least 60-mil thick. The FML component shall be installed in direct and uniform contact with the compacted soil component.

(4) Alternative designs: alternatives to the above designs may be approved by the Department based on waste type and site specific technical information. Proposals for alternative designs shall demonstrate that the facility can comply with Subsection 2.1.15 at the relevant point of compliance and for MSWLF with

40 CFR Part 258.40(a)(1). Alternative designs include, but are not limited to the following:

- (1) Geosynthetic clay liners;
- (2) Natural lithology without recompaction;
- (3) Soil admixtures;
- (4) Geomembranes;
- (5) Polymers, and
- (6) Variations of design components described in this Section 3.2.5.

(D) Leachate collection and leachate removal system

(1) A leachate collection system shall be designed and constructed to maintain less than a twelve (12) inch depth of leachate over the barrier layer, and to promote transport of leachate from the most distant point of the leachate collection system to the leachate removal system in less than twelve (12) months (assuming a saturated drainage media). Factors to be considered in the design of a leachate collection system include, but are not limited to, the following:

- (a) Waste type;
- (b) Anticipated leachate generation rate;
- (c) Slope length;
- (d) Percent slope;
- (e) Barrier layer;
- (f) Hydraulic conductivity of the drainage layer, and
- (g) Long term performance during the active life and post-closure care period.

(2) A leachate removal system shall be designed, constructed and operated to:

- (I) Allow the leachate collection system to perform as designed; and
- (II) Account for potential increased hydraulic head in the removal system.

3.2.6 Surface water control systems shall be designed, constructed and maintained to:

- (a) Restrict flow onto the active portion of the landfill during peak discharge from a 25-year, 24-hour storm; and
- (b) Control the water volume resulting from a 25-year, 24-hour storm from the active portion of the landfill. (See also Section 2.5.7).

3.2.7 Prior to the acceptance of waste, the owner or operator must submit a report to the Department and the local governing body having jurisdiction documenting that the designed construction has been completed in accordance with the approved plan. The report shall be signed by a Colorado registered professional engineer, approved by the Department and placed in the operating record.

3.3 OPERATING CRITERIA

3.3.1 General data The engineering design and operations report shall include, as a minimum, the following general data:

- (A) Mailing address, county and legal description of the landfill for solid wastes disposal, township, section, quarter section and range;
- (B) Area site, in acres;
- (C) Type of landfill for solid waste disposal proposed for the site; and
- (D) Discussion of landfills service area, including transportation corridors and surrounding access.

3.3.2 Operational data The engineering design and operations report shall include, as a minimum, the following operational data:

(A) The qualifications, names, and addresses of the persons operating the landfill and having the authority to take corrective action in the event of noncompliance;

(B) The hours of the day and days of the week that the landfill will be operating;

(C) The types and daily volumes in yards per day and/or gallons per month of wastes to be received; expected life of site. If sludge is to be received, its quality should be determined in accordance with Department technical guidelines. A listing of the waste stream types to be approved for routine receipt;

(D) The number, classification, and job descriptions of personnel projected to be employed at the landfill when operating at full capacity;

(E) Number, description, and uses of all equipment projected to be employed at the landfill when operating at full capacity;

(F) The size and types of disposal cells or processing areas to be constructed;

(G) The frequency of the application of adequate cover;

(H) The types and heights of fencing to be placed on-site;

(I) Provisions to minimize nuisance conditions on-site;

(J) Provisions for fire protection to eliminate open burning on-site, and to prevent the spread of open burning to adjoining property;

(K) Provisions for the retrieval of windblown solid wastes, on or off-site;

(L) Conceptual plans to be implemented if the contamination of surface waters or ground waters occur, or if nuisance conditions are confirmed beyond the site boundary; and

(M) The amounts and sources of water to be used on site for the control of nuisance conditions, fire protection, construction purposes and personnel use.

3.3.3 Quality assurance and quality control reports shall be developed and implemented for all engineered structures at the landfill.

3.3.4 Cover material requirements

(A) The owners or operators of all landfills must cover disposed solid waste with six (6) inches of earthen material at the end of each operating day, or at more frequent intervals if necessary, to control disease vectors, fires, odors, blowing litter, and scavenging.

(B) Alternative materials of an alternative thickness (other than at least six (6) inches of earthen material) may be approved by the Department and the governing body having jurisdiction, if the owner or operator demonstrates that the alternative material and thickness control nuisance conditions and scavenging without presenting a threat to human health and the environment.

(C) The Department and the governing body having jurisdiction may grant a temporary waiver from the requirement of daily and intermediate cover requirements, if the owner or operator demonstrates that there are extreme seasonal climatic conditions that make meeting such requirements impractical. Alternate approaches to daily cover as described above will be considered on a case-by-case basis for non-MSWLF's.

3.3.5 Sufficient amounts of adequate cover shall be readily available for use throughout the site's life and for closure to minimize nuisance conditions as necessary.

3.3.6 Adequate amounts of water shall be available for construction purposes and to minimize nuisance conditions, as necessary.

3.3.7 Leachate and landfill gas condensate may be recirculated over the landfill with specific approval by the Department and the local governing authority.

3.4 RECORDKEEPING An operating record shall be maintained and include, as a minimum, the following:

(A) Incoming waste volumes,

(B) Water quality monitoring results,

(C) Explosive gas monitoring results,

- (D) Construction as-built details, and
- (E) Variations from approved operations procedures.
- (F) Any demonstration and waiver documentation required in these regulations.

3.4.1 Following closure of landfills, the owner or operator shall:

- (A) Record a notation on the deed to the facility property, or some other instrument that is normally examined during title search; and
- (B) Notify the Department and the local governing body having jurisdiction that notation has been recorded and a copy has been placed in the operating record.

The notation on the deed must in perpetuity notify any potential purchaser of the property that:

- (1) The land has been used as a landfill facility; and
- (2) Its use is restricted under Section 3.6.1(7)

The Department after consultation with the local governing body having jurisdiction may grant permission to remove the notation from the deed if all wastes are removed from the facility.

3.5 CLOSURE The owner or operator of a solid waste site and facility shall develop a closure plan which meets the following minimum criteria.

- 3.5.1 (A) The closure plan shall be prepared and submitted to the Department for approval. The closure plan shall describe the steps necessary to close the landfill at any point during its active life. The closure plan, at a minimum, shall include the following information:
 - (1) A description of the final cover system, designed in accordance with Section 3.5.2 and 3.5.3, And the methods and procedures to be used to install the cover;
 - (2) An estimate of the largest area of the landfill ever requiring a final cover during the active life; and

(3) A schedule for completing all activities necessary to satisfy the closure criteria of this section.

(B) Discrete units of a landfill may be closed independently of closure of the entire facility.

3.5.2 The final grades shall promote surface water run-off and minimize erosion, and shall have slopes no less than 5% (20:1) and no greater than 25% (4:1). Variations from these standards may be acceptable if demonstrations of the adequacy of proposed variance are made to the Department by the owner or operator.

3.5.3 The final cover permeability shall not exceed that of the liner; and the final cover design shall be comprised of one (1) of the following types:

(A) A soil final cover design shall consist of the following:

(1) An infiltration layer consisting of a minimum of 18 inches of earthen material that has a permeability of less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less, and

(2) An erosion layer of earthen material a minimum of 6 inches in thickness that is capable of sustaining native plant growth.

(B) A composite final cover design shall consist of the following components:

(1) foundation layer to be comprised of a minimum six (6) inch soil layer, located immediately above the refuse, to provide a suitable foundation for placement of the geomembrane.

(2) The barrier layer shall consist of a geomembrane which has a minimum 30-mil thickness and displays properties adequate for its intended purpose.

Factors to be considered in determining barrier adequacy shall include, but are not limited to the following:

(1) The effects of landfill settlement,

- (2) Permeability,
- (3) Seam strength,
- (4) Friction properties, and
- (5) Puncture resistance.

(6) Rooting layer comprised of a soil capable of supporting a root system and of sufficient thickness to protect the barrier layer and a seed bed layer of soil capable of supporting plant germination. The minimum thickness of the former layer shall be eighteen inches and the latter layer shall be six inches.

(C) Alternatives to the above designs may be approved by the Department based on waste type and site specific technical information. Proposals for alternative designs shall demonstrate that the final cover system will minimize infiltration and erosion, and comply with Subsection 2.1.15 at the relevant point of compliance. Alternative designs include, but are not limited to the following:

- (1) Geocomposite materials,
- (2) Soil admixtures,
- (3) Polymers and
- (4) Variations of design components described in this Section 3.5.3.

- 3.5.4 The final cover shall be designed so that landfill gases will not adversely affect cover performance as described in this Section 3.5.
- 3.5.5 Upon approval, and prior to beginning closure of each landfill phase, an owner or operator must notify the Department and place notice of the intent to close the phase in the operating record.
- 3.5.6 The owner or operator must commence closure activities of each landfill phase no later than 30 days after final refuse grades are reached. Extensions beyond the 30-day deadline for beginning closure may be granted by the Department if the owner or operator demonstrates that all steps necessary to prevent threats to human health and the environment from the active landfill phase will be taken.

- 3.5.7 The owner or operator must complete closure activities of each landfill phase, in accordance with the closure plan, within one hundred eighty (180) days following the beginning of closure as specified in this section. Extensions of the closure period may be granted by the Department if the owner or operator demonstrates that closure will of necessity, take longer than one hundred eighty (180) days and the owner/operator has taken and will continue to take all steps to prevent threats to human health and the environment.
- 3.5.8 Following closure of each landfill phase, the owner or operator must submit a report to the Department documenting that closure has been completed in accordance with the approved closure plan. The report, which must be signed by a Colorado registered professional engineer, shall be approved by the Department and placed in the operating record.

3.6 POST-CLOSURE CARE AND MAINTENANCE

- 3.6.1 (A) Following closure of each landfill or landfill phase, the owner or operator must conduct post-closure care which shall consist of at least the following:
- (1) Provisions to prevent nuisance conditions;
 - (2) Maintaining the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;
 - (3) Monitoring the ground water in accordance with the requirements of Subsection 2.2 And maintaining the ground water monitoring system, if applicable;
 - (4) Maintaining and operating the leachate collection system in accordance with the requirements in Section 3.2.5 (C). The Department may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;
 - (5) Maintaining and operating the gas monitoring system in accordance with the requirements Subsection 2.3.

(6) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period; and

(7) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in the Department's regulations. The Department may approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

3.6.1 (B) Discrete landfill units that can be monitored and maintained separately may be allowed to begin and end the post-closure period independent of closure of the entire facility.

3.6.2 Following completion of the post-closure care period the owner or operator must notify the Department that a certification signed by an independent Colorado registered professional engineer or approved by the Department and the local governing body having jurisdiction, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

3.6.3 Post-closure care must be conducted for a minimum of thirty (30) years. The length of the post-closure care period may be:

(A) Decreased by the Department after consultation with the local governing body having jurisdiction if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment; or

(B) Increased by the Department after consultation with the local governing body having jurisdiction if it is determined that the lengthened period is necessary to protect human health and the environment.

SECTION 4

**CONSTRUCTION DEBRIS AND INERT MATERIAL LANDFILL SITES AND
FACILITIES [RESERVED]**

[RESERVED]

Pages 112-114 are Reserved

112-114

September 30, 2014

SECTION 5

ASBESTOS WASTE MANAGEMENT

- 5.1 General Provisions**
- 5.2 Non-Friable Asbestos Waste Disposal Areas**
- 5.3 Friable Asbestos Waste Disposal Areas**
- 5.4 Storage of Asbestos Waste**
- 5.5 Management of Regulated Asbestos-Contaminated Soil (RACS)**
 - 5.5.1 Scope and Applicability**
 - 5.5.2 Exemptions**
 - 5.5.3 Training**
 - 5.5.4 Response to Unplanned RACS Discovery**
 - (A) Immediate Actions
 - (B) 24-Hour Notification Requirements
 - (C) Interim Actions
 - 5.5.5 Response to Planned RACS Management**
 - (A) Project Specific RACS Management Plan (PSRMP)
 - (B) Standard Operating Procedures (SOPs)
 - (C) Standard Requirements of Section 5.5.7
 - (D) Risk Based Approach
 - 5.5.6 Remediation of Asbestos in Soil**
 - 5.5.7 Standard Requirements for the Disturbance of RACS**
 - (A) Establishment and Control of a Regulated Work Area (RWA)
 - (B) Personal Protective Equipment (PPE) for the Purposes of Preventing Cross-Contamination
 - (C) Wetting
 - (D) Wind Speed Monitoring
 - (E) Air Monitoring
 - (F) Work Practices to be Followed During RACS Disturbance
 - (G) Loading and Placement of RACS
 - (H) Onsite Staging, Stockpiling, and Storage of RACS
 - (I) Decontamination
 - (J) RACS Spill Response
 - (K) Requirements for Exposed RACS Remaining in Place
 - (L) Documentation

5.5.8 Packaging and Disposition of Regulated Asbestos-Contaminated Soil (RACS)

(A) Disposal of RACS

(B) Onsite Reuse of RACS

(C) Demonstration of Non-RACS

5.5.9 Fees

Appendix 5A: Sample Collection Protocols and Analytical Methodologies

SECTION 5

ASBESTOS WASTE MANAGEMENT

- 5.1 GENERAL PROVISIONS:** The provisions of Section 5.1-5.4 shall apply to all asbestos waste disposal areas.
- 5.1.1 (A) Any person who disposes of asbestos waste and any owner or operator of an asbestos waste disposal area, shall comply with the requirements of Sections 1, 2, 3, and 5 of these regulations.
- (B) If a conflict exists between the requirements of this section and Sections 1, 2, or 3, the requirements of Section 5 shall control.
- 5.1.2 Each asbestos waste disposal area shall comply with the rules and regulations of the Department, the Water Quality Control Commission, the Air Quality Control Commission and each applicable local law and ordinance. Each asbestos waste disposal area shall be located, designed, constructed, operated and maintained so that it will protect public health, worker safety, and the environment.
- 5.1.3 No asbestos waste management activities shall cause or contribute to the occurrence of any visible emissions.
- 5.2 NON-FRIABLE ASBESTOS WASTE DISPOSAL AREAS:** The provisions of this subsection 5.2 shall apply to each asbestos waste disposal area that receives non-friable asbestos waste.
- 5.2.1 Within 24 hours following receipt of non-friable asbestos waste and any storage thereof in accordance with Section 5.4 of these regulations, the waste shall be covered with a minimum of nine inches (9") of soil or eighteen inches (18") of non-asbestos cover material. The Department and local governing body having jurisdiction may approve on a case-by-case basis alternative materials of an alternative thickness. All other requirements of Sections 1.1 through 1.9 and 2.0 and 3.0 of these regulations regarding placement of "adequate cover" shall also apply to the disposal of non-friable asbestos waste. Operators shall minimize the potential for release from and exposure to asbestos waste after placement in each disposal area and shall not compact the waste prior to application of cover materials. At no time shall compaction equipment come into contact with asbestos waste, containers, or packaging.

5.2.2 Non-friable asbestos waste management shall be accomplished in a manner that minimizes any change in the friability of the waste.

5.3 FRIABLE ASBESTOS WASTE DISPOSAL AREAS: The provisions of this subsection 5.3 shall apply to each asbestos waste disposal area that receives friable asbestos waste.

5.3.1 (A) No friable asbestos waste shall be received or disposed of at a solid waste facility unless expressly authorized by an approved design and operations plan. This design and operations plan shall describe the friable asbestos disposal area, areas, or work practices used for onsite disposal of friable asbestos waste and shall contain provisions for a response to a spill or release of friable asbestos waste material.

5.3.2 The Department may approve specific disposal activities for friable asbestos waste on a case-by-case basis in accordance with Section 1.5 of these regulations.

5.3.3 No friable asbestos wastes shall be disposed of within one hundred feet (100') in all directions of the property line of a solid waste disposal site and facility.

5.3.4 Warning signs and fencing, or appropriate controls as approved by the Department, shall be installed and maintained at the perimeter of each asbestos waste disposal area where friable asbestos waste is disposed of, in accordance with the following minimum requirements:

(A) A fence shall be placed around the entire area where there has been or will be disposal of friable asbestos waste to ensure the restriction of activities in that area and to preclude the entry of unauthorized and unprotected personnel.

(B) Warning signs shall be displayed as follows: one at each entrance to each asbestos waste disposal area; and one or more on each side of the fenced area based on the length of the side, at a rate of one for every three hundred linear feet (300') of fence.

(C) Warning signs shall be posted in such a manner and in such locations that the legend can be easily read.

(D) Each warning sign shall be an upright rectangle with minimum measurements of twenty inches by fourteen inches (20"x14").

(E) Each warning sign shall display the legend set out below. The letter sizes used in the legend shall be as specified below or of a visibility at least equal to those specified below.

LEGEND	NOTATION
ASBESTOS WASTE DISPOSAL AREA	1 INCH
DO NOT CREATE DUST	0.75 INCH
BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH	14 POINT

(F) Spacing between any two lines in the legend of the warning signs must be at least equal to the height of the upper of the two lines.

(G) Facilities that have existing signs referring to Asbestos Waste Disposal Sites may continue to use these signs until replacement is warranted.

5.3.5

(A) No friable asbestos waste shall be accepted for disposal unless it is tightly sealed in at least two 6 mil, leak-tight plastic bags or in a wrapping or other container deemed equivalent by the Department.

(B) The outermost layer of any containers holding friable asbestos waste shall be labeled with either of the following legends in type at least .5 inches tall:

(1)	<p style="text-align: center;">CAUTION CONTAINS ASBESTOS AVOID OPENING OR BREAKING CONTAINER BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH</p>
(2)	<p style="text-align: center;">DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD</p>

- 5.3.6 All activities involved in the disposal of friable asbestos waste, including placement in an asbestos waste disposal area, covering the asbestos waste, and compacting the fill shall be conducted in a manner that minimizes the potential for the rupture or opening of any bags, wrappers or other containers holding the friable asbestos waste and that prevents the emission of asbestos to the air.
- 5.3.7 (A) Within 24 hours following receipt of friable asbestos waste and any storage thereof in accordance with Section 5.4 of these regulations, the waste shall be covered with a minimum of nine inches (9") of soil or eighteen inches (18") of non-asbestos cover material. The Department and local governing body having jurisdiction may approve on a case-by-case basis alternative materials of an alternative thickness. All other requirements of Sections 1.1 through 1.9 and 2.0 and 3.0 of these regulations regarding placement of "adequate cover" shall also apply to the disposal of friable asbestos waste. Operators shall minimize the potential for release from and exposure to asbestos waste after placement in the disposal area and shall not compact the waste prior to application of cover materials. At no time shall compaction equipment come into contact with asbestos waste, containers or packaging.
- 5.3.8 Structurally rigid containers that hold friable asbestos waste shall be covered as specified in Section 5.3.7 within seventy-two hours of receipt or termination of storage. Precautions must be taken to avoid damage or rupture of the asbestos containers during handling. Before the owner/operator compacts any friable asbestos waste containers, the containers shall be covered with a minimum of nine inches (9") of soil or eighteen inches (18") of non-asbestos cover material.
- 5.3.9 (A) Any friable asbestos waste received in packaging other than a structurally rigid container shall be received and disposed of only if:
- (1) An asbestos waste disposal area necessary for the disposal of such friable asbestos waste is prepared prior to the arrival of such waste at the landfill;
 - (2) A minimum of nine inches (9") of soil or eighteen inches (18") of non-asbestos cover material and the equipment necessary to cover the asbestos waste upon its placement in each asbestos waste disposal area is available to cover the asbestos waste per the requirements of Sections 5.3.7 and 5.3.8;

(3) All unrelated landfill activities within one hundred (100') feet in all directions of each asbestos waste disposal area are stopped during the placement, covering, and compaction of the asbestos waste;

(4) No non-essential persons are allowed within one hundred (100') feet in all directions of each asbestos waste disposal area during the placement, covering, and compaction of the asbestos waste;

(5) Sustained wind speeds at the asbestos waste disposal area do not exceed twenty miles per hour (20 mph) and gusts do not exceed thirty miles per hour (30 mph);

(6) A source of water is provided at the site to facilitate wetting the asbestos wastes if any container is breached during placement of asbestos waste.

(B) Any friable asbestos waste received in packaging other than structurally rigid containers shall be disposed of by placement in an asbestos waste disposal area that is at least one hundred feet (100') in all directions from any area being used concurrently for the disposal of other waste.

5.3.10 The owner or operator of an asbestos waste disposal area where friable asbestos waste has been disposed of shall:

(A) Maintain operating records required under subsection 2.4 of these regulations, including permanent records of the date and amount of each receipt of asbestos waste, the location of each asbestos waste disposal area within the boundaries of the solid waste disposal facility and the quantity of asbestos waste at each such location. These records shall be of sufficient specificity to identify the location and depth of the asbestos waste.

(B) Ensure that records made to comply with this subsection are readily available at all times and are made available to the local governing body having jurisdiction and the Department upon request.

(C) Such records shall be submitted to the local governing body having jurisdiction within thirty (30) days after the closure of the asbestos waste disposal area has been completed.

5.4 STORAGE OF ASBESTOS WASTE: Storage of asbestos waste at an asbestos waste disposal area, prior to burial, shall be conducted in accordance with the following requirements:

- 5.4.1 Asbestos waste shall be stored only in rigid containers and in segregated locations used solely for the purpose of such storage where asbestos waste packages can be handled, stored and maintained without being opened or disturbed.
- 5.4.2 Asbestos waste shall be stored at an asbestos waste disposal area for no more than twenty (20) calendar days prior to burial.
- 5.4.3 A warning sign shall be posted on each side of an area where asbestos waste is stored prior to burial. Such signs shall conform to subsection 5.3.4(C), (D) and (F). The legend on each such sign shall conform to the requirements of subsection 5.3.4(E) except that the first line shall read "Asbestos Waste Storage".

5.5 MANAGEMENT OF REGULATED ASBESTOS-CONTAMINATED SOIL (RACS):

5.5.1 SCOPE AND APPLICABILITY

The requirements of Section 5.5 apply to the owner or operator of any property with regulated asbestos contaminated soil (RACS) at which soil-disturbing activities are occurring or planned. The owner/operator may choose to follow the procedures set forth in Sections 5.5.1(A) and 5.5.1(B) below when debris is exposed or disturbed to determine if the debris is RACS. The requirements of Sections 5.5.1(C) and 5.5.1(D) apply when RACS is exposed or disturbed.

(A) Any person who disturbs debris or exposes debris during a soil disturbing activity shall characterize debris to determine the applicability of Section 5.5, and have appropriate personnel to characterize debris. Any person who disturbs debris or exposes debris during a soil disturbing activity shall:

- (1) Conduct visual inspection of disturbed material;
- (2) If debris is exposed during soil disturbing activities, and/or the soil or ash is known to contain asbestos fibers, through documented

evidence, then Section 5.5 is applicable. If there is no visible RACS or documented evidence of RACS at a site, an owner/operator does not have a duty under these regulations to sample or otherwise investigate for RACS prior to commencing soil disturbing activities;

- (3) If debris is exposed that only contains green waste, and/or natural stone with no associated material suspected of containing asbestos fibers, then Section 5.5 is not applicable.
 - (4) In the event of an emergency in which a soil disturbing activity in an area of debris must continue or commence at once, a RACS determination in accordance with Section 5.5.1(B) may be postponed during the initial response to the immediate emergency. However, the RACS determination must be made within 48 hours of the initial emergency response.
 - (5) Any person who exposes but does not disturb debris during a soil disturbing activity shall have protocols to characterize debris as required by this section 5.5.1(A) and stabilize any debris determined to be RACS as required by Section 5.5.7(K), unless the debris is exempted by subsection 5.5.2(A) through (F).
- (B) Any person who disturbs debris during soil disturbing activities, when the subject debris is not excluded within Section 5.5.1(A)(3), must inspect the debris, through continuous visual inspection during soil disturbing activities, to determine if the debris is, or contains, suspect asbestos-containing material (ACM). If debris is exposed that only contains metal, glass, plastic, wood, and/or bare concrete with no associated material suspected of being ACM (such as sealants, adhesives, mastics, coatings, adhered materials, or resins), then Section 5.5 is not applicable. The person(s) conducting the visual inspection must be a Qualified Project Monitor (QPM) or a Certified Asbestos Building Inspector (CABI).

All suspect ACM(s) must be:

- (1) Assumed to be ACM; or
- (2) Sampled by a CABI. The samples shall be analyzed by a National Voluntary Laboratory Accreditation Program (NVLAP) participating laboratory utilizing Polarized Light Microscopy (PLM) (EPA Method 600/R-93/116 or equivalent) to determine if it is ACM; or

- (3) Determined to be ACM, or non-ACM, through the use of documentation specific to the material observed in the field establishing the asbestos content of the material (e.g. laboratory analysis results from previous encounters with the same material).
 - (4) The ACM determination shall be made within seven (7) calendar days of discovery of the debris.
 - (a) Within 24 hours of discovery of debris, and until the ACM determination is made, the debris shall be stabilized in accordance with Section 5.5.4(A)(3) of these regulations.
 - (b) No additional disturbance, other than necessary to perform the required stabilization in Section 5.5.4(A)(3), of the debris shall occur prior to the asbestos determination.
 - (5) A person who disturbs debris, determined or assumed to be or contain ACM per this 5.5.1(B), shall determine if the ACM is exempted in accordance with Section 5.5.2 of these regulations.
 - (6) A person who disturbs debris, determined or assumed to be or contain ACM per this 5.5.1(B), shall make a RACS determination by:
 - (a) Assuming the debris containing ACM is RACS and managing the RACS in accordance with Section 5.5 of these regulations;
or
 - (b) Applying site and material specific knowledge of the presence or absence of RACS based on observation and/or documented evidence about the nature of ACM(s).
 - (7) The owner/operator shall retain, or make available for inspection, records of all RACS determinations onsite for the duration of the debris disturbance, which shall be retained by the owner/operator for a period of six (6) months after the completion of debris disturbing activities.
- (C) Soil or ash known to contain non-visible asbestos, based on documented evidence, is RACS and if exposed or disturbed shall be managed in accordance with these regulations.
- (D) If soil, ash, or debris is, or contains, RACS then:

- (1) RACS that is exposed or disturbed shall be managed, disposed of, or reused in accordance with these regulations.
- (2) Removal of ACM that is on, or comprises, a facility component, that is located on or in soil that will be disturbed, shall be conducted under this Section 5.5, in accordance with work practices in Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B), Section III.V, and is not subject to the permit requirements of 5 CCR 1001-10, Part B, if the total quantity of ACM is below the following trigger levels:
 - (a) 260 linear feet on pipes; or
 - (b) 160 square feet on other surfaces; or
 - (c) The volume of a 55-gallon drum.
- (3) RACS that is generated and not disposed of or reused in compliance with Section 5.5.8 of these regulations is solid waste and shall be managed in accordance with the landfill requirements of the Colorado Solid Wastes Disposal Sites and Facilities Act (C.R.S. 30-20, Part 1) and Sections 5.1 through 5.4 of these regulations.
- (4) Except as provided in Section 5.5.1(D)(5), a person who disturbs or exposes RACS shall make the decision upon the initial discovery of RACS to either manage the RACS in accordance with Section 5.5, or cease soil disturbing activities and permanently stabilize the disturbed or exposed RACS to control the release of asbestos fibers in accordance with one of the following:
 - (a) Cover RACS with geofabric, or equivalent visible and physical barrier, and restore the site to pre-disturbance conditions using fill suitable for unrestricted use; or
 - (b) Cover RACS with geofabric, or other visible and physical barrier, followed by eighteen (18) inches of fill suitable for unrestricted use, and vegetation; or
 - (c) Cover RACS with geofabric, or other visible and physical barrier, followed by six (6) inches of fill suitable for unrestricted use, and concrete or asphalt; or
 - (d) Cover RACS with geofabric, or other visible and physical barrier, followed by fill suitable for unrestricted use to grade for vertical excavation faces or trenches; or
 - (e) Alternate cover designs as approved by the Department.

(5) RACS that is driven upon is an RWA and shall be kept adequately wet in order to prevent visible emissions from leaving the RWA, or demonstrate that asbestos is not leaving the RWA above risk based thresholds. All equipment surfaces that have come into contact with RACS shall be decontaminated per Section 5.5.7(I) before leaving the RWA.

5.5.2 EXEMPTIONS

- (A) Removal of ACM on a facility component with asbestos quantities above the trigger levels, as defined in 5.5.1(D)(2), is subject to the permit and abatement requirements of Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B), and is therefore not subject to this Section 5.5., but shall still comply with Sections 5.1 through 5.4 of these regulations.
- (B) Spill response activities that are subject to the requirements of Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B) are not subject to the requirements of Section 5.5, but shall still comply with Sections 5.1 through 5.4 of these regulations.
- (C) Ambient occurrences of asbestos fibers in soil that are demonstrated to be the result of background conditions and not the result of site specific activities are not subject to the requirements of this Section 5.5. This background demonstration shall be submitted to, and approved by, the Department prior to the exemption being exercised.
- (D) During active solid waste disposal operations, asbestos waste disposal areas that have a certificate of designation are not subject to Section 5.5, but shall comply with the facility's Engineering Design and Operations Plan.
- (E) De minimis projects involving a total RACS disturbance of less than one (1) cubic yard, utilizing low-emission methods, are exempt from this Section 5.5, except for the decontamination procedures in Section 5.5.7(I) and the disposal requirements in Section 5.5.8.
- (F) Projects conducted directly by a homeowner on their residence not used for the purpose of generating of income, including residential landscaping projects and other private residential soil-disturbing projects conducted after the primary dwelling is built, such as planting trees, digging holes for fence posts, installing sign posts, gardening,

other such projects conducted by homeowners on their residence, as described above, are not subject to this Section 5.5, but shall still comply with Sections 5.1 through 5.4 of these regulations.

- (G) Soil disturbing activities involving Non-RACS, where no RACS is present or generated, are not subject to the requirements of Section 5.5, but Non-RACS must be disposed as non-friable asbestos waste in accordance with the disposal requirements set forth in Section 5.2 of these regulations.
- (H) Soil disturbing activities involving debris that only contains metal, glass, plastic, wood, and/or bare concrete with no associated material suspected of being ACM (such as sealants, adhesives, mastics, coatings, adhered materials, or resins), as determined by a CABI, QMP, or generator knowledge, are not subject to the requirements of Section 5.5.
- (I) Soil disturbing activities involving debris that only contains green waste or natural stone are not subject to the requirements of Section 5.5.

5.5.3 TRAINING

- (A) All personnel inside the regulated work area (RWA) during the disturbance of RACS shall have annual awareness training. Except as provided in Section 5.5.3(F), this training requirement also applies to equipment operators and drivers of trucks carrying contaminated material for offsite disposal or reuse. This training shall cover information necessary to comply with Section 5.5 requirements and the approved project specific RACS management plan (PSMRP) or standard operating procedure (SOP) (if any) including:
 - 1) General asbestos awareness; including health effects; and
 - 2) Overview of the requirements of Section 5.5 and its implementation; and
 - 3) Overview of suspect ACM that requires further evaluation by a CABI; and
 - 4) Overview of RACS and Non-RACS; and

- 5) Worker protection, including respiratory protection. An overview of the levels of personal protective equipment (PPE) required for various activities and conditions; and
- 6) Decontamination requirements for equipment and personnel including the establishment of decontamination station(s); and
- 7) Engineering controls in order to prevent visible emissions from leaving the RWA or demonstrate that asbestos is not leaving the RWA above risk-based air thresholds; and
- 8) Overview of RACS handling procedures.

This training shall be conducted by a CABI who is familiar with the site specific plan and/or the Standard Requirements in Section 5.5.7. Records of this training shall be retained, by the owner/operator, and be available for inspection, for a minimum of one year from the date of the training.

(B) In addition to the annual asbestos awareness training required in 5.5.3(A), all personnel inside the RWA during the disturbance of RACS shall have per-project site-specific awareness training. Except as provided in Section 5.5.3(F), this training requirement also applies to equipment operators and drivers of trucks carrying contaminated material for offsite disposal or reuse. This training shall cover site-specific information necessary to comply with Section 5.5 and the selected management approach for the project (PSRMP, SOPs, or the standard requirements of Section 5.5.7), including:

- 1) An overview of the items from 5.5.3(A) as they pertain to site specific provisions and/or conditions that will affect work practices; and
- 2) Project chain-of-command and identification of authorized personnel with stop work authority, and identification of QPM(s); and
- 3) Hands on training specific to the soil disturbing activities the individual will be performing subject to this Regulation.

This training shall be provided by a CABI who meets the training requirements of 5.5.3(D). Records of this training shall be retained by

the owner/operator, and be available for inspection, for the duration of the project for which the training was conducted.

(C) Qualified Project Monitors shall have, at a minimum:

- 1) Annual asbestos awareness training and site specific awareness training under Section 5.5.3(A) and (B); and
- 2) Training from a CABI on identifying debris, exempted materials under Section 5.5.1(A)(3), and the assumption of debris to be RACS as outlined in Section 5.5.1; and
- 3) Training from a CABI on how to implement the standard requirements under Section 5.5.7 and how to perform the duties that a QPM may perform in lieu of a CABI; and
- 4) Training from a CABI on how to implement the provisions of the chosen RACS management approach (PSRMP, SOPs, or standard requirements of Section 5.5.7) and how to perform the duties that a QPM may perform in lieu of a CABI; and
- 5) Forty (40) verifiable hours of direct experience implementing Section 5.5.

Records of this training shall be retained by the owner/operator, and be available for inspection for the duration of the project for which the training was conducted.

(D) Visual Inspection and identification of RACS shall be conducted by a CABI, with forty (40) verifiable hours of on the job asbestos in soils experience on a minimum of three (3) different asbestos in soils projects, conducted under either AQCC Regulation No. 8 or Section 5.5. The CABI shall be independent of the general contractor (GC) and/or abatement contractor unless the CABI and the GC or abatement contractor are both direct employees of the property owner. However, the GC or abatement contractor may hire a subcontractor CABI, but the CABI shall not be a direct employee of the GC or abatement contractor.

(E) Air monitoring conducted in accordance with this Section 5.5 shall be performed by an Air Monitoring Specialist (AMS).

- (F) Truck drivers who do not complete the training in 5.5.3(A) and (B) are ancillary workers. Soil disturbing activities must cease if the truck driver is present within the RWA unless the driver remains in the cab of the truck, the truck's windows and doors remain closed, and the air handling system remains off while the truck is inside the RWA.

5.5.4 RESPONSE TO UNPLANNED RACS DISCOVERY

Soil disturbing activities that expose RACS without previously approved plans are subject to the following requirements:

- (A) IMMEDIATE ACTIONS: Immediate actions shall be taken by the person conducting the soil disturbing activity, or representative of the owner or operator, to manage RACS in accordance with Section 5.5 and Section 1.2 definitions of these Regulations. These actions shall include, at a minimum, the following:
 - (1) Stopping all soil disturbing activities related to RACS, until the 24-hour notification requirements in Section 5.5.4(B), and the interim action requirements in Section 5.5.4(C), are met. In the event of an emergency in which a soil disturbing activity must continue or commence at once, notification shall be made as soon as possible, but within 24 hours of identifying or assuming the presence of RACS within the soil disturbing area. During the initial response to the immediate emergency, the standard requirements of Section 5.5.7 shall be implemented to the extent possible. Within 48 hours, any disturbed and/or exposed RACS shall be managed in accordance with the standard requirements of Section 5.5.7, an approved PSRMP, or an approved SOP.
 - (2) Establishing and taking measures in order to prevent access to the RWA by unauthorized persons. Instances of unauthorized access not under the control of the owner/operator shall be evaluated to determine if additional access controls are warranted. The unauthorized access, and the response actions taken, shall be documented and provided to the Department within 48 hours of the incident.
 - (3) Conducting interim surface soil stabilization to reduce emissions including:

- a. Polyethylene sheeting or geofabric with daily inspection, and inspection after storm events, and repair/replacement of sheeting as necessary to maintain stabilization; or
- b. Chemical stabilizer demonstrated to be effective in the stabilization of RACS (e.g. magnesium chloride) with weekly inspection, and inspection after storm events, and re-application of chemical stabilizer as necessary to maintain stabilization; or
- c. Minimum of three (3) inches of soil appropriate for unrestricted use; or
- d. Other means of stabilization as approved by the Department.
- e. Stabilization is not required if RACS is kept adequately wet. Verification of adequately wet conditions shall be conducted at least every two (2) hours, or RACS shall be stabilized by one of the methods described in (3)(a-d) above.

(B) 24-HOUR NOTIFICATION REQUIREMENTS: The owner/operator, or owner/operator representative shall submit a completed Notification of RACS Disturbance form to the Department's Hazardous Materials and Waste Management Division within 24 hours of identifying RACS during a soil disturbing activity.

(C) INTERIM ACTIONS: In accordance with Section 5.5.5, the owner/operator, or owner/operator representative, shall submit to the Department's Hazardous Materials and Waste Management Division, for review and approval, within five (5) working days of the discovery, a PSRMP, SOPs, or indicate the standard requirements of Section 5.5.7 will be followed on the Notification of RACS Disturbance form submitted to the Department.

(D) Once the requirements of Sections 5.5.4(A), (B), and (C) are completed, any soil disturbing activities shall proceed in accordance with applicable requirements.

5.5.5 RESPONSE TO PLANNED RACS MANAGEMENT

Planned soil disturbing activities involving RACS shall be conducted in accordance with the standard requirements identified in Section 5.5.7, and with one of the following management strategies and the associated notification requirement:

(A) PROJECT SPECIFIC RACS MANAGEMENT PLAN (PSRMP);

- (1) The owner/operator, or owner/operator representative, shall submit a completed Notification of RACS Disturbance form to the Department's Hazardous Materials and Waste Management Division at least ten (10) working days prior to any planned soil disturbing activity. This notification shall include submittal of a PSRMP conforming to the requirements of Section 5.5.5(A)(2). The Department will acknowledge receipt of a notification of the intent to utilize a PSRMP by mail or electronic correspondence. The PSRMP shall be approved by the Department prior to implementation.
- (2) If the owner/operator choose(s) management in accordance with this Section 5.5.5(A), a PSRMP shall be developed and submitted to the Department's Hazardous Materials and Waste Management Division for review and approval prior to implementation. The Department will use its best efforts to review and respond to the plan within ten (10) working days of receipt. The PSRMP shall include the following:
 - (a) Property representative's name and phone number; and
 - (b) Property location; and
 - (c) General site description, including a description of RACS and the types of known or assumed ACM(s), and the location(s) of these material on the site; and
 - (d) Description of planned soil disturbing activities; and
 - (e) Description of site management, emission control activities, and work practices to control the release of, and/or exposure to, asbestos outside of the RWA including:
 - (i) Measures to assure that the soil is adequately wet (as that term is defined in Section 1.2 of these regulations), stabilized, or covered during soil disturbing activities; and
 - (ii) Wind speed monitoring during RACS disturbance, including frequency of monitoring, and shutdown and start up criteria; and
 - (iii) An air monitoring plan designed to detect asbestos at the perimeter of the RWA as an indication that the measures to control the release of asbestos outside of the RWA are effective. The plan may include a tiered air monitoring approach providing less frequent air monitoring given demonstrated effectiveness of work practices; and

- (iv) Work practices specific to mechanical and/or hand disturbance of RACS including measures in order to prevent the release of visible emissions outside of the RWA, or demonstrate that asbestos is not leaving the RWA above risk-based air thresholds; and
 - (v) Work practices for the loading and placement of RACS including spill prevention procedures.
 - (vi) The owner /operator has the option to erect a structure maintained at a negative pressure differential sufficient to contain all dust, with off-gas from the evacuation system treated with HEPA filtration. If this option is chosen, the requirement to submit an air monitoring plan, under Section 5.5.5(A)(2)(e)(iii) is not applicable.
- and

- (f) Description and location of any planned sampling. All sampling shall be performed in accordance with the procedures set forth in Appendix 5A. All investigation derived waste shall be managed in accordance with Section 5.5.8.

- (3) A copy of the PSRMP shall be maintained on the site during RACS disturbing activities.

- (4) At the option of the owner/operator and upon notice to the Department, a Soil Characterization and Management Plan approved prior to the effective date of this amended Section 5.5, and that complies with the substantive requirements of the regulation prior to amendment, shall remain in effect until the completion of the subject project or until it is replaced by a PSRMP.

(B) STANDARD OPERATING PROCEDURES (SOPs)

- (1) The owner/operator, or owner/operator representative, shall notify the Department's Hazardous Materials and Waste Management Division, by submitting a completed Notification of RACS Disturbance form, prior to implementation of the previously approved SOPs at a RWA. SOPs that conform to Section 5.5.5(B)(2) shall be approved by the Department prior to implementation. The Department will acknowledge receipt of a notification of the intent to utilize an SOP by mail or electronic correspondence.

(2) If the owner/operator chooses management in accordance with this Section 5.5.5(B), the owner/operator shall develop and submit to the Department's Hazardous Materials and Waste Management Division, for review and approval, thirty (30) calendar days in advance of any RACS disturbing activities, SOPs that conform with Section 5.5.5(A)(2)(a) – (f) that will be implemented, upon notice to the Department per Section 5.5.5(B)(1), at future RWA(s). A copy of the SOPs shall be maintained on site during RACS disturbing activities for the duration of the Project.

(3) At the option of the owner/operator and upon notice to the Department, a SOP approved prior to the effective date of this amended Section 5.5, and that complies with the substantive requirements of the regulation prior to amendment, shall remain in effect and may be used to comply with the amended regulation.

(C) STANDARD REQUIREMENTS OF SECTION 5.5.7

The owner/operator, or owner/operator representative, shall submit to the Department's Hazardous Materials and Waste Management Division a completed Notification of RACS Disturbance form indicating the intent to utilize the standard requirements of Section 5.5.7, as a default RACS management plan, prior to any planned soil disturbing activity. This notification shall include property location, general site description, and contact information for the owner/operator responsible for the RWA activities. The Department will acknowledge receipt of a notification of the intent to utilize the standard requirements of Section 5.5.7 by mail or electronic correspondence.

(D) RISK BASED APPROACH

The owner/operator may choose to submit, for Department review and approval, a site-specific risk assessment work plan to evaluate the risks of the proposed work practices associated with planned disturbance activities in an area or areas of RACS.

5.5.6 REMEDIATION OF ASBESTOS IN SOIL

(A) Remediation is not required of properties at which ACM, RACS, or asbestos waste is located. If the owner of a property chooses to remediate (rather than just manage) all or a portion of the property containing ACM, RACS, or asbestos waste a Remediation Plan shall

be submitted to the Department's Hazardous Materials and Waste Management Division for review and approval prior to commencement of activities associated with the remediation. The Remediation Plan shall comply with this Section 5.5, and include the following:

- (1) The standard requirements in accordance with Section 5.5.7, and the plan requirements outlined in Section 5.5.5(A). Alternatively, a risk based approach pursuant to Section 5.5.5(D) may be proposed, for Department review and approval, for disturbance of RACS; and
 - (2) A detailed description of planned remediation activities, including proposed depth and areal extent of remediation, and work practices to be implemented; and
 - (3) The proposed use of the property and area of remediation; and
 - (4) Any planned engineering or institutional controls in order to prevent exposure to any asbestos left in place, or minimize exposure below a risk-based concentration approved by the Department, within the area covered by the Remediation Plan, and
 - (5) A schedule for submittal of a Remediation Completion Report that incorporates the information from Section 5.5.7(L) and any additional information necessary to demonstrate that the remediation goals have been achieved.
- (B) The Department shall use its best efforts to provide written notification that a Remediation Plan has been approved or disapproved within no more than forty-five (45) calendar days after a request by a property owner, unless the property owner and the Department agree to an extension of the review to a date certain.
- (C) If a remedial decision is made by the Department, the area subject to the remedial decision may be subject to C.R.S. Section 25-15-320(2), and an environmental covenant may be required for waste left in place.

5.5.7 STANDARD REQUIREMENTS FOR THE DISTURBANCE OF RACS

The requirements of this section, if followed in their entirety, constitute a default RACS management plan, eliminating the need to submit a PSRMP or SOP.

(A) ESTABLISHMENT AND CONTROL OF A REGULATED WORK AREA (RWA)

(1) Requirements for establishment and control of a RWA applicable to all projects subject to this Regulation:

- (a) Establish a RWA which is identifiable to all persons. Haul roads between RWAs, where RACS is not present, are considered to be outside the RWA(s); however, equipment decontamination [Section 5.5.7(I)] and spill response procedures [Section 5.5.7(J)] shall be followed; and
- (b) Stop all soil disturbing activities in the RWA if ancillary workers or members of the public are present within the RWA. Truck drivers who do not complete the training under Sections 5.5.3(A) and (B) are ancillary workers. Soil disturbing activities must cease if the truck driver is present within the RWA unless the driver remains in the cab of the truck, the truck's windows remain closed, and the air handling system remains off while the truck is inside the RWA; and
- (c) Post labeling and signage to demarcate RWA(s). The RWA shall be demarcated by visible means that fully defines the extent of the RWA. Labeling and signage shall indicate the presence of asbestos, and that the area is off limits to unauthorized personnel.

(2) **Additional Requirement for Projects Disturbing RACS Containing Friable ACM.** Establish a secured work site (e.g., fencing with locks/zip-ties/chains). Personnel, or staff assigned to this duty, may be used to secure the RWA in lieu of fencing. If the RWA is located within a larger secure facility, fencing of the RWA is not necessary as long as the RWA is secured.

(B) PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR THE PURPOSES OF PREVENTING CROSS-CONTAMINATION

(1) Requirements applicable to all RWAs subject to this Regulation:

- (a) Use of disposable booties or impermeable footwear that will be decontaminated per Section 5.5.7(I); and
- (b) Use of disposable gloves or impermeable gloves that will be decontaminated per Section 5.5.7(I); and
- (c) Replace or decontaminate (per Section 5.5.7(I)) all PPE in all instances where the integrity of the PPE is compromised, and when workers exit the RWA; and
- (d) Decontaminate (per Section 5.5.7(I)) or dispose of all used PPE as asbestos contaminated waste.

(2) **Additional Requirement Applicable to Projects at RWAs**

Containing Friable ACM. Use of disposable impermeable suits or equivalent coveralls, remove suits or coveralls upon exiting the RWA, and dispose of used suits or coveralls as asbestos contaminated waste.

(C) WETTING

(1) Wetting requirements applicable to all RACS disturbance:

- (a) Adequately wet all RACS and soils, or other materials containing RACS, on the surface and in the sub-surface prior to and during RACS disturbance, except as provided in Section 5.5.7(F)(1)(b)(ii). Pre-wetting is not necessary if soils are already adequately wet. Apply water or amended water (as required in Section 5.5.7(C)(2)) at low pressure in order to minimize dust generation and splattering to prevent visible emissions from leaving the RWA, or demonstrate that asbestos is not leaving the RWA above risk-based thresholds.
- (b) Mist RACS and soils, or other materials, containing RACS during placement as needed to maintain the material in an adequately wet condition using equipment mounted spray bars, or additional hose operator(s).
- (c) Except as provided in (d) below, incidental occurrences of visible emissions leaving the RWA shall be managed by evaluating site conditions and engineering controls for each occurrence of visible emissions, and immediately implementing

any identified engineering control revisions necessary in order to prevent future occurrences of visible emissions. All instances of visible emissions leaving the RWA shall be documented as required in Section 5.5.7(L) of this regulation.

(d) When utilizing the risk-based air monitoring threshold approach to evaluate the effectiveness of adequately wetting, visible emissions are allowed to leave the RWA as long as the risk-based air threshold is not exceeded.

(2) Additional requirement for RACS that contains friable ACM.

Use amended water containing a wetting agent, such as a 50:50 mixture of polyoxyethylene ester and polyoxyethylene ether, or the equivalent, in a 0.16 percent solution (1 ounce to 5 gallons) of water, or as per manufacturer recommendations for the wetting of asbestos. This requirement may be waived by the Department for emergency situations where the work must occur immediately and wetting agents are not available.

(D) WIND SPEED MONITORING

(1) Requirements applicable to all projects involving mechanical disturbance of RACS, and hand disturbance of RACS containing friable ACM:

(a) Take wind measurements from within the RWA using a hand held anemometer. Alternatively, or in conjunction with hand held measurements, an onsite weather station may be used within a quarter mile of the RWA as long as the conditions measured by the weather station are representative of conditions in the RWA.

- i. Collect wind speed measurements at a minimum of thirty (30) minute intervals and during wind gust(s). Average wind speed measurements shall be obtained manually by taking ten readings at one minute intervals and averaging the ten readings, or through the use of instrumentation that provides a ten minute average wind speed reading.
- ii. If wind break barriers are used, wind speed measurements may be taken from within barriers; however, wind speed measurements shall also be taken outside the wind break barriers if any RACS disturbing activities, such as loading, are taking place outside or above the barriers. Wind speed

shut-down criteria shall be based on measurements taken that are representative of the area of active RACS disturbance.

- (b) Immediate stoppage of all RACS disturbance shall occur based on results of wind speed monitoring conducted in accordance with subsection (a) and exceedance of the following criteria:
 - i. Wind gust(s) in excess of 20 mph, or
 - ii. Sustained winds in excess of 12 mph, averaged over ten (10) minutes, or
 - iii. Winds are interfering with the ability of engineering controls to work as intended, or
 - iv. Winds are creating visible emissions that leave the RWA.

- (c) RACS disturbance may resume when all of the following criteria are met:
 - i. No gust(s) in excess of 20 mph occur for twenty (20) minutes, and
 - ii. No sustained winds in excess of 12 mph occur for twenty (20) minutes, based on a ten (10) minute average wind speed measurement, and
 - iii. Winds are not interfering with the ability of engineering controls to function as intended, and
 - iv. Winds are not creating visible emissions that leave the RWA.

(E) AIR MONITORING

- (1) If using the risk-based air threshold approach to monitor the effectiveness of adequately wetting:
 - (a) Air monitoring to determine asbestos content of visible emissions allowed to leave the RWA, for comparison to the risk-based air thresholds shall not be utilized for projects that are less than ten (10) days in duration.
 - (b) Air monitoring to determine asbestos content of visible emissions allowed to leave the RWA, for comparison to the risk-based air thresholds, shall begin on the first day of the project.
 - (c) A minimum of four (4) air samples per day shall be collected for TEM analysis.
 - (d) Sample collection, analysis, and data evaluation shall be conducted in accordance with Appendix 5A.

- (2) If preventing visible emissions leaving the RWA as an indication of the effectiveness of work practices, not for risk evaluation, air monitoring is required during mechanical disturbance of RACS in RWAs with an adjacent receptor zone:
- (a) No air monitoring is required for RACS disturbance that will not exceed a duration of two (2) days. However, the requirements for adequate wetting (Section 5.5.7(C)) and no visible emissions leaving the RWA (Section 5.5.7(F)) shall be adhered to on all RACS disturbance projects. Dividing projects into multiple two (2) day or shorter components shall not be used as a mechanism to avoid air monitoring requirements.
 - (b) Area monitoring shall consist of a minimum of four (4) samples collected on the perimeter of the RWA at appropriate intervals to provide representative information regarding potential releases of asbestos fibers to the adjacent receptor zone(s). Additional samples shall be collected for large perimeter RWAs (greater than one (1) acre). RWAs greater than one (1) acre shall require additional perimeter monitoring points be added at a rate of one (1) sample for every 200 linear feet (or approximately each additional $\frac{1}{4}$ acre). If representative information about potential releases to the adjacent receptor zone(s) can be collected using less than the minimum number of samples, the remaining sample locations shall be at the discretion of the AMS.
 - (c) Phase Contrast Microscopy (PCM) analysis is required on all samples collected (unless all samples will be analyzed by Transmission Electron Microscope (TEM) by default). The laboratory shall be requested to provide verbal results to the AMS or the QPM by the start of the next working day, or as soon as possible after the start of the next working day, with written results within 24 hours of the receipt of verbal results. A consultation with the Department is required if this timeframe cannot be met by the laboratory.
 - (d) Upon receipt of a laboratory report indicating a “cannot be read (CBR)”, or a “not analyzed (NA) or rejected” due to loose debris or uneven loading, analysis result:

- i. The AMS shall evaluate the lab report and any field documentation to determine a possible cause for the CBR or “not analyzed (NA) or rejected” result; and
 - ii. If the CBR or “not analyzed (NA) or rejected” cannot be correlated to a specific field event that compromised the sample (e.g. the sample was blown over, the filter of the sample was sprayed with water) then the sample shall be prepared for indirect TEM presence/absence analysis to determine potential asbestos content in accordance with Appendix 5A; and
 - iii. If the CBR or “not analyzed (NA) or rejected”, analysis result can be correlated to a compromised sample, then preparation for indirect TEM presence/absence analysis is not required as long as adequate air monitoring data is available to evaluate the effectiveness of engineering controls. However, overloading of a sample with particulate matter does not constitute a compromised sample, and will require indirect preparation for TEM presence/absence analysis; and
 - iv. Field personnel shall evaluate why the sample was compromised and modify field procedures as necessary to avoid future samples from being compromised; and
 - v. The Department project manager shall be notified by phone or email of instances of CBR or “not analyzed (NA) or rejected” analysis results within 24 hours of receipt of verbal results.
- (e) TEM presence/absence analysis is required (analysis providing fiber counts/concentrations is always optional) as described in paragraphs (i) through (iv) below. The laboratory shall be requested to provide verbal results by the start of the next working day, or as soon as possible after the start of the next working day, with written results within 24 hours of the receipt of verbal results.
- i. All samples, required by this Section 5.5, with PCM results having fiber concentrations greater than 0.01f/cc shall be submitted for TEM analysis.
 - ii. During the first five (5) days of RACS disturbance – A minimum of 25% of the samples collected from each RWA, inclusive of the downwind floating samples as described in 5.5.7(E)(2), shall be submitted for TEM analysis. The

sample(s) selected for TEM analysis shall have the highest PCM result(s) based on fiber concentration. If all PCM results are Below Detectable Limit (BDL) for fiber concentration, then the sample(s) selected for TEM analysis shall be determined by highest fiber count. If all samples have no fiber counts (i.e. zero (0) fibers counted, not a "below detection limit" fiber concentration) then no TEM analysis is required.

- iii. After five (5) days of RACS disturbance with no asbestos detections by TEM analysis, the frequency of analysis by TEM, on the highest 25% of PCM results(s), may be reduced to once every five (5) days of RACS disturbance, or portions thereof, using the same selection criteria as in paragraphs (i) and (ii) above. The samples submitted for TEM analysis during the period of reduced frequency TEM analysis shall be either the first occurrence of: 1) high winds exceeding wind shut down criteria, or 2) visible emissions. In the absence of high wind events or visible emissions the selected day for TEM analysis may be random, as determined by the AMS.
 - iv. If there are any asbestos detections during the random once every five (5) days of RACS disturbance analysis by TEM, then TEM analysis shall be conducted for the next three (3) consecutive days of RACS disturbance, or portions thereof, using the same procedures as in paragraph (i) and (ii) above. If there are no additional asbestos detections during the next three (3) consecutive days of RACS disturbance with samples submitted for TEM analysis, then the frequency of TEM analysis may return to random once every five (5) days of RACS disturbance.
 - v. If site conditions, friability of the materials being managed, or work practices change, then the initial five (5) days of TEM analysis shall restart using the provisions set forth in this Section 5.5.7(E)(1)(e).
- (f) Detection or presence responses - For each detection of asbestos by TEM analysis, the following shall be conducted:
- i. Notify the Department project manager by phone or email, on the same calendar day as receipt of verbal or written results (whichever comes first) from the laboratory.
 - ii. Evaluate site conditions and engineering controls for each detection, and immediately implement any identified

engineering control revisions necessary with the goal of preventing future detections of asbestos fibers.

- iii. Submit an Emission Control Plan (ECP) to the Department project manager for each detection (days with multiple detections can be addressed by a single ECP). The ECP shall be submitted within 48 hours from the asbestos detection event and shall contain:
 1. The date of the detection.
 2. A written description of sample details (sample ID, number of structures detected, type of asbestos detected, PCM analytical result) and any potential cause of the release. Include a description of site activity (engineering controls being employed, equipment being used, size of excavation/soil disturbing activity, types of materials identified, etc.) and CABI observations at the work area before and during the presumed time of release.
 3. A diagram or write up of all air sample positions clearly indicating which sample received the TEM detection. Indicate, through illustration or description, prevailing wind direction and average wind speeds for the detection event; include any wind speed shutdowns for the date of detection. If applicable, indicate downwind floater air sample relocation times and new positions through illustration or description.
 4. Laboratory reports confirming the type and amount of fibers detected by TEM analysis.
 5. Other pertinent information that will additionally describe the release and/or will assist in the prevention of future releases from the RWA.
 6. A written description of actions taken and any other proposed actions with the goal of preventing future releases from the RWA.
 7. If the owner/operator believes fibers are coming from offsite and are not under the control of the owner/operator, then, in addition to the information provided in the ECP, documentation shall be provided demonstrating additional sources of asbestos fibers.

- (g) If there are three (3) TEM detections on consecutive analysis events or ten (10) detections for a single project, consultation with the Department is required to determine if the standard requirements of Section 5.5.7 are being implemented appropriately and whether:
 - i. Changes in the standard requirements of Section 5.5.7 are likely to prevent future releases; or
 - ii. Changes in the standard requirements of Section 5.5.7 are not likely to prevent future releases and a PSRMP is necessary per Section 5.5.5(A)(2); or
 - iii. If the owner/operator believes fibers are coming from offsite and are not under the control of the owner/operator, then, in addition to the information provided in the ECP, documentation shall be provided demonstrating additional sources of asbestos fibers. Air samples shall be collected and analyzed following the analytical procedures of Appendix 5A for the type of project being conducted; and
 - iv. Additional consultation with the Department is required to determine whether additional engineering controls for structures within the adjacent receptor zone are appropriate.

(3) **Additional requirement for projects disturbing RACS containing friable ACM.** Collect two (2) additional downwind floating samples for mechanical disturbance of RACS containing friable ACM. The samplers shall be moved based on prevailing wind direction and adjacent receptors. For example, if adjacent receptors are present on only one side of the RWA, one sample location should be maintained between the RWA and the adjacent receptor.

(F) **WORK PRACTICES TO BE FOLLOWED DURING RACS DISTURBANCE**

- (1) Work practice requirements applicable to all management of RACS:
 - (a) Prevent visible emissions from leaving the RWA, or demonstrate that asbestos is not leaving the RWA above risk based thresholds by:
 - i. Excavating in lifts not to exceed the extent of wetting; or

- ii. Conducting continuous wetting while mixing dry materials at the point of RACS disturbance to ensure all materials are adequately wet prior to removal from the excavation.
 - iii. Instances of visible emissions leaving the RWA shall be documented and addressed by changing or increasing controls (e.g. more effective wetting, reduced speed of excavation).
- (b) RACS on exposed excavation faces that will be disturbed and/or managed during the project shall either be kept adequately wet (in accordance with Section 5.5.7(C)), or be stabilized using any of the following in order to prevent visible emissions from leaving the RWA, or demonstrate that asbestos is not leaving the RWA above risk based thresholds:
- i. Polyethylene sheeting or geofabric with daily inspection, and inspection no later than twelve (12) hours following a storm event, and repair/replace sheeting as necessary to maintain stabilization; or
 - ii. Chemical stabilizer demonstrated to be effective in the stabilization of RACS (e.g. magnesium chloride) with weekly inspection, and inspection no later than one (1) calendar day following a storm event, and re-application of chemical stabilizer as necessary to maintain stabilization; or
 - iii. Minimum of three (3) inches of soil appropriate for unrestricted use.
- (c) Stormwater shall be managed in accordance with the Water Quality Control Commission's stormwater regulations (5 CCR 1002-61), which include specific stormwater permitting and management requirements for construction sites. The Water Quality Control Division should be contacted to determine the specific requirements for each project. Stormwater shall be managed in a manner that minimizes run on and runoff from RACS. Stormwater that comes into contact with RACS shall be treated as asbestos contaminated water in accordance with Section 5.5.7(J)(4), and other material(s) impacted by asbestos contaminated stormwater shall be managed as RACS in accordance with Section 5.5.7(J)(3).

(2) Work Practice requirements applicable to the management of RACS using hand methods on surfaces or in the subsurface:

- a. Wet and remove the RACS and six (6) inches, in all directions, of surrounding soil or other material from the last occurrence of visible ACM; and
- b. A CABI shall confirm that the visible extent of ACM and surrounding soil, or other material, has been removed (or extent of excavation has been reached). If RACS remains, it shall be managed for stabilization or future removal. If there is no documented evidence of non-visible RACS at the site, then a visual inspection and clearance shall be sufficient to determine the removal of RACS. If there is documented evidence of non-visible RACS at the site, sampling is required to confirm the removal of RACS. After the removal of the additional six (6) inches, and in the absence of any debris, a QPM may make the determination that RACS has been removed; and
- c. If RACS remains in the RWA, it shall be managed for stabilization, per Section 5.5.7(K), or future removal.
- d. In lieu of stabilization or full removal, sampling may be performed per Section 2.2 of Appendix 5A to demonstrate that the material is not RACS.
- e. Dispose of RACS in accordance with Section 5.5.8.

(3) Work practice requirements applicable to management of RACS using mechanical methods:

- a. For surface occurrence of RACS - Wet and remove all RACS and a minimum of six (6) inches of soil, and/or other matrix material, in all directions from the last occurrence of visible ACM, with CABI confirmation that the visible extent of RACS has been removed.
- b. For subsurface occurrence of RACS - Wet and remove all RACS and a minimum of three (3) linear feet of soil or other matrix material, in the direction(s) of planned excavation, with CABI confirmation that the visible extent of RACS has been removed. If there is no documented evidence of non-visible

RACS at the site, then a visual inspection and clearance shall be sufficient to determine the removal of RACS. If there is documented evidence of non-visible RACS at the site, sampling is required to confirm the removal of RACS. After the removal of the additional three (3) linear feet, and in the absence of any debris, a QPM may make the determination that RACS has been removed.

- c. If RACS remains in the RWA, it shall be managed for stabilization, per 5.5.7(K), or future removal.
- d. In lieu of stabilization or full removal, sampling may be performed per Appendix 5A to demonstrate that the material is not RACS.
- e. Package and dispose of RACS in accordance with Section 5.5.8.

(4) Soil or other matrix material that remains after removal of RACS in accordance with Section 5.5.7(F), Section 5.5.7(H)(1)(c)(i), or an approved plan, is not considered RACS, is not subject to Section 5.5, and may be appropriate for unrestricted use, onsite or offsite, as long as it does not contain any other regulated material.

(G) LOADING AND PLACEMENT OF RACS

(1) Requirements for the loading of RACS:

- (a) Protect clean surfaces (including loading surface and truck or disposal container surfaces that may come in contact with RACS) by covering or decontamination of surfaces prior to transport or removal of the truck or disposal container from the RWA and/or loading zone.
- (b) Spill prevention shall consist of:
 - i. Minimization of spillage by not overfilling the excavator or loader bucket and returning the bucket to a closed position prior to moving from the loading point; and
 - ii. Replacement of protective coverings when worn or damaged in order to prevent breaches; and
 - iii. Control of runoff in order to prevent cross contamination from water containing asbestos; and

iv. Mitigation of spills of RACS in accordance with Section 5.5.7(J).

(c) During the process of loading the container, the equipment operator shall lower the bucket as close as possible to the interior of the container before dumping, and dump the load slowly to allow adequate misting and in order to prevent visible emissions from leaving the RWA, or demonstrate that asbestos is not leaving the RWA above risk based thresholds.

(2) Requirements for the transportation of RACS:

(a) Onsite transportation of RACS between the RWA and an onsite area of staging, stockpiling, storage, disposal or reuse shall comply with the following:

- i. The packaging requirements for RACS set forth in Section 5.5.8(A) of these regulations are not applicable; however, the decontamination requirements of Section 5.5.7(I) shall be followed at the end of disposal operations, or before disposal equipment is removed from the site; and
- ii. Driving speeds shall not exceed 12 miles per hour or RACS shall be covered during transport; and
- iii. For transportation between the RWA and a non-contiguous onsite staging, stockpiling, storage, disposal, or reuse area:
 1. Transportation equipment tires shall not contact RACS; or
 2. RACS that is driven upon is a RWA and shall be kept adequately wet in order to prevent visible emissions from leaving the RWA, or demonstrate that asbestos is not leaving the RWA above risk based thresholds, and all equipment surfaces that have come into contact with RACS shall be decontaminated per Section 5.5.7(I) before leaving the RWA; or
 3. The haul road shall be managed as RACS for stabilization, per Section 5.5.7(F)(1), and future removal of a minimum of three (3) inches of soil, or other matrix material. If the road is constructed of a durable surface such as concrete or asphalt, the surface shall be decontaminated in accordance with Section 5.5.7(I)(1)(b) using wet methods, followed by CABI inspection verifying that all soil and debris has been removed from the

surface. Rinsate/runoff shall be collected and filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will be managed under these regulations.

(H) ONSITE STAGING, STOCKPILING, AND STORAGE OF RACS

(1) Staging, as defined in Section 1.2 of these regulations, is the accumulation and temporary storage of RACS in the RWA for 12 hours or less. The following requirements shall apply to the staging of RACS:

(a) Staged RACS shall be kept adequately wet.

(b) Staging of RACS shall be on 6 mil, or greater, polyethylene sheeting or shall include removal, and management as RACS, of a minimum of three (3) inches of material, from below the staging pile/area prior to demobilization; with visual or measured confirmation of removal. If polyethylene sheeting is placed on top of a durable surface such as concrete or asphalt, the surface must be decontaminated using wet methods, followed by CABI inspection verifying that all soil and debris has been removed from the surface. Rinsate/runoff shall be collected and filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will be managed under these regulations.

(c) Material determined to be clean during generation shall be inspected during placement for staging. Staging of clean material with incidental discovery of RACS shall be managed as follows:

- i. If a CABI was continually inspecting the material during generation, remove the piece of ACM and one (1) foot of material in all directions, with CABI confirmation that the visible extent of RACS has been removed. If more than one (1) piece of ACM, or a pocket of ACM is discovered, remove the pocket of ACM plus one (1) foot of material in all directions, with CABI confirmation that the visible extent of RACS has been removed. Material that remains after removal of RACS, and CABI visible confirmation, is not

considered RACS, is not subject to Section 5.5, and may be appropriate for unrestricted reuse, onsite or offsite, as long as it does not contain any other regulated material.

- ii. If a CABI was not continually inspecting the material during generation, an intrusive inspection of the pile shall be conducted to determine the extent of RACS contamination, followed by the removal of the visible extent of contamination plus removal of one (1) foot of material in all directions. Alternatively, the entire pile, plus three (3) inches of material below the pile, shall be removed and managed as RACS. If the pile was placed on top of a durable surface such as concrete or asphalt, the surface shall be decontaminated using wet methods, followed by CABI inspection verifying that all soil and debris has been removed from the surface. Rinsate/runoff shall be collected and filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will be managed under these regulations.

(2) Stockpiling, as defined in Section 1.2 of these regulations, is the accumulation and storage of RACS that will exist for more than twelve (12) hours, up to and including ten (10) calendar days. The following requirements shall apply to stockpiled RACS:

- (a) Stockpiled RACS shall be placed on a minimum of 6 mil polyethylene sheeting or shall include removal, and management as RACS, of a minimum of three (3) inches of soil, or other matrix material, from under the entire area of RACS stockpiling after stockpile removal. If the stockpile was placed on top of a durable surface such as concrete or asphalt, the surface must be decontaminated using wet methods, followed by CABI inspection verifying that all soil and debris has been removed from the surface. Rinsate/runoff shall be collected and filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will be managed under these regulations.
- (b) RACS shall be adequately wet during disturbance.
- (c) Stockpiled RACS shall be controlled per Section 5.5.7(A).

(d) Stockpiled RACS shall be stabilized by:

- i. Polyethylene sheeting or geotechnical fabric with daily inspection, and inspection no later than twelve (12) hours following storm events, and repair/replace sheeting as necessary to maintain stabilization; or
- ii. Chemical stabilizer demonstrated to be effective in the stabilization of RACS (e.g. magnesium chloride) with weekly inspection, and inspection no later than one (1) calendar day after storm events, and re-application of chemical stabilizer as necessary to maintain stabilization; or
- iii. Minimum of three (3) inches of soil appropriate for unrestricted use.

(e) For stockpile areas that are non-contiguous with the RWA, transportation of RACS shall be conducted in accordance with the following:

- i. Transportation equipment tires shall not contact RACS; or
- ii. The tires shall be decontaminated per Section 5.5.7(I) before leaving the RWA; or
- iii. The haul road shall be managed as RACS for stabilization, per Section 5.5.7(H)(2)(d), and future removal of a minimum of three (3) inches of soil, or other matrix material. If the road is constructed of a durable surface such as concrete or asphalt, the surface shall be decontaminated using wet methods, followed by CABI inspection verifying that all soil and debris has been removed from the surface. Rinsate/runoff shall be collected and filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will be managed under these regulations.

(f) For a stockpile that was previously thought to be free of RACS, but where RACS is subsequently identified, the procedure outlined in Section 5.5.7 (H)(1)(c) shall be followed.

(3) Storage of RACS exceeding ten calendar days shall require the submission of a RACS Storage Plan. Storage of RACS shall not commence prior to approval of the RACS Storage Plan by the Department's Hazardous Materials and Waste Management Division. The RACS Storage Plan shall include:

- (a) Approval of storage with signature from the property owner; and
 - (b) Volume of RACS intended for storage; and
 - (c) Liner design or provisions for removal of a minimum of three (3) inches of underlying material; and
 - (d) Storm water design including protections for run-on and run-off; and
 - (e) Cover design or use of an equivalent durable stabilizer; and
 - (f) Access control and signage; and
 - (g) Storage timeframe (shall not exceed six (6) months unless an extended storage timeframe is approved by the Department and complies with local governing authority requirements); and
 - (h) Inspection and maintenance schedule; and
 - (i) Closure and removal requirements; and
 - (j) Documentation and reporting; and
 - (k) Certification of any designed elements by a Colorado registered Professional Engineer.
- (4) Temporary sub-surface storage of RACS in areas of future planned RACS removal shall not exceed six (6) months and shall comply with the following:
- (a) RACS may only be placed within the Area of Contamination (AOC) that it was originally removed from.
 - (b) Placement of RACS utilizing standard RACS management requirements in accordance with the standard requirements of Section 5.5.7, an approved PSRMP, or an approved SOP.
 - (c) Cover RACS in accordance with the requirements of Section 5.5.7(K).

(d) RACS not removed within six (6) months (unless an extended storage timeframe is approved by the Department), shall be considered disposal in accordance with Section 5.5.8(A), or reuse within an AOC and will require an environmental covenant in accordance with Section 5.5.8(B)(1).

(5) Offsite staging, stockpiling, and storage of RACS are allowed as long as they comply with the disposition requirements of Section 5.5.8.

(I) DECONTAMINATION

(1) Requirements applicable to all projects subject to Section 5.5:

(a) Personnel Decontamination:

- i. Remove booties and/or gloves before exiting RWA and dispose as asbestos contaminated waste; or
- ii. If not using disposable PPE, decontaminate boots in a boot wash station, remove gloves after exiting the boot wash station, and dispose of gloves as asbestos contaminated waste. Rinsate from the boot wash station shall be collected, filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility, or re-applied to RACS that will be managed under these regulations.

(b) Decontamination of Equipment or Surfaces that have come into Contact with RACS

- i. For equipment that comes into contact with RACS:
 1. Wet decontamination on a decontamination pad (minimum 10 mil poly or other durable non-permeable barrier) followed by CABI inspection and verification of equipment decontamination before it leaves the decontamination area. All decontamination liquids and solids shall be contained, and run-on and run-off shall be prevented. Rinsate/runoff shall be collected, filtrated to less than 5 microns (or applicable local requirements) and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will

be managed under these regulations. For breaches in the decontamination pad where RACS or water contaminated with asbestos may have impacted the material below the decontamination pad, implement the provisions of Section 5.5.7(J);

and/or

2. Decontamination using HEPA vacuums followed by CABI inspection and verification of equipment decontamination before it leaves the decontamination area.

(c) Protection of Clean Equipment and Surfaces:

- i. Keep all equipment off of RACS; or
- ii. Protect clean surfaces from coming in contact with RACS by covering equipment surfaces or RACS surfaces with polyethylene sheeting or equivalent durable impermeable covering. For onsite movement of excavation equipment between RWAs, where only the excavator bucket has come in contact with RACS, the bucket shall be wrapped in polyethylene sheeting (minimum 6 mil) prior to movement. Protective coverings shall be cleaned, repaired, or replaced as necessary. If protective coverings are breached and RACS or asbestos contaminated water comes into contact with underlying material, the provisions of Section 5.5.7(J) shall be followed. Coverings that have come in contact with RACS shall be disposed as asbestos contaminated waste.

(2) Additional Requirements for Projects Disturbing RACS Containing Friable ACM:

- (a) Remove disposable impermeable suits or equivalent coveralls before exiting RWA and dispose as asbestos contaminated waste, or
- (b) After removal of suits or coveralls, conduct full wet decontamination prior to exiting RWA with collection of rinsate and filtration to less than 5 microns and discharge to a sanitary sewer or other Department-approved disposal facility. Re-application of decontamination shower water is prohibited.

(J) RACS SPILL RESPONSE

- (1) Areas where RACS is spilled are RWAs until clean up is completed.
- (2) Spilled material shall be cleaned up immediately and not allowed to dry out or accumulate on any surface. The Department's Hazardous Materials and Waste Management Division shall be notified, through the spill reporting hotline, in the event that spills of RACS cannot be cleaned up within 24 hours of spill identification.
- (3) Where there are breaches in ground coverings that have the potential to allow RACS or water contaminated with asbestos to impact the material below the covering, a minimum of three (3) inches of soil, or other matrix material, shall be removed from beneath the breached ground coverings. Visual or measured (e.g. survey) confirmation that three (3) inches of soil and/or other matrix material from beneath the breached covering has been removed shall be conducted. If ground coverings are placed on top of a durable surface such as concrete or asphalt, the surface shall be decontaminated using wet methods, followed by CABI inspection that all soil and debris has been removed from the surface.
- (4) Rinsate, runoff, or any other water that has come into contact with RACS shall be considered to be asbestos contaminated water and shall be collected and filtrated to less than 5 microns and discharged to a sanitary sewer or other Department-approved disposal facility or re-applied to RACS that will be managed under these regulations.
- (5) Surfaces that are contacted by asbestos contaminated water shall be managed as RACS as per Section 5.5.7(J)(3) or permanently stabilized as per Section 5.5.7(K).
- (6) If work practices in an RWA are causing an ongoing spill outside the RWA, the work practices shall cease or be modified to prevent additional releases.

(K) REQUIREMENTS FOR EXPOSED RACS REMAINING IN PLACE

- (1) Any remaining RACS that has been exposed by the soil disturbing activity, but is not disturbed, such as an excavation side-wall or bottom shall be covered or stabilized using one of the following:

- (a) Cover RACS with geofabric, followed by eighteen (18) inches of fill suitable for unrestricted use, and vegetation; or
- (b) Cover RACS with geofabric, followed by six (6) inches of fill suitable for unrestricted use, and concrete or asphalt; or
- (c) Cover RACS with geofabric, followed by fill suitable for unrestricted use to grade or six (6) inches, whichever is greater, for vertical excavation faces or trenches; or
- (d) Alternate cover designs as approved by the Department.

(L) DOCUMENTATION

(1) The documents listed below shall be maintained during a project and available for Department review upon request. However, this documentation need not be submitted to the Department unless requested. CABI and AMS notes may be collected by one individual if they possess both certifications; however, if no AMS is onsite the CABI shall provide items listed in the AMS notes section (e.g. wind monitoring and shutdown events). CABI and AMS notes may be taken by another individual, but shall be reviewed, approved, and signed by the CABI or AMS for whom the notes are being taken. Other appropriate personnel may also provide the following documentation.

(a) CABI/QPM Notes shall include documentation of:

- i. Site description including location; and
- ii. Descriptions of site activities; and
- iii. Descriptions of equipment in use; and
- iv. Descriptions of hand removals (including locations); and
- v. Descriptions of types of debris identified; and
- vi. Descriptions of suspect material identified; and
- vii. Friability of ACM identified (as determined by a CABI); and
- viii. Sampling, if conducted (all sampling shall be conducted by a CABI); and
- ix. Decontamination visual inspection and clearances; and
- x. Excavation visual inspection and clearances; and
- xi. Spill response activities; and
- xii. Observations of visible emissions and responses; and

- xiii. Observations of non-earthen material or the appearance of fill; and
- xiv. Observations of other indicators of impact to soils.

(b) AMS notes shall include documentation of:

- i. Wind speed measurements; and
- ii. Prevailing wind direction(s); and
- iii. Wind shut down event(s); and
- iv. Initial air sample locations; and
- v. Air sample relocation notes; and
- vi. Observations of visible emissions and responses; and
- vii. Notes pertaining to sample malfunctions (pump faults, overloading, etc.); and
- viii. Instances of samples being compromised (samples knocked over, sample filters being sprayed with water, samples physically impacted by equipment, etc.); and
- ix. Air sample data (flow rates, time of sampling, volumes, calibration method, etc.).

(c) General documentation shall include:

- i. Disposal records; and
- ii. Analytical reports including chain of custody forms; and
- iii. Evaluations of any samples with a “cannot be read” analysis result and the notifications of these events to the Department; and
- iv. Location of known remaining RACS; and
- v. Creation and removal dates for, and locations of, staged, stockpiled, and/or stored RACS; and
- vi. Stockpile and staging pile inspection logs and documentation of weather events requiring inspection; and
- vii. Logs of all site personnel with access to the RWA; and
- viii. Certification records for all CABIs and AMSs utilized on the project, and
- ix. Records for training conducted in accordance Sections 5.5.3(A) and 5.5.3(B); and
- x. Records demonstrating the QPM(s) meet the training and experience requirements set forth in Section 5.5.3(C); and
- xi. ECP(s) generated during the project.

5.5.8 PACKAGING AND DISPOSITION OF REGULATED ASBESTOS CONTAMINATED SOIL (RACS)

(A) Disposal of RACS

(1) RACS containing one percent (1%) or greater of friable ACM (as determined in the field by a CABI) by volume per load or container, based on visual estimation through continuous visual inspection or other Department-approved quantifiable means of measurement, shall be packaged in a leak tight container and disposed as friable asbestos waste, in accordance with Section 5.3 of these regulations. Alternatively, a friable ACM determination by a CABI is not required if the disposal load is assumed to be RACS containing 1% or greater of friable ACM and is packaged and disposed of in accordance with Section 5.3 of these regulations. Documentation shall accompany each load of RACS removed from the site stating that soil originating from this site shall not be used as daily cover or reused offsite.

(2) For RACS containing:

(a) Less than one percent (1%) of friable ACM (as determined in the field by a CABI) by volume, per load or container, based on visual estimation through continuous visual inspection, or other Department-approved quantifiable means of measurement, shall be packaged in a leak tight container and disposed in a manner similar to non-friable asbestos waste, as described in Section 5.2 of these regulations. Documentation must accompany each load of RACS removed from the site stating that soil originating from this site shall not be used as daily cover or reused offsite.

(b) Except as provided by Section 5.5.8(A)(3), only visible non-friable ACM (as determined in the field by a CABI) that has not been rendered friable, or RACS that contains no visible ACM, shall be packaged in a leak tight container and disposed of as non-friable asbestos waste in accordance with Section 5.2 of this Part 5. Documentation shall accompany each load of RACS removed from the site stating that soil originating from this site shall not be used as daily cover or reused offsite.

- (c) A total volume of debris that is less than 1% of the disposal load, based on visual estimation through continuous visual inspection, and the debris is all assumed to be RACS, then a CABI is not required to make a friable ACM determination.
- (3) Owners/operators may utilize alternative packaging for RACS, that contains only non-friable ACM and/or asbestos fibers in soil, that ensures that there are no visible emissions during transport to or from the landfill. The alternative packaging must also be acceptable to the disposal facility accepting the waste. A written notice shall be submitted to the Department at least forty-eight (48) hours prior to the alternative packaging being used. If alternative packaging will be used for material that contains any amount of friable asbestos waste, the alternative packaging shall be in accordance with Section 5.3.5 of the Regulation.
- (4) A Design and Operations (D&O) plan shall be submitted to, and approved by, the Department for onsite disposal of RACS outside of the AOC, in accordance with the Colorado Solid Wastes Disposal Sites and Facilities Act (C.R.S. 30-20, Part 1) and these regulations. The packaging requirements set forth above in Section 5.5.8(A)(1-2) are not required for onsite disposal, but the requirements of Section 5.5.5(A)(2)(e) are applicable. An environmental covenant, in accordance with 25-15-320, C.R.S., is required for onsite RACS disposal, and a Certificate of Designation shall be required, in accordance with Section 1.6 of these regulations, unless exempt under Section 1.4.

(B) Onsite reuse of RACS:

- (1) A plan for reuse of RACS within the footprint of the AOC shall be submitted to the Department for review and approval prior to implementation and shall comply with Section 5.5.5(A)(2)(e), and the following cover requirements:
 - (a) Cover RACS with geofabric, followed by eighteen (18) inches of fill suitable for unrestricted use, and vegetation; or
 - (b) Cover RACS with geofabric, followed by six (6) inches of fill suitable for unrestricted use, and concrete or asphalt; or

- (c) Cover RACS with geofabric, followed by fill suitable for unrestricted use to grade or six (6) inches, whichever is greater, for vertical excavation faces or trenches; and
 - (d) The final grades shall promote surface water run-off and minimize erosion, and shall have slopes no less than 5% (20:1) and no greater than 25% (4:1); or
 - (e) Alternate cover designs as approved by the Department; and
 - (f) An environmental covenant, in accordance with 25-15-320, C.R.S., may be required for onsite reuse of RACS.
- (2) A plan for beneficial reuse of RACS outside the footprint of the AOC, in accordance with Section 8.6, shall be submitted to the Department for review and approval prior to its implementation. The plan shall include provisions for covering RACS and shall comply with the management requirements of Section 5.5.5(A)(2)(e). Additionally, the cover requirements outlined in Section 5.5.7(K) shall be adhered to. An environmental covenant, in accordance with 25-15-320 C.R.S. may be required for beneficial reuse of RACS.

(C) Demonstration of Non-RACS

- (1) Soil or other matrix material initially determined to be RACS may be demonstrated not to be RACS based on visual inspection, removal of all ACM, and sampling and analysis of the remaining material showing no detectable asbestos. Sampling and analysis shall be conducted in accordance with Appendix 5A. If there is no detectable asbestos, this material is no longer subject to Section 5.5 and may be appropriate for unrestricted use, onsite or offsite, as long as it does not contain any other regulated material.

5.5.9 FEES

The Department shall collect fees, from the owner, operator, or person conducting the soil disturbing activity, based on total documented costs, in accordance with Section 1.7

APPENDIX 5A
SAMPLE COLLECTION PROTOCOLS AND ANALYTICAL METHODOLOGIES

1.0 Purpose

- (A) The purpose of this appendix is to establish standard sample collection requirements and analytical methods and procedures for use in identifying and quantifying asbestos fibers in air, bulk material, and environmental media such as soil or ash.

2.0 Sample Collection Requirements

- (A) The following sample collection requirements shall be followed when collecting samples for the purpose of determining the applicability of Section 5.5, and when collecting samples necessary to comply with the requirements of Section 5.5. Remediation plans submitted in accordance with Section 5.5.6 shall include a site specific sampling and analysis plan that incorporates the sample collection methodologies and analytical procedures in this Appendix, or proposes alternatives, and include site specific clearance criteria.

2.1 Bulk Samples

- (A) Bulk samples shall be collected, in a manner sufficient to determine whether the material is asbestos-containing material (ACM) or not ACM, from each type of suspect ACM. Bulk samples shall be collected by a State of Colorado certified Asbestos Building Inspector (CABI). In the absence of bulk sample collection, any suspect ACMs must be assumed to be ACMs.
- (B) Bulk samples shall be collected by homogenous type based on color, pattern, texture, thickness, associated materials, or by other identifying characteristics. Additionally, the quantity and location of a suspect material shall be used to determine the number of bulk samples required to characterize the asbestos content of each homogeneous suspect material. For the purpose of determining that a homogeneous suspect material does not contain asbestos, a minimum of three (3) bulk samples shall be collected from the homogeneous material unless there is insufficient material to constitute three (3) samples. If one of the collected samples of a homogeneous bulk material is determined to be ACM, then the homogeneous material shall be considered ACM.

2.2 Soil Samples

- (A) Samples collected to determine asbestos content in soil shall be ten (10) point aliquot composite samples collected from a maximum area of 1,250 square feet (representing 0-6 inches beyond the exposed surface) or a maximum volume of forty (40) cubic yards. Individual aliquots shall be approximately 1/10 of the entire sample volume. At each aliquot location approximately one (1) tablespoon of soil shall be collected. The total volume of the ten (10) aliquots should equal roughly a half cup. The total collected sample volume should be greater than one quarter ($\frac{1}{4}$) cup, but should not exceed one cup. Aliquot locations shall be randomly selected but shall be representative of the entire sample area or volume (to be inclusive of the interior of soil piles in addition to the surface). However, aliquots shall be co-located with any areas where friable ACM was formerly present. All samples collected to determine asbestos content shall be collected by a CABI.
- (B) Sampling for clearance purposes of any exposed horizontal or vertical surface shall have the following additional requirements:
- 1) The aliquots of a clearance sample shall not be collected until after the RACS, and the required amount of associated material, has been removed.
 - 2) A visual inspection shall be performed and passed (i.e., no visible ACM present) by a CABI prior to the collection of soil samples. Visual inspections shall include the following:
 - a) The area to be cleared shall be designated before the visual inspection; and
 - b) Former locations of friable materials shall be designated; and
 - c) The surface being inspected shall be dry enough to allow identification of suspect ACM; and
 - d) The visual inspection shall be conducted in adequate lighting; and
 - e) The area to be cleared shall be free of visual impediments (e.g. snow cover, plastic sheeting, standing water, etc.); and
 - f) At a minimum, the area to be cleared shall be inspected in at least two (2) perpendicular directions; and
 - g) Single or multiple inspectors may be used to perform a visual inspection and clearance. However, a single inspector shall not visually inspect more than a five (5) foot width with each pass [i.e. for a clearance area that is 25' x 50' a single inspector would be required to

make at least five (5) passes in one direction (25' length) and at least ten (10) passes in the other direction (50' length)]; and

h) Detailed close examination of the area being cleared is required. The inspector(s) should use limited invasive inspection techniques, such as periodically sifting the surface being cleared and closely inspecting the disturbed area.

- 3) If sidewalls with six (6) inches or greater of vertical height are present, independent ten (10) point aliquot composite samples shall be collected from each of the sidewalls and the floor of the excavation.

2.3 Ash Samples

- (A) Ash that contains, or is comingled with, suspect ACM and/or construction and demolition debris shall be considered to be RACS unless the ash is sampled, and analysis demonstrates that the ash is not RACS. Representative samples of each type of ash materials shall be sampled and analyzed in the same manner as soil (including area/volumetric limitations of sampling). Ash samples shall be collected by homogenous strata, location, content of other surrounding material, or other observations indicating heterogeneity of the ash present. All samples collected to determine asbestos content shall be collected by a CABI. In the absence of suspect ACM or construction and demolition debris, and in the absence of documented evidence of non-visible asbestos, ash material may be treated as non-RACS.

2.4 Cross Contamination Prevention

- (A) All sample collection equipment shall be decontaminated in a manner sufficient to prevent cross contamination between individual samples or individual composite samples. Decontamination is not required between the collection of aliquots comprising a single composite sample.

2.5 Air Samples for Standard RACS Management

- (A) Air samples shall be collected by drawing air through 0.8-micron (μm), 25-millimeter (mm), mixed cellulose ester (MCE) filters, using an open-faced cowl extension oriented face down at an angle of 45°. Sample flow rate shall be between 0.5-10 liters per minute depending on the anticipated duration of sampling and the specified detection sensitivity. The air sampling equipment shall be run until the minimum volume required is collected for each sample. However, if the minimum air volume required by the method, and/or to reach the required analytical sensitivity, being

utilized cannot be met, the State of Colorado trained and certified Air Monitoring Specialist (AMS) shall request that the laboratory prepare the sample using an indirect preparation method, for TEM presence/absence analysis. Air samples shall be collected at a height that is representative of the disturbance activity taking place. However, air samples shall be located at a height between three (3) feet above the ground surface but not to exceed twenty (20) feet above the ground surface. Air samples shall be collected by an AMS.

2.6 Air Samples for Risk-Based Air Threshold Monitoring

- (A) Air samples shall be collected by an AMS. Air monitoring shall be conducted during each partial or full day of soil management activities using fixed and mobile monitors as follows:
- 1) A minimum of four (4) samples shall be collected for each regulated work area (RWA).
 - 2) For the purpose of determining the number of samples necessary, each RWA shall be divided into four (4) equal quadrants. A minimum of one (1) sample shall be collected for each quadrant with an adjacent receptor zone.
 - 3) If an RWA is greater than one (1) acre, one (1) additional sample for each quadrant with an adjacent receptor zone shall be collected and analyzed for each additional one quarter ($\frac{1}{4}$) acre in RWA surface area.
 - 4) Samples shall be located along the RWA perimeter, between the RWA and each adjacent receptor zone. Samples shall be placed between the RWA and any fixed adjacent receptor(s). In the absence of fixed adjacent receptors, sample placement shall be at the AMS's discretion.
 - 5) The sample volume shall be the minimum necessary to meet analytical sensitivity.
 - 6) Samples shall be collected by drawing air through 0.8-micron (μm), 0.25-millimeter (mm), mixed cellulose ester (MCE) filters, using an open-faced cowl extension oriented face down at an angle of 45°.

3.0 Analytical Requirements

- (A) The following analytical methods shall be used to evaluate the presence of asbestos and/or to determine asbestos content when analyzing samples for the purpose of determining the applicability of Section 5.5, and when analyzing samples collected in accordance with Section 5.5:

3.1 Bulk Samples

- (A) Samples of suspect ACM shall be analyzed by polarized light microscopy (PLM), according to United States Environmental Protection Agency (USEPA) Method EPA/600/R-93/116 or equivalent method, to determine if any asbestos fibers are present. If the asbestos content of a sample is estimated to be 1% asbestos or less, but greater than 0%, by a method other than point counting (such as visual estimation), the determination shall be repeated using the point counting technique with PLM. Alternatively, the material may be assumed to be ACM. Analysis shall be conducted by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.

3.2 Soil Samples and Ash Samples

- (A) Prior to preparation of a soil or ash sample, bulk materials shall be separated from the soil or ash sample for independent analysis. Any bulk materials identified in a soil or ash sample that contain any amount of asbestos shall be reported as independent layers of the whole sample. The samples shall be adequately prepared (crushed and dried) to facilitate stereomicroscopic analysis by the laboratory. The goal of the preparation process should be to produce dried conglomerates of approximately one eighth inch (1/8") to one quarter inch (1/4") size. Rock and/or stone material does not need to be crushed (this process is not intended to be homogenization). Soil and ash samples shall be analyzed by PLM according to USEPA Method EPA/600/R-93/116 to determine if any asbestos fibers are present. Analysis shall be conducted by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory. During the stereomicroscopic analysis (10X – 50X) of the soil/ash sample the analyst shall sift through the sample at a rate of approximately one (1) tablespoon per minute. At the end of the stereomicroscopic analysis the sample shall be agitated or shaken as a final check for asbestos prior to the preparation of PLM grab mounts. At no time during the stereomicroscopic analysis shall a sub sample be collected. The entire sample shall be analyzed and the results reported. If no asbestos was identified by PLM after the initial stereomicroscopic examination, then three (3) random grab mount preparations shall be analyzed by PLM to determine if the sample is none detected for asbestos content. If any asbestos is found by the laboratory it shall be reported even in the absence of a second detection (i.e. there does not need to be a second detection to qualify a trace level of asbestos in the sample). Quantification of asbestos content shall be based on the entire sample volume, and be reported as such.

3.3 Air Samples for Standard RACS Management

- (A) Air samples submitted for Phase Contrast Microscopy (PCM) shall be analyzed according to NIOSH Method 7400 by a laboratory showing successful participation in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program or individual(s) certified through the AIHA Asbestos Analysts Registry (AAR) Program.
- (B) Air samples submitted for Transmission Electron Microscopy (TEM), for which quantification of asbestos is desired, shall be prepared and analyzed according to the standard Asbestos Hazard Emergency Response Act (AHERA) method (AHERA; 40 CFR Part 763, Subpart E, Appendix A). All TEM analysis shall be performed by a NVLAP accredited laboratory. If a presence/absence analysis is desired, the analysis shall be performed using the AHERA method modified in the following manner:
 - 1) A minimum of two (2) preparations shall be prepared and utilized for each sample.
 - 2) Analysis shall be conducted on a minimum of four (4) grid openings or until three (3) or more structures are identified, whichever comes first.
 - 3) Any structure (adhering to the AHERA counting rules) identified during analysis shall be reported.
 - a) Identification of less than three (3) structures shall be reported as present.
 - b) Identification of three (3) or greater structures shall be reported as detected.
- (C) Any air sample analysis that results in a “cannot be read (CBR)” determination from the analyst, or a “not analyzed (NA) or rejected” due to loose debris or uneven loading, shall be evaluated by the AMS to determine if a cause of the CBR or NA can be ascertained. If it is determined that the CBR is a result of overloading from airborne emissions, then the AMS shall request that the laboratory prepare the sample, using an indirect preparation method, for TEM presence/absence analysis.

3.4 Risk-Based Air Threshold Samples

- (A) Air samples collected for TEM analysis shall be submitted to a NVLAP accredited laboratory. Samples shall be analyzed by TEM according to ISO Method 10312 with the following modifications for PCM equivalent (PCMe) structures:

- 1) An aspect ratio of 3:1 shall be used when counting structures greater than 5 µm in length, rather than the 5:1 ratio specified in the method.
 - 2) A width range of 0.25 to 3 µm will be used when counting PCMe structures, rather than the 0.2 to 3 µm specified in the method.
 - 3) A minimum of ten grid openings will be counted, rather than the minimum of four (4) grid openings specified in the method.
 - 4) Calculations shall be made based on total fibers rather than primary fibers.
- (B) The maximum number of grid openings (GOs) to be counted to achieve the specified analytical sensitivity shall be estimated as follows:

$$\text{Number of GOs} = \text{EFA} \div (\text{A}_{\text{GO}} \times \text{V} \times \text{S} \times \text{CF})$$

where:

EFA = effective filter area (385 for a 25-mm filter)

A_{GO} = area of a grid opening (approximately 0.01 mm²; actual value to be provided by the analytical laboratory)

V = volume of air sampled (in liters [L])

S = analytical sensitivity (structures per cubic centimeter [s/cc])

CF = conversion factor (1000 cc/L)

- (C) Any air sample analysis that results in a “cannot be read (CBR)” determination from the analyst, or a “not analyzed (NA) or rejected” due to loose debris or uneven loading, shall be prepared by the laboratory, using an indirect preparation method, for TEM presence/absence analysis.

3.5 Data Evaluation for Risk-Based Air Threshold Samples

- (A) General requirements:
- 1) Samples collected for comparison to risk-based air thresholds shall be evaluated based on the average (mean) concentration over the exposure duration.
 - 2) All valid data shall be used to calculate daily and ten (10) day rolling averages.
 - 3) For all projects a minimum of three (3) samples per day must have quantifiable data (not CBR or rejected). If less than three (3) quantifiable analytical results are available then the daily average is invalid.

(B) Project days 1-9:

- 1) The results of the daily samples must be averaged to calculate a daily average for use in comparing to the risk based air threshold for days 1-9 of monitoring.
- 2) A ten (10) day average shall be calculated for days 1-9. The ten (10) day average shall be comprised of at least eight (8) valid daily average results. However, all valid data shall be used to calculate the ten (10) day average.
- 3) If the ten (10) day average exceeds the risk-based air threshold, engineering controls shall be adjusted to reduce the daily average.
- 4) The Department shall be notified within 24 hours if the calculations in paragraphs 1 and 2 above cannot be completed due to invalid data.

(C) Project days 10 and greater:

- 1) Starting on day 10, a ten (10) day rolling average shall be calculated and compared to the risk-based threshold.
- 2) If average concentration trends indicate the risk-based air threshold will be exceeded before project completion, engineering controls shall be adjusted to reduce the daily asbestos emissions.
- 3) If subsequent evaluation of average concentration trends indicates that the risk-based air threshold will still be exceeded before project completion, additional adjustments to engineering controls shall be made.
- 4) If changes in engineering controls are not effective in reducing airborne concentration trends such that the risk-based air thresholds can be met, consultation with the Department is required.
- 5) The Department shall be notified within five (5) working days if the averaged airborne asbestos concentration for the entire project exceeds the risk-based air threshold.

4.0 Documentation

- (A) All of the following sampling and analytical documentation shall be maintained during a project and available for Department review upon request. This documentation need not be submitted to CDPHE unless requested or as required in a project specific plan.

- 1) Documentation of bulk, soil, and ash samples shall include:
 - a. A description of the material being sampled including friability.

- i. For samples collected for characterization purposes also include an estimate of the quantity of visible suspected RACS present.
- ii. For samples of ash, also include a brief description of the ash layer, and any associated identifiable debris.
- b. Name of person collecting the sample(s).
- c. Date and time of sample collection.
- d. Location of sample collection (a map, drawing, or diagram showing sample locations in relation to the work area and surrounding area).
- e. The boundary/limits that are represented by the collected sample.
- f. Chain of custody documentation.
- g. Laboratory analysis reports.
- h. Log of characterized homogeneous bulk materials including material descriptions, photographic documentation, and asbestos content.

2) Documentation of air samples shall include:

- a. Name of person collecting the sample(s).
- b. Date and time(s) of sample collection.
- c. Locations of air sample collection.
- d. Any relocation of air samples.
- e. A map, drawing, or diagram showing air sample locations (initial and relocations) in relation to the work area and the surrounding area.
- f. Chain of custody documentation.
- g. Laboratory analysis reports.
- h. Explanation of any air sample malfunctions and any voided air samples.
- i. Risk based air threshold concentration calculations.
- j. Air sample data (flow rates, time of sampling, volumes, calibration method, etc.).
- k. Wind speed measurements.
- l. Prevailing wind directions.
- m. Wind shut down events.
- n. Observations of visible emissions and responses.

5.0 Deviations from Sampling and Analysis Procedures

- (A) Deviation from this sampling and analysis appendix shall only be allowed upon consultation with, review by, and approval from, the Department.

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SECTION 6

INCINERATOR ASH DISPOSAL SITES AND FACILITIES

6.1 GENERAL REQUIREMENTS FOR MANAGEMENT OF SOLID WASTE INCINERATOR ASH

- 6.1.1 In addition to applicable requirements in the preceding sections of these regulations, this Section 6 shall apply to the management and disposal of solid waste incinerator ash.
- 6.1.2 Solid waste incinerator ash must either be beneficially used or reused, as defined in paragraph 6.1.3, or finally disposed in accordance with paragraphs 6.1.4 through 6.2.10.
- 6.1.3 Beneficial use or reuse of solid waste incinerator ash must receive approval from both the Colorado Department of Public Health Environment and the county. In order to constitute beneficial use the applicant must demonstrate:
- (A) That the waste material can meet the same specifications as alternative non-waste materials; and
 - (B) That the beneficially used waste materials will not release contaminants into the environment.
- 6.1.4 Solid waste incinerator ash must be disposed of only at approved or designated solid waste disposal sites and facilities. Sites not approved to take solid waste incinerator ash on a continuous basis must receive approval from the Department and the local governing body having jurisdiction. A substantial change in operations may be required prior to accepting the residual ash for disposal at the facility.
- 6.1.5 All solid waste combustion ash and associated waste water and fugitive dust handling and disposal shall comply with all applicable laws and regulations, and with all applicable local zoning laws and ordinances.
- 6.1.6 Residual ash shall be dewatered to remove any free liquids prior to shipment to a disposal site. The ash residue must be wet enough so the surface of the ash remains damp after unloading at a landfill until soil cover material can be applied.

6.1.7 Transportation of ash shall occur in equipment designed and utilized to prevent leakage, spillage or dispersion of the material during transportation.

6.1.8 The ash must be covered daily or less frequently as approved by the Department considering factors such as the type of ash, the climate and hydrogeology of the site and size of the active area. In any regard, the ash must be covered at intervals sufficient to prevent infiltration of precipitation and fugitive dust problems from the ash.

6.2 MUNICIPAL SOLID WASTE INCINERATOR ASH DISPOSAL STANDARDS

6.2.1 These regulations apply to the management and disposal of municipal solid waste incinerator ash, except as provided for in 6.2.2 for facilities in operation prior to adoption of these regulations.

6.2.2 Those sites and facilities in operation prior to adoption of these regulations, must comply with Sections 6.1 of these regulations and may be required to come into compliance with all other regulations in this section applicable to the management and disposal of municipal solid waste incinerator ash upon a determination by the Department that such sites and facilities may be causing impact of existing or future uses of surface or ground water.

6.2.3 Municipal solid waste incinerator ash must be disposed of in lined monofills having leachate detection and collection systems. The Department may waive the requirement of monofilling on a case-by-case basis if, after taking into consideration factors such as ash volume, physical and chemical characteristics of the ash including toxicity, leaching potential and site characteristics, the operator can demonstrate that co-disposal with solid waste would provide the degree of environmental protection equal to that provided by monofilling.

6.2.4 Plans and specifications for the liner and leachate collection system shall be included in the facility engineering report. The liner and leachate collection system must meet the following minimum standards:

6.2.5 The liner shall be constructed on a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure due to settlement, compression or uplift.

- 6.2.6 The liner shall consist of a minimum of 2 feet compacted clay below the leachate collection system, with 10^{-7} cm/sec permeability or an equivalent liner which includes a synthetic material. The liner must be installed using quality control measures specified in the facility engineering report to ensure attainment of the design permeability and to prevent damage to the liner during construction and during the active life of the landfill.
- 6.2.7 The system for the collection of leachate shall conform to the following standards:
- (A) Protective cover shall be provided which allows for the flow of any leachate generated by the ash to the collection layer; and prevents damage to the liner system.
- (B) The collection system shall be designed to ensure that liquids and leachate will drain continuously from the protective cover to the collection sump or point without ponding or accumulating on the liner and shall have adequate provisions for maintenance and cleaning.
- (C) The leachate collection and removal system must be constructed of materials that are: (1) chemically resistant to the leachate which is expected to be generated and (2) of sufficient strength and thickness to prevent collapse under the pressures exerted by the overlying ash, cover materials, and by equipment used at the landfill.
- 6.2.8 At least two (2) feet of compacted clay of 10^{-7} cm/sec permeability and one foot of soil cover must be placed over the disposal site at closure. Final grades and cover design shall ensure proper drainage to prevent infiltration of water and provide stabilization to control erosion and maintain the integrity of the cap at closure.
- 6.2.9 A plan for monitoring of leachate in the collection system and procedures for handling, treatment and disposal must be contained in the facility operations report.
- 6.2.10 Monitoring of the leachate detection and collection system and groundwater monitoring shall continue through post closure for a minimum of twenty (20) years.

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SECTION 7

REGULATIONS FOR TRANSFER STATIONS

7.1 PURPOSE, SCOPE AND APPLICABILITY:

(A) The purpose of this section is to establish minimum health and safety standards for the operation of transfer stations. The criteria apply to all transfer stations at which refuse generated off-site awaits transportation to approved solid waste disposal sites and facilities. At such sites, refuse may be transferred from one type of containerized collection receptacle, is processed by shredding, baling, or compaction, and then placed into another receptacle. Other waste management and disposal activities conducted at the site of the transfer station may require regulation by the Department and a certificate of designation from the local governing body having jurisdiction.

(B) A transfer station shall not be deemed to be a solid waste disposal site and facility and therefore, such a facility shall not be required to apply for and obtain a certificate of designation as outlined in these regulations. The governing body having jurisdiction can request, in writing, that the Department conduct a technical review of the site and facility documents and its operation plan. The Department shall be notified, by the governing body having jurisdiction when a permit approving a transfer station is issued. A copy of the approved operations plan shall be maintained at the transfer station.

(C) An intermediate processing facility is a transfer station under these regulations and a material recovery facility is a recycling facility under Section 8 of these regulations.

(D) Only residential and commercial waste shall be accepted at transfer stations. Wastes such as asbestos waste and contaminated soil shall not be accepted at transfer stations unless the transfer station is specifically designed and approved for these wastes.

(E) Transfer stations shall comply with the health laws, standards, rules, and regulations of the Department, the storm water rules of the Water Quality Control Commission, the Air Quality Control Commission, and all applicable local laws, ordinances and regulations.

(F) In conformance with Section 1.5.2, portions of these requirements may be waived or modified for small rural transfer stations as long as the performance of the site under the altered requirements is as protective of public health and the environment as these regulations.

7.2 OPERATING PLAN CRITERIA Owners or operators of all new transfer stations shall develop an operation plan that contains, as a minimum, descriptive responses of compliance to this subsection.

7.2.1 General data and maps

(A) Name(s) and address(es) and telephone number(s) of the owner/operator. Name and address and phone number of the person(s) operating the facility and having the authority to take corrective action in an emergency.

(B) Facility mailing address, county and legal description including $\frac{1}{4}$ section, section, township and range.

(C) Regional map depicting service area, existing and proposed.

(D) Vicinity map showing access and service roads, zoning and land use, residences, water wells and the location of all surface water bodies, the location of 100 year flood plain boundaries, and all manmade or natural features relating to the facility within a $\frac{1}{2}$ mile radius.

(E) Site map showing adjacent properties including land use, property owners names and addresses, site property boundaries and area (acres). If proposed site is adjacent to public roads or streets, include the properties across the street or road. The map should show the present site conditions and the projected site utilization including all site structures (such as buildings, fences, gates, entrances and exits, parking areas, on-site roadways, and signs) and the location of all water supplies and utilities. This site map shall be certified by a state licensed surveyor or engineer.

(F) Site maps and drawings showing all the proposed structures and areas designated for unloading, baling, compacting, storage, and loading, including the dimensions, elevations, and floor plans of these structures and areas, including the general process flow.

(G) Facility's drainage system and water supply system.

7.2.2 Design criteria

(A) Unloading and loading areas shall be:

- (1) Adequate in size to facilitate efficient unloading from the collection vehicles and the unobstructed movement of vehicles;
- (2) Constructed of concrete or asphalt paving material and equipped with adequate drainage structures;
- (3) Solid waste handling shall be confined to the smallest practical area. Such handling shall be supervised by competent operating personnel who shall be familiar with proper operational procedures;
- (4) Sufficient internal storage areas to provide for incoming solid waste;
- (5) Exhaust removal systems shall be installed in enclosed areas; and
- (6) Measures shall be provided to prevent backing into pits while unloading.

(B) On-site roads

- (1) Designed to accommodate expected traffic flow in a safe and efficient manner;
- (2) The road surface design shall be suitable for heavy vehicles and the road base shall be capable of withstanding expected loads;
- (3) Passable, in all weather conditions, by loaded collection and transfer vehicles. Provisions shall be made for de-icing ramps during winter months; and
- (4) Where public dumping is allowing, separate access for passenger vehicles shall be provided.

(C) Equipment Number, description and uses of all equipment projected to be employed including the design capacity.

(D) Gate and fencing Types and heights of suitable gate and fencing material to be placed on site, to limit unauthorized persons from access to the facility when the facility is closed.

(E) Signs A sign shall be posted, at all access points to the facility, with the hours of operation, the types of solid waste accepted and not accepted, the operating hours the facility accepts wastes, and emergency telephone numbers of a responsible party.

(F) Buffer zones Buffer zone of 200 feet around the active operating area to the nearest property line in residential zoned areas, or as otherwise established by the governing body having jurisdiction.

7.2.3 Operation standards

(A) Waste characterization The types, composition, and expected daily volume of all solid waste to be accepted at the facility in cubic yards or tons/per day, the maximum time any such waste will be stored, and the proposed capacity of the facility.

(B) Supervision Facilities with permanent continually operating mechanical equipment shall have an attendant on duty at all times the facility is open to the public.

(C) Personnel The number, classification, and job descriptions of personnel to be employed at the facility when operating at full capacity. A personnel training plan which includes recognizing unauthorized waste such as PCB's and hazardous wastes, equipment operation, and any other personnel concerns.

(D) Nuisance conditions All reasonable measures shall be employed to collect, properly contain, and dispose of scattered litter, including frequent policing of the area, and the use of wind screens where necessary. The facility shall be managed in such a manner that noise, dust and odors do not constitute a hazard to human health. The facility shall be managed in such a manner that the attraction, breeding and emergence of birds, insects, rodents and other vectors do not constitute a health hazard.

(E) Off-site water Control measures shall be provided to protect surface and ground waters, including run-off collection and discharge, designed and operated to handle a twenty-four (24) hour, twenty-five (25) year storm and equipment cleaning and washdown water.

(F) Fire protection Fire protection equipment shall be available at all times. A fire protection plan including provisions to prevent the spread of fire to adjoining property shall be approved by the local fire department.

(G) Operational records Records shall be maintained for all facilities. These records shall include a daily log of the quantity of solid waste received and transported, as-built construction details, and variations from approved operations procedures. Records shall be kept on-site whenever practicable or as otherwise approved.

(H) Contingency plan Contingency plans specifying the procedures to be followed to handle situations such as the following shall be available at all times to the transfer station attendants:

(1) Hazardous material incident, including emergency response contacts, equipment, identification of trained personnel, and notification procedures;

(2) Contamination of surface water or ground water;

(3) Nuisance conditions on site or confirmed beyond the site boundary;
and

(4) Alternate solid waste handling system for periods of inability to operate or delays in transporting solid waste due to fires, unusual traffic conditions, equipment breakdown, hot loads, or other emergencies or undesirable conditions.

(I) Cleaning facilities handling more than 100 cubic yards of waste per day shall be cleaned daily of all loose materials and litter, by wash-down or other approved method, to prevent odors and other nuisance conditions. All residuals shall be properly removed and disposed. All boxes, bins, pits or other container type used shall be cleaned on an approved schedule.

(J) Standing water All floors shall be free from standing water. All drainage from cleaning areas shall be discharged to sanitary sewers or other methods that meet local pre-treatment standards.

(K) Storage adequate Storage space for incoming solid waste shall be available at the transfer station. Solid wastes should be loaded into the containerized collection receptacle on the same day it arrives at the transfer station. Uncompacted wastes will not be allowed to remain on the tipping floor overnight. Removal of all putrescible solid waste from the transfer station

whenever transfer containers are full, or weekly, whichever comes first, is also required. Uncleaned transfer vehicles containing putrescible material shall not be parked on public streets or roads except under emergency conditions. Adequate off-street parking for facility vehicles shall be provided.

(L) All solid waste received at a transfer station shall be transferred as soon as practicable. All solid wastes arriving at the transfer station that are not transferred within twenty-four (24) hours of receipt shall be placed in closed containers or in totally enclosed buildings, structures, or other means of cover acceptable to the Department, that deter water, birds, insects, rodents and other vectors from reaching wastes.

(M) Final disposal All solid waste passing through the transfer station shall be ultimately treated or disposed of in an approved solid waste disposal site and facility.

(N) Water supply The amounts and source of water for use on site for the control of nuisance conditions, fire protection, construction purposes and personnel use shall be presented.

- 7.2.4 Closure plans for final closure of the transfer station shall include a plan for the removal of all stored solid wastes and washdown liquids. The Department and the local governing authority shall be notified, in writing, of temporary or permanent closure of the transfer station.

[RESERVED]

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SECTION 8

RECYCLING & BENEFICIAL USE

- 8.1 General Provisions
- 8.2 MSW Drop-off Sites and Recyclable Material Generators
- 8.3 MSW Material Recovery Facilities
- 8.4 MSW Recyclable Material End Users
- 8.5 Industrial Recycling Operations
- 8.6 Beneficial Use

SECTION 8 RECYCLING & BENEFICIAL USE

8.1 GENERAL PROVISIONS

8.1.1 Purpose

Consistent with § 30-20-102(5), C.R.S., the overall purpose of these rules is to encourage responsible recycling and beneficial use of recyclable materials. Section 8 is a fully integrated framework to provide a regulatory structure for sites and facilities that manage recyclable materials. Section 8 additionally sets the requirements for beneficial use of solid waste projects. Section 8 is designed to manage recycling facilities and beneficial use based on the classification of materials and facilities accepting recyclable materials. The regulations set forth in Section 8 are classified and defined into the following sub-categories:

- 8.2 Municipal Solid Waste (MSW) Drop-off sites and recyclable material generators;
- 8.3 MSW Material recovery facilities;
- 8.4 MSW Recyclable material end users;
- 8.5 Industrial recycling operations; and
- 8.6 Beneficial use projects.

8.1.2 Scope and Applicability

The scope of this section applies to any site and facility operated for the purpose of processing, reclaiming, or recycling recyclable materials that qualify for the statutory exemption from the requirement to obtain a certificate of designation and as a solid waste disposal site and facility as provided in § 30-20-102(5), C.R.S. Also included in this section are all sites subject to the reporting requirements of § 30-20-122, C.R.S.

8.1.3 Minimum Site and Facility Standards

- (A) A recycling facility that does not comply with the requirements set forth in Section 8 is a solid waste disposal site and facility and is, therefore, subject to Section 1 and all other applicable sections of the Solid Waste Regulations.

- (B) A recycling facility shall be operated in order to prevent ground water contamination and the creation of off-site odors as a result of processing, reclaiming, recycling, or storage prior to recycling.
- (C) To qualify as a recycling facility, a facility must be able to meet the required three year rolling average material turnover rate set forth in this section and defined in the solid waste definitions.
- (D) Recycling facilities shall comply with the health laws, standards, rules, and regulations of the Department, the Water Quality Control Commission, the Air Quality Control Commission, and all applicable local laws and ordinances.

8.1.4 Exemptions

This section 8 does not apply to the following:

- (A) Biosolids and activities regulated under section 25-8-205(1)(e), C.R.S;
- (B) Composting facilities that are regulated under Section 14 of these regulations, unless recycling operations are conducted at that facility;
- (C) Waste grease recycling regulated under Section 18 of these regulations, unless recycling operations are conducted at that facility;
- (D) Waste tire collection facilities or waste tire processors or end-users that are regulated under Section 10 of these regulations, unless recycling operations are conducted at that facility;
- (E) Facilities that collect and process only scrap automobiles, scrap appliances, or other processed scrap metal, unprocessed home scrap metal, unprocessed prompt scrap metal, and obsolete scrap metal, as those terms are defined in section 30-20-101, C.R.S.;
- (F) Facilities that collect and process only shredded circuit boards;
- (G) Recyclable hazardous waste and household hazardous waste; and

- (H) Household hazardous waste roundup events, community cleanup events, and other one-time or occasional collection events where yard waste and other recyclable materials are accepted for drop-off by private citizens for cleanup events.

8.2 MSW DROP-OFF SITES AND RECYCLABLE MATERIAL GENERATORS

8.2.1 Scope and Applicability

Section 8.2 is applicable to all municipal solid waste drop-off sites and recyclable material generators that meet the following criteria and operations:

- (A) All sites defined as a drop-off site; and
- (B) All sites defined as a recyclable material generator.

8.2.2 Exemptions

All drop off sites and recyclable material generators that meet the following criteria are exempt from the registering and the reporting requirements:

- (A) Drop-off sites and recyclable material generators where the collected recyclable materials are sent to be processed at a registered recycling facility operating in Colorado;
- (B) Non-baled recyclable material storage, and drop-off sites with containers less than a total of twelve cubic yards of recyclable material storage; and
- (C) Industrial recycling operations, which are exempt from Section 8.2 but subject to Section 8.5.

8.2.3 Minimum Material Turnover

Recyclable material at drop-off sites and at recyclable material generator locations shall be collected and managed at a rate to prevent an overflow of material from containers, bins, or other adequate storage methods.

8.2.4 Reporting and Recordkeeping

- (A) Recyclable material generators which collect and send recyclable material directly out of state for recycling and/or processing shall register with the Department and submit the Recycling Facility Annual Reporting Form to the Department by March 1st of each year for the previous calendar year. The annual report shall provide the following information:
 - (1) Types of materials recovered for recycling based on the Department's material classification;
 - (2) Amount in tons of each material recovered for recycling;
 - (3) Destination of each material and amount per destination; and
 - (4) Company name, address, and phone number, and email.
- (B) Facilities may request confidential business information protection on the amount and destination of materials recovered for recycling data submitted per § 24-72-204(3)(a)(IV), C.R.S.
- (C) Recyclable material generators and operators of drop-off sites that collect and send recyclables directly out of state may provide one Recycling Facility Annual Reporting Form for multiple recycling site locations documenting the total amount of each material collected for recycling statewide specifying material collected per location in the report.

8.3 MSW MATERIAL RECOVERY FACILITIES

8.3.1 Scope and Applicability

- (A) Section 8.3 applies to material recovery facilities (MRFs) as defined in the solid waste definitions.
- (B) A material recovery facility that does not comply with or meet the conditions identified in this section will be considered a solid waste disposal site and facility that is subject to Section 1 and all other applicable sections of the Solid Waste Regulations.

- (C) A facility that manages municipal solid waste recyclable materials is subject to section 8.3.

8.3.2 Exemptions

The following operations are exempt from Section 8.3:

- (A) Drop-off sites subject to Section 8.2;
- (B) Industrial recycling operations subject to Section 8.5;
- (C) Composting operations subject to Section 14 of the regulations pertaining to solid waste.

8.3.3 Facility Registration

All Material Recovery Facilities shall register with the Department and submit the following required information on the Recycling Facility Initial Registration Form:

- (A) The name, physical and mailing address of the facility, including a business and corporate name as necessary;
- (B) The name and address of the owner and the operator;
- (C) The emergency contact for a 24-hour contact; and
- (D) Types of recyclable material collected based on the Department's material classification.

8.3.4 General Site Requirements

- (A) All sites defined as material recovery facilities shall have an operations plan detailing how the facility qualifies for § 30-20-102(5), C.R.S. and how it will operate and ensure the facility does not become a solid waste disposal site and facility. The operations plan must be kept on-site or at a Department-approved off-site location. Facilities may request a plan review by the Department. The operations plan shall include the following:
 - (1) A physical description of the facility and the types of recyclable materials managed;

- (2) Methods to control public access and prevent unauthorized vehicle traffic and illegal dumping by adequate fencing or other security means;
 - (3) Emergency response procedures including procedures to prevent and control fires;
 - (4) Procedures for preventing receipt of unauthorized waste; and
 - (5) A closure plan including a plan for the disposition of collected materials on-site at the time of closure.
- (B) Following a 1-year accumulation period, the weight or volume of recyclable materials that are recycled shall be at least 75% of the total weight or volume (determined using a consistent measure) of recyclable materials received and currently in storage over a 3-year rolling average.
- (C) Upon filing a written justification to the Department, a recycling facility may implement a commodity and site-specific variance to the accumulation period and/or minimum recycling rate requirement, and/or material specific variance to the accumulation period and/or recycling rate. The Department reserves the right to deny such a submittal based on the grounds of the facility operating in a manner that is producing, or could lead to nuisance conditions.
- (D) Intermediate processing facilities which accept recyclable material combined with municipal solid waste shall comply with all regulations in Section 7 regarding transfer stations.
- (E) Electronic recycling facilities shall comply with all applicable local, State and Federal requirements.

8.3.5 Recordkeeping and Reporting

- (A) All material recovery facilities shall complete the Recycling Facility Annual Reporting Form and submit to the Department by March 1st of each year for the previous calendar year. The annual report shall provide the following information:
- (1) Types of materials recovered for recycling based on the Department's material classification;

- (2) Amount in tons of each material recovered for recycling;
 - (3) Destination of each material and amount per destination to prevent double counting; and
 - (4) Amount of material remaining on-site.
- (B) Facilities may request confidential business information protection on weight or volume data and destination of materials submitted per § 24-72-204(3)(a)(IV), C.R.S.
- (C) All material recovery facilities shall maintain records on-site for at least the previous three years.

8.3.6 Closure Requirements

- (A) No person shall close a material recovery facility without notifying the Department in writing at least sixty (60) calendar days in advance of initiating closure.
- (B) Prior to completing the closure activities, all recyclable materials and solid waste shall be processed, reclaimed, or recycled so that potential off-site odors, ground water contamination, and nuisance conditions shall be addressed. Any material remaining on-site following closure renders the site a solid waste disposal site.
- (C) Closure shall be completed within one hundred eighty (180) calendar days of initiating closure activities.
- (D) Facilities shall submit a final report to the Department within ninety (90) calendar days of completing closure.

8.4 MSW RECYCLABLE MATERIAL END USERS

8.4.1 Scope and Applicability

This section applies to all recyclable material end users, which includes but is not limited to all facilities which utilize municipal solid waste recyclable materials to be processed into a product as defined in the solid waste definitions.

8.4.2 Exemptions

The following operations are exempt from Section 8.4:

- (A) On-site recycling facilities that process only recyclable materials generated on-site;
- (B) Industrial recycling operations subject to Section 8.5.
- (C) Composting operations subject to Section 14 of the Solid Waste Regulations.
- (D) Facilities which utilize a recycled material feedstock which has already been processed into a product.

8.4.3 Facility Registration

All recyclable material end users shall register with the Department and submit the following required information on the Recycling Facility Initial Registration Form:

- (A) The name, physical and mailing address of the facility, including a business and corporate name as necessary;
- (B) The name and address of the owner and the operator;
- (C) The emergency contact for a 24-hour contact; and
- (D) Types of recyclable material collected.

8.4.4 General Site Requirements

All sites classified as a recyclable material end user shall follow best management practices for storage and utilization of the specific recyclable material which includes at a minimum:

- (A) Recyclable materials shall be stored indoors, covered, or properly managed in order to prevent ground water contamination and off site odors.
- (B) Following a 1-year accumulation period, the weight or volume of recyclable materials that are recycled shall be at least 75% of the total

weight or volume (determined using a consistent measure) based on the amount of recyclable materials received and currently in storage over a 3-year rolling average.

- (C) Upon filing a written justification to the Department, a recycling facility may implement a commodity and site-specific variance to the accumulation period and/or recycling rate, and/or material specific variance to the accumulation period and/or recycling rate. The Department reserves the right to deny such a submittal based on the grounds of the facility operating in a manner that is producing, or could lead to nuisance conditions.
- (D) A recyclable material end user that does not comply with or meet the conditions identified in this section will be considered a solid waste disposal site and facility and is, therefore, subject to Section 1 and all other applicable sections of the Solid Waste Regulations.

8.4.5 Recordkeeping and Reporting

- (A) All recycling facilities are required to complete the annual Recycling Facility Annual Reporting Form and submit to the Department by March 1st of each year for the previous calendar year. The annual report shall provide all information required by the Department to properly complete the legislative requirement of recycling data including:
 - (1) Types of materials recovered for recycling based on the Department's material classification;
 - (2) Amount in tons of each material recovered for recycling; and
 - (3) Amount of material remaining on-site.
- (B) Facilities may request confidential business information protection on weight or volume data and receipt of materials submitted per § 24-72-204(3)(a)(IV), C.R.S.
- (C) Recyclable material end users shall maintain records on-site for at least the previous three years.

8.4.6 Closure Requirements

- (A) No person shall close a recycling facility without notifying the Department in writing at least sixty (60) calendar days in advance of the closure date.
- (B) Prior to completing the closure activities, all recyclable materials and solid waste shall be processed, reclaimed, or recycled so that potential off-site odors, ground water contamination, and nuisance conditions shall be addressed. Any material remaining on-site following closure renders the site a solid waste disposal site.
- (C) Closure shall be completed within one hundred eighty (180) calendar days of initiating closure activities.
- (D) Facilities shall submit a final report to the Department within ninety (90) calendar days of completing closure.

8.5 INDUSTRIAL RECYCLING OPERATIONS

8.5.1 Scope and Applicability

Section 8.5 applies to industrial recycling operations, operated for the purpose of processing, reclaiming, or recycling recyclable materials. Industrial recycling operations include the following recyclable materials:

- (A) Construction & demolition debris;
- (B) Other recyclable materials as approved by the Department.

8.5.2 Recyclable Material Performance Criteria

The Department will consider the following criteria in making determinations to define what materials shall be deemed to be recyclable materials as a result of processing, reclaiming, recycling, or storage prior to recycling:

- (A) Adherence to established engineering or other appropriate specifications;
- (B) Adherence to established product, end user specifications or customer conditions of acceptance;

- (C) Environmental impacts;
- (D) Demonstrated benefit associated with the use; and
- (E) Actual use as a substitute for, or in conjunction with, a commercial product or raw material.

8.5.3 Exemptions

The following operations are exempt from Section 8.5:

- (A) On-site recycling operations where the processing of recyclable materials occurs on the same site from where the recyclable materials are generated and that recycle and store only materials generated on-site and meet the performance criteria of 8.5.2. Creation of ground water contamination, off-site odors, and speculative accumulation of waste materials voids this exemption.
- (B) Concrete and asphalt operations when the material is managed like a commodity by meeting the following conditions:
 - (1) material is managed and separated into commodity specific piles processed for reuse;
 - (2) material is managed in active piles separated by material type or use within the past year; and
 - (3) Incoming loads shall have all non-concrete, non-asphalt and non-rebar material removed from concrete and asphalt materials within thirty (30) calendar days and non-concrete, non-asphalt and non-rebar material shall not exceed 10% of the total material onsite by weight or volume.
- (C) Environmental media storage and reuse.

8.5.4 Facility Registration

All industrial recycling operations shall register with the Department and submit the following required information on the Recycling Facility Initial Registration Form:

- (A) The name, physical and mailing address of the facility, including a business and corporate name as necessary;
- (B) The name and address of the owner and the operator;
- (C) The emergency contact for a 24-hour contact; and
- (D) Types of recyclable material collected.

8.5.5 General Site Requirements

- (A) All sites defined as Industrial recycling operations shall have an operations plan detailing how the facility will operate in accordance with § 30-20-102(5), C.R.S. Facilities may request a plan review by the Department. The operations plan shall include the following:
 - (1) A physical description of the facility and the types of recyclable materials managed;
 - (2) Methods to prevent unauthorized vehicle traffic and illegal dumping by adequate fencing or other security means;
 - (3) Procedures for preventing receipt of unauthorized waste; and
 - (4) A closure plan including a plan for the disposition of collected materials on-site at the time of closure.
- (B) All recycling operations that process liquid or leachable recyclable materials shall have a design and operations plan approved by the Department prior to receiving recyclable materials to document the operations will not contaminate ground water. The Department will then determine whether the facility is operated for the purpose of processing, reclaiming, or recycling recyclable materials under § 30-20-102(5), C.R.S.
- (C) Following a 1-year accumulation period, the weight or volume of recyclable materials that are recycled shall be at least 75% of the total weight or volume (determined using a consistent measure) of recyclable materials received and currently in storage over a 3-year rolling average.

- (D) Upon filing a written justification to the Department, a recycling facility may implement a commodity and site-specific variance to the accumulation period and/or recycling rate, and/or material specific variance to the accumulation period and/or recycling rate. The Department reserves the right to deny such a submittal based on the grounds of the facility operating in a manner that is producing, or could lead to nuisance conditions.

8.5.6 Recordkeeping and Reporting

- (A) All industrial recycling operations shall complete the Recycling Facility Annual Reporting Form and submit to the Department by March 1st of each year for the previous calendar year. The annual report shall provide all information required by the Department to properly complete the legislative requirement of recycling data including:
 - (1) Types of materials recovered for recycling based on the Department's material classification;
 - (2) Amount in tons of each material recovered for recycling;
 - (3) Destination per material and amount per destination to prevent double counting; and
 - (4) Amount of material remaining on-site.
- (B) Facilities may request confidential business information protection on weight or volume data and destination of materials submitted per § 24-72-204(3)(a)(IV), C.R.S.
- (C) All industrial recycling operations shall keep and maintain records on-site for at least the previous three years.

8.5.7 Closure Requirements

- (A) No person shall close a recycling facility without notifying the Department in writing at least sixty (60) calendar days in advance of the closure date.
- (B) Prior to completing the closure activities, all recyclable materials and solid waste shall be processed, reclaimed, or recycled so that potential off-site odors, ground water contamination, and nuisance conditions shall be

addressed. Any material remaining on-site following closure renders the site a solid waste disposal site.

- (C) Closure shall be completed within one hundred eighty (180) calendar days of initiating closure activities.
- (D) Facilities shall submit a final report to the Department within ninety (90) calendar days of completing closure.

8.6 BENEFICIAL USE

8.6.1 Scope and Applicability for Beneficial Use

- (A) This section applies to the beneficial use of solid wastes, including but not limited to those listed in a table found on the Pre-Approved Beneficial Uses Table. The following tables referenced in this Section 8.6, as may be amended by the Department, are on the Division's website:
 - (1) Table 1A: Category 1 Total Elemental Analysis Table. Table 1A provides total elemental analysis testing criteria for Category 1 beneficial use materials.
 - (2) Table 1B: Category 1 and 2 Analyte Mobility Analysis Table. Table 1B provides water leaching testing criteria for Category 1 & 2 beneficial use materials.
 - (3) Table 2: Beneficial Use-by-Category Table. Table 2 defines allowable beneficial uses based on Category of Material.
 - (4) Table 3: Pre-Approved Beneficial Uses Table. Table 3 provides pre-approved beneficial uses that do not require testing and characterization under Section 8.6.
- (B) This section serves to encourage the utilization of solid wastes.
- (C) Proposals for those beneficial uses not listed in or removed from the Pre-Approved Beneficial Use Table will be reviewed by the Department according to the criteria set forth in this Section, resulting in the issuance of a Beneficial Use Determination (BUD) by the Department.

- (D) Persons requesting the beneficial use of solid waste may propose alternative material characterization and beneficial use evaluation processes as identified in § 8.6.5(E).

8.6.2 Performance and Storage Standards

- (A) Waste management, including handling, processing, treatment, storage, and ultimate disposition of wastes, may not have:
 - (1) A negative impact on groundwater quality; and
 - (2) Environmental impacts exceeding:
 - i. Those expected from available commercial products or raw materials;
 - ii. Department-approved unrestricted use concentrations that are protective of ground and surface water; or
 - iii. Any residual constituents exceeding background concentrations for those constituents.
- (B) The weight or volume of recyclable materials that are recycled shall be at least 90% of the total weight or volume (determined using a consistent measure) of recyclable materials received and currently in storage over a 3-year rolling average.
- (C) Waste usage shall comply with applicable federal, state, and local requirements;
- (D) Upon failing to meet any of the above performance standards, the Department may revoke the beneficial use approval, and the Solid Waste regulations shall apply; and
- (E) Use of the waste material shall meet the following criteria:
 - (1) Adherence to established engineering or other appropriate specifications;
 - (2) Adherence to established product, end user specifications or customer conditions of acceptance;
 - (3) Demonstrated benefit associated with the use; and

- (4) Actual use as a substitute for, or in conjunction with, a commercial product or raw material.

- (F) Any waste generation facility storing waste for beneficial use shall remove the waste prior to discontinued use and provide written notification to the Department describing the closure activities that have taken place.

8.6.3 [Reserved]

8.6.4 Department Approved Beneficial Uses

The Department has approved beneficial uses specified in the Pre-Approved Beneficial Use Table. A person may use wastes specified on the Pre-Approved Beneficial Use Table and meet the performance standards listed in 8.6.2 without prior approval from the Department, unless there is reason to believe the waste contains contaminants that exceed the Department approved unrestricted use concentrations that are protective of ground and surface water, or background constituent concentrations or alternative criteria approved by the Department.

8.6.5 Beneficial Use Waste Material Characterization

- (A) Non-characterized materials or categorized uses:

Testing programs and beneficial uses for wastes not specifically listed in the Category 1 Total Elemental Analysis Table, Category 1 and 2 Analyte Mobility Analysis Table and the Beneficial Use by Category Table and the Pre-Approved Beneficial Use Table shall be approved by the Department on a case-by-case basis. Wastes or uses not listed on Category 1 Total Elemental Analysis Table, Category 1 and 2 Analyte Mobility Analysis Table and the Beneficial Use by Category Table and the Pre-Approved Beneficial Use Table shall follow the characterization testing requirements described in Section 8.6.5, unless another characterization method or process is approved by the Department. The characterization results shall be reported to the Department as specified in Section 8.6.5 (E). The Department will assign an appropriate category.

- (B) Initial Characterization:

Any waste stream proposed for a specific beneficial use shall be properly characterized prior to beneficial use to determine its category under Section 8.6.6.

(C) Characterization Methods:

- (1) The limits of quantitation used in the characterization shall be at or below the concentration listed in Category 1 Total Elemental Analysis Table and Category 1 and 2 Analyte Mobility Analysis Table for each parameter for the specific target category. All material sampling, total elemental analyses and analyses of leach testing shall be performed using EPA SW-846 methods, unless otherwise approved by the Department. The Department may require additional tests to characterize waste materials prior to beneficial use. The limit of detection and the limit of quantitation shall be reported with the sample results. If a substance is reported below the limit of quantitation, the detected value with the appropriate qualifier shall be reported.
- (2) All wastes to be beneficially used in accordance with these regulations shall be determined not to be a hazardous waste as defined under § 25-15-302, C.R.S.
- (3) All wastes which are characterized to determine eligibility for Category 1 and 2 under Section 8.6.6 shall be analyzed using EPA SW-846 methods for determining the mobility of analytes in liquid, soils and wastes, or other methods as approved by the Department.
- (4) All wastes characterized to determine eligibility for Category 1 under Section 8.6.6 shall be analyzed using EPA SW-846 methods for determining total elemental analytes present in liquids, soils or waste, or methods as approved by the Department.
- (5) All waste shall be evaluated through geotechnical engineering methods or other appropriate means to show suitability for intended beneficial uses.

(D) Recharacterization:

Wastes that are beneficially used under this section shall be recharacterized after the initial characterization in accordance with this section, unless the Department approves an alternative recharacterization method and/or frequency. Persons may use knowledge of the

constituents, materials and beneficial use in lieu of the following material characterization process, if the constituents, materials and beneficial uses have not changed since the initial BUD. In these cases the person must provide a statement to the Department by March 1 each year following the initial BUD.

- (1) Representative sampling of each Category 1 waste shall be performed in the same manner as specified for the initial characterization once each year.
 - (2) Representative sampling of each Category 2 waste shall be performed in the same manner as specified for the initial characterization once every 2 years.
 - (3) Notwithstanding the frequencies set forth in (D)(1)-(D)(2) above, representative sampling of each waste shall be performed whenever there is any change in the waste generation process.
- (E) Department notification:
- (1) Each waste generator or user shall submit initial characterization results, proposed categorization under Section 8.6.6, and estimated quantities to be beneficially used to the Department for approval prior to the beneficial use of waste materials.
 - (2) Test results from waste recharacterization shall be submitted within thirty (30) calendar days of receipt of recharacterization results. Recharacterization due to processing changes shall be submitted to the Department prior to the beneficial use of the waste.

8.6.6 Beneficial Use Materials Categories

- (A) Category 1: Wastes containing constituent concentrations less than those specified in Category 1 Total Elemental Analysis Table and Category 1 and 2 Analyte Mobility Analysis Table may be used as Category 1 beneficial use materials.
- (B) Category 2: If a waste does not meet the criteria for Category 1, the characterization test as approved by the Department shall be run on a representative number of samples of the final product. Waste products

containing constituent concentrations less than those specified in Category 1 and 2 Analyte Mobility Analysis Table may be used as Category 2 beneficial use materials.

- (C) Category 3: Wastes that are characterized as non-hazardous may be used in liquid waste solidification applications where the material is disposed of at the same permitted solid waste disposal site and facility. The site of final disposal shall be permitted to accept such wastes as defined in the facility Design and Operations Plan.

8.6.7 Beneficial Uses

- (A) Once characterization is completed, use the Beneficial Use-by-Category Table for a list of potential beneficial uses; and
- (B) Wastes may not be placed below groundwater, or into permanent standing water, unless they are a part of a solidified application that has been demonstrated to not impact groundwater. A waiver for approval may be granted for unsolidified uses that are demonstrated to not have a negative impact on groundwater geologically and chemically.

8.6.8 Recordkeeping and Reporting

- (A) Ongoing beneficial use operations shall complete the Industrial Recycling Facility Annual Reporting Form and submit to the Department by March 1st of each year for the previous calendar year. The annual report shall provide all information required by the Department to properly complete the legislative requirement of recycling data including:
 - (1) Types of wastes beneficially used;
 - (2) Amount in tons of each waste recovered for beneficial use; and
 - (3) Destination per waste and amount per destination to prevent double counting.
- (B) Facilities may request confidential business information protection on weight or volume data submitted per § 24-72-204(3)(a)(IV), C.R.S.
- (C) All waste beneficial use operations shall keep and maintain records on-site for at least the previous three years.

SECTION 9
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SECTION 9

WASTE IMPOUNDMENTS

9.1. GENERAL PROVISIONS

9.1.1. SCOPE AND APPLICABILITY: This Section 9 applies to all waste impoundments, as defined in Section 1.2 of these Solid Waste Regulations, where storage, treatment, utilization, processing, or deposit and final treatment of solid waste occurs, unless exempted in Section 9.1.2 below.

Sections 1 and 2 of these Solid Waste Regulations are applicable to all waste impoundments and ancillary equipment associated with a waste impoundment, unless specifically otherwise noted herein. Sections 1 and 2 of these Solid Waste Regulations do not apply to the impoundments exempted in Section 9.1.2(A)(1), (3), (4), (6), (7), (8), (10), (11), (13), (14), (15), (16) and (17). For ease of use, this Section 9 includes those Section 2 requirements that usually apply to the operation of waste impoundments; however, there may be unique features at a particular facility that trigger additional site-specific Section 2 requirements not referenced in this Section 9.

Facilities subject to this Section 9 must obtain a certificate of designation (CD) unless otherwise exempt per Section 30-20-102, C.R.S., or these Regulations. The CD will include, at a minimum, the engineering, design and operations plan (EDOP) for the facility required by this Section 9. Facilities that require a CD must follow the CD application process in Section 30-20-103, C.R.S., and these Regulations. See section 1.6 of these Solid Waste Regulations.

Facilities subject to this Section 9, but exempt from the requirement to obtain a CD, must provide an EDOP to the Department for review and approval prior to implementation. Nothing in this section shall preclude any review action that may be required by the local governing authority under appropriate local ordinance or rule. See sections 1.3.9 and 1.4.1 of these Solid Waste Regulations.

Section 30-20-100.5(1)(a), C.R.S. provides that proper disposal of solid wastes is a matter of mixed statewide and local concern. Because a facility may also need to comply with applicable local requirements in addition to this Section 9, facilities should check with the local governing authority for their submittal, notification, and approval requirements. The phrase "Department and local governing authority approval, as appropriate," as used in this Section 9 acknowledges that the Solid Waste Act and Regulations establish dual jurisdiction over solid waste. Facilities

should review Title 30, Article 20, Part 1, C.R.S., and the Solid Waste Regulations to determine which authorities apply.

Compliance with this Section 9 shall not relieve the facility owner or operator from the obligation to comply with the facility's CD and any other applicable federal, state or local statute, regulation, requirement or ordinance.

9.1.2. EXEMPTIONS

- (A) This Section 9 does not apply to the following:
- (1) Impoundments whose design and primary function is retaining or detaining stormwater for water quality or flood control purposes as required by any state, district, or local requirement;
 - (2) Stormwater/leachate impoundments subject to the composting regulations under Section 14 of these Solid Waste Regulations;
 - (3) Raw water impoundments;
 - (4) Secondary containment;
 - (5) Tanks incorporating structural and water-retaining elements into their design and construction (exemption includes basins constructed of reinforced concrete and whose joints are sealed with water and joint sealant and whose sidewalls may be either sloped or vertical so long as reinforced);
 - (6) Impoundments that contain water in a treatment process and whose primary function is water treatment, not waste treatment or disposal (exemption includes drinking water treatment backwash ponds that recycle water for further treatment, even if those ponds are periodically taken out of service for solids handling and removal);
 - (7) Impoundments that do not contain solid waste, as defined in Colorado Revised Statutes (CRS) 30-20-101;
 - (8) Impoundments containing only substances exempted from the definition of Solid Waste by section 30-20-101(6)(b)(I) through (VIII), C.R.S.;

- (9) Impoundments subject to a consent order, decree or agreement or a written cooperative agreement issued pursuant to the "Solid Waste Disposal Sites and Facilities Act", CRS, 30-20-101, et seq., as amended, to the extent that the treatment, storage or disposal of such wastes in a waste impoundment is approved by the Department pursuant to such consent order, decree, agreement, or written cooperative agreement;
- (10) Impoundments subject to license issued pursuant to the "Radiation Control Act", CRS 1973, 25-11-101, et seq., as amended;
- (11) Impoundments subject to an uncontested order, a consent order, decree or agreement; or a written cooperative agreement issued pursuant to the federal "Comprehensive Environmental Response Compensation and Liability Act of 1980", as amended, to which the Department is a signatory party, to the extent that the treatment, storage or disposal of such wastes in a waste impoundment is approved by the Department pursuant to such uncontested order, consent order, decree, agreement, or written cooperative agreement;
- (12) Impoundments subject to the commercial exploration and production (EP) waste impoundment regulations under Section 17 of these Solid Waste Regulations;
- (13) Impoundments subject to the requirements for oil and gas liquid waste impoundments regulated by the Oil and Gas Conservation Commission;
- (14) Ponds and basins operating under the Water Quality Control Commission (WQCC) Regulation 64;
- (15) Impoundments which are used for temporary or emergency (up to 30 days) storage of solid waste (this temporary storage time-frame must be documented to ensure the 30-day time frame is not exceeded);
- (16) Impoundments operating under WQCC Regulation 84;
- (17) Impoundments that are subject to a permit issued pursuant to the Colorado Mined Land Reclamation Act, section 34-32-101 and the Colorado Surface Coal Mining Reclamation Act, section 34-33-101, CRS, et seq.

(18) Other waste impoundments exempted, based on a case-by-case determination, by the Department.

(B) Reserved

9.1.3. PRECLASSIFICATION:

(A) The following types of impoundments are preclassified as Type A:

(1) Coagulant sludge impoundments at surface water treatment plants;

(2) Reserved.

The impoundment types that are preclassified as Type A are not subject to Sections 9.1.7, 9.1.8, 9.1.9, and 9.3. The impoundment types preclassified as Type A are subject to Section 9.2.

9.1.4 EFFECTIVE DATE: This Section 9 was adopted by the Solid and Hazardous Waste Commission on February 21, 2012 and became effective on March 30, 2012.

9.1.5. DEFINITIONS: For a comprehensive list of definitions, refer to Section 1.2 of these Solid Waste Regulations. The following definitions commonly used relative to this Section 9 are provided for the convenience of the regulated community.

(A) **“Ancillary Equipment”** as used in this Section 9 means any device, such as, but not limited to, piping, fittings, flanges, valves, or pumps, from the first such equipment upstream from a waste impoundment to the first such equipment downstream of the waste impoundment. All other equipment not included in this definition is not ancillary equipment for the purposes of this Section 9.

(B) **“Demonstration Plan”** as used in this Section 9 means an evaluation prepared by an existing waste impoundment facility pursuant to Section 9.1.8 of this Section 9 for purposes of classifying one or more waste impoundments at the facility as Type A or Type B.

- (C) **“Existing facility”** as used in Section 9 refers to a facility with waste impoundments that have received solid waste prior to the effective date in Section 9.1.4.
- (D) **“Facility”** as used in this Section 9 means a facility with one or more waste impoundments.
- (E) **“Site Setting”** as used in this Section 9 means the hydrology, geology, hydrogeology, geography, ground water quality, and/or climate at a particular site or impoundment location.
- (F) **“BSGW/Appendix B”** as used in this Section 9 means the ground water quality standards presented in WQCC Regulation 41 (Basic Standards for Ground Water or BSGW; 5 CCR 1002-41), augmented by Appendix B to the Solid Waste Regulations. Appendix B presents a methodology for determining alternate facility- or impoundment-specific enforceable limits for constituents not included in Regulation 41, a methodology for establishing background concentrations in ground water, and a statistical method for evaluating ground water data.

9.1.6 CLASSES OF WASTE IMPOUNDMENTS

Classification of waste impoundments, as described below, is based upon the potential for environmental threat, as determined by evaluating the waste stream characteristics and the site setting of the facility. For purposes of this Section 9, waste impoundments are classified without regard to the engineering or operational controls that may already exist or be proposed at the facility. This Section 9 includes two classes of waste impoundments, defined according to potential impact to ground water.

(A) Type A Waste Impoundment

- (1) A waste impoundment is considered Type A if it meets one of the following criteria:
 - (a) Liquid captured from the underdrain system of the waste impoundment has constituent concentrations less than the standards set forth in Regulation 41 (5 CCR 1002-41) Basic Standards for Ground Water (BSGWs) for all constituents relevant to the impoundment’s waste stream(s) (if there are multiple waste impoundments at a facility handling the same waste stream and not all waste impoundments are equipped with an underdrain system, then underdrain samples from

those impoundments having underdrains may be representative of leaching potential from those not having an underdrain system); or

- (b) The constituent concentrations in the liquid fraction of the sludge managed in the waste impoundment is less than the standards set forth in the BSGWs for all constituents relevant to the impoundment's waste stream(s); or
 - (c) TCLP or SPLP data on the solid fraction of the sludge shows concentrations in the leachate extract to be below standards set forth in the BSGWs for all constituents relevant to the impoundment's waste stream(s).
- (2) If insufficient information is available to satisfy the criteria in Section 9.1.6(A)(1), and the concentrations in the influent to the waste impoundment are less than the BSGWs for all constituents, as determined using a Department-approved sampling plan to make sure the sampling results are representative of impoundment conditions given the potential variability in the influent waste stream, the impoundment can still be classified as a Type A impoundment.
 - (3) Despite failing to meet one of the criteria in 9.1.6(A)(1) or (2), if the facility is able to demonstrate, based on evaluation of waste characteristics and site setting and not considering impoundment design or operations, that there is no reasonable potential to exceed BSGWs at the point of compliance as defined in Section 1.2 of the Solid Waste Regulations, the impoundment can still be classified as a Type A impoundment.
 - (4) A demonstration that an impoundment meets one or more of the criteria in this section and should be classified as a Type A impoundment is subject to Department approval per Section 9.1.8.

(B) Type B Waste Impoundment

Type B waste impoundments pose risk of adverse impact to ground water, based on the waste type, site setting. Any facility not satisfying the Type A criteria above or not otherwise exempt in Section 9.1.2 is a Type B waste impoundment.

- (C) The impoundment classification may be subject to reclassification based on a significant change to the treatment process delivering waste to an impoundment that alters the potential of an impoundment at the facility to impact ground water or cause exposure to individuals in proximity to the impoundment.

9.1.7. COMPLIANCE SCHEDULE

The following compliance schedules apply to certain waste impoundments:

- (A) Operators of waste impoundments receiving sludge from the following types of treatment must submit, within nine (9) months of the effective date of this Section 9, either an engineering design and operation plan for a Type B waste impoundment consistent with Section 9.3, or a Demonstration Plan consistent with Section 9.1.8(B) showing that the facility can qualify as Type A on the basis of favorable site hydrogeology:
 - (1) reverse osmosis,
 - (2) ion exchange, and
 - (3) iron filtration.
- (B) With the exception of impoundments subject to Section 9.1.2(B), 9.1.7(A) and 9.1.7(C), all other waste impoundments that are not pre-classified must follow the process and schedules outlined in Section 9.1.8 and 9.1.9 below and the requirements of Section 9.2 and 9.3.
- (C) Operators of waste impoundments that will be closed and taken out of service consistent with the timelines established in the Clean Air, Clean Jobs Act (HB10-1365) for closure or transition of an electric generating unit must submit, within 12 months of the effective date of this Section 9, a written notice to the Department containing the schedule for planned impoundment closure. These operators must submit, within 24 months of the effective date of this Section 9, a closure plan addressing the applicable provisions of Section 9.3.4(F) and 9.3.6.
- (D) Alternative implementation schedules may be proposed to the Department and approved as part of a site-specific closure plan.

9.1.8 INVENTORY AND CLASSIFICATION OF IMPOUNDMENTS AT EXISTING FACILITIES

This section applies to existing facilities, except those that are preclassified under Section 9.1.3 and those listed in Section 9.1.7(A).

Existing facilities are required to inventory the impoundments at their facility and propose a classification for each impoundment subject to Department approval. New facilities not receiving waste prior to the effective date of this Section 9 must propose waste impoundment classifications as part of their certificate of designation application, or as part of their engineering design and operation plan submittal, as appropriate.

- (A) Inventory and Preliminary Classification Report: Existing facilities subject to this Section 9 must submit an Inventory and Preliminary Classification Report (IPCR) to the Department for review and approval. Existing facilities shall submit the IPCR to the Department within twelve (12) months of the effective date of this Section 9. Water treatment plants other than those listed in Section 9.1.7(A) serving fewer than 10,000 people may petition to take up to twenty-four (24) months to submit the IPCR.

The IPCR shall include a brief description of all waste impoundments identified at the facility. In addition, for each waste impoundment having sufficient information readily available in order to classify the impoundment, the IPCR should propose a preliminary classification according to the Type A or Type B categories described above. For waste impoundments not having sufficient information on which to propose a preliminary classification, the IPCR will state that fact. In cases of insufficient information, the facility must submit a Demonstration Plan pursuant to Section 9.1.8(B) below after receiving a written determination on the IPCR from the Department.

For each waste impoundment that the facility has attempted to classify, the Department will determine whether the information provided in support of the proposed classification is adequate. This written determination will constitute a final agency action subject to appeal. Facilities obtaining an approved IPCR that was successful in classifying all waste impoundments at the facility may skip 9.1.8(B) below and proceed to development of an engineering design and operation report, if necessary.

- (B) Demonstration Plan: Existing facilities without sufficient readily available information with which to classify their waste impoundments in the IPCR must develop a Demonstration Plan. The purpose of the Demonstration Plan is to obtain further information in order to classify one or more waste impoundments at a facility. The facility may request a meeting with the Department prior to submission of the Demonstration Plan. Within twelve (12) months of the date of the Department's written determination on the IPCR, facilities shall submit the Demonstration Plan for Department review and approval. Water treatment plants other than those listed in Section 9.1.7(A) serving fewer than 10,000 people may petition the Department for an additional twelve (12) months to complete the Demonstration Plan.
- (1) The demonstration plan shall include a scope of work and schedule for implementation, and may include any of the following as necessary to complete classification of each impoundment:
- (a) Operational history of the waste impoundment;
 - (b) Chemical characteristics of the waste stream(s) disposed, managed, stored, treated, or processed in the waste impoundment;
 - (c) Evaluation of the site setting and, through modeling or other appropriate means approved by the Department, evaluate the constituent concentrations relevant to the waste streams received in the impoundment that may occur at the point(s) of compliance without considering existing engineering or operational controls;
 - (d) Maps and plans, drawn to a commonly recognized engineering scale, that show the following:
 - i. The location and depth of cut or fill for liners;
 - ii. The location, dimensions and grades of all surface water control structures, and/or ground water containment structures, if applicable;
 - iii. The location and dimensions of all surface water containment structures, including those designed to impound contaminated runoff, sludge, or liquids for treatment;

- iv. The spatial distribution of engineering, geologic and hydrologic data, and relationship to the proposed facility and each individual impoundment unit;
 - v. The location of all proposed monitoring points for surface water and ground water quality;
 - (e) The design details of the impoundment including size and total volume at capacity;
 - (f) Sampling of the uppermost aquifer at the point of compliance, as defined in Section 1.2 of these Solid Waste Regulations, for those constituents reasonably expected based on current and historical operations and activities at the facility and for which there is a BSGW. Appendix B of these Solid Waste Regulations may be used to establish background levels for constituents.
 - (g) The owner or operator of the facility must implement the demonstration plan according to the approved schedule.
- (C) The facility shall provide a Demonstration Report summarizing the findings of the Demonstration Plan to the Department for review and approval within three (3) months of completing implementation of the Demonstration Plan.

9.1.9 TIMING OF SUBMITTAL OF AN ENGINEERING DESIGN AND OPERATION PLAN

- (A) Within twelve (12) months of the Division's formal determination approving the proposed IPCR, or within twelve (12) months of the Division's formal determination approving the Demonstration Report in the case of those impoundments for which a Demonstration Report is required, facilities having Type B waste impoundments shall submit a CD application including an EDOP, or for CD-exempt facilities, an EDOP that satisfies the requirements of Section 9.3. The CD application will be reviewed by the Department and approved by the local governing authority. CD-exempt facilities shall submit the EDOP to the Department for approval. The EDOP shall include schedules for implementing and performing the identified activities. For an owner or operator with multiple impoundments, the schedule for implementation may include a prioritization of the impoundments based upon risk, operational constraints and logistical

considerations prevailing at the facility. The facility must ensure that all Type B waste impoundments are included in the EDOP. For facilities with both Type A and Type B impoundments, requirements for Type A waste impoundments may be integrated into the EDOP. The facility shall implement the approved EDOP in accordance with the approved schedules.

- (B) New waste impoundments constructed after the effective date of this Section 9 must include the waste impoundment evaluation and demonstration required by Section 9.1.8(B) as part of their CD application, or as part of their EDOP submittal if the facility is managing its own waste in its own impoundments.
- (C) Alternative implementation schedules may be proposed to the Department and approved on a site-specific basis.

9.2 REQUIREMENTS FOR TYPE A WASTE IMPOUNDMENTS

9.2.1 DESIGN AND CONSTRUCTION

The following design criteria apply to a Type A waste impoundment.

- (A) **Access control:** The owner or operator shall control public access, prevent unauthorized access, provide for site security both during and after business hours, and prevent illegal dumping of wastes. Effective artificial or natural barriers may be used in lieu of fencing.
- (B) **Stormwater control:** Each waste impoundment shall be designed, constructed and maintained to provide: (1) run-on control and diversion structures to prevent flow into the unit from a 25-year, 24-hour storm, and (2) a run-off control system to collect runoff from a 25-year, 24-hour storm and control run-off from a 100-year, 24-hour storm. Precipitation that cannot be diverted from the impoundment, and therefore comes in contact with impounded waste, shall be managed as solid waste. Each impoundment shall be designed, constructed and maintained to prevent damage to the containment structure from erosion.

9.2.2 FINANCIAL ASSURANCE:

The owner or operator of a Type A waste impoundment shall establish and maintain financial assurance in accordance with Section 1.8 of these Solid Waste Regulations.

9.2.3 SELF-CERTIFICATION

The Department, as deemed necessary, may utilize self-certification checklists in conjunction with their inspections. Any facility that receives a self-certification checklist from the Department must complete the checklist and return it to the Department. Submission of a completed self-certification checklist will substitute for submission of an Annual Report, as required in Section 9.2.4 below.

9.2.4 ANNUAL REPORT: By March 1 of each year, the owner or operator of a Type A waste impoundment shall submit an annual report documenting:

- (A) the annual volume of waste removed from the impoundment in the previous calendar year;
- (B) the disposition of waste removed;
- (C) a description of any unauthorized release that occurred;
- (D) a description of corrective actions taken to address any such unauthorized release; and
- (E) an attestation from the facility that the process generating the waste has not significantly changed and continues to support the original classification.

Submittal of a self-certification checklist for a particular year will substitute for that year's annual report.

9.2.5 CLOSURE: The owner or operator of each Type A waste impoundment shall develop a closure plan and submit it for Department approval. The closure plan must present sufficient detail to support the closure cost estimates required in Sections 1.8 and 9.2.2 above and to enable the Department to evaluate the adequacy of financial assurance. For some Type A impoundments, the scope of the closure plan will be limited to sludge and impacted soil removal, disposal and verification sampling to ensure residual contamination is below acceptable levels in soil and ground water.

- (A) **Closure Certification:** A closure certification report is required to be submitted within sixty (60) calendar days of completion of closure activities which documents all the requirements and conditions of the closure plan have been achieved. The Report must be signed and sealed by a Colorado registered professional engineer and is subject to review and approval by the Department.

9.2.6 POST-CLOSURE CARE: The owner or operator of each Type A waste impoundment whose closure activities result in waste disposed in place as a landfill or with levels of residual contamination that exceed unrestricted use must implement a post-closure care plan in accordance with the criteria identified Section 9.3.6.

9.3 REQUIREMENTS FOR TYPE B WASTE IMPOUNDMENTS

The design and operation of Type B waste impoundments must not cause exceedances of BSGWs/App. B at the point(s) of compliance. The extent of engineering and operational controls necessary to satisfy this requirement will vary considerably from facility to facility depending on the potential for groundwater impact. Engineering Design and Operation Plans (EDOP; see Section 9.3.4) have the flexibility to include only the requirements applicable to the unique combination of site setting and waste characteristics at an impoundment. Type B waste impoundment facilities may request alternative, equally protective measures.

Attaining the BSGW/App. B at the point of compliance may be achieved through a prescriptive liner or performance-based alternative design. Performance-based design allows existing facilities to use existing liner systems if those systems can be successfully demonstrated to reasonably ensure groundwater protection, given the unique interplay of waste characteristics, site construction and site setting. New facilities may employ performance-based design to show that a liner system other than a prescriptive liner will be sufficient to meet the design objective of attaining BSGWs/App. B at the point(s) of compliance.

9.3.1 FACILITY DESIGN REQUIREMENTS

Type B Waste Impoundments shall comply with the following.

(A) **Review by Professional Engineer:** All engineered features of the facility design shall be reviewed and sealed by a Colorado registered professional engineer.

(B) **Liner Design Requirements**

Waste impoundment design and operation can utilize either prescriptive or performance-based alternative liner designs that, in conjunction with waste characteristics and site setting, ensures attaining BSGWs/App. B at the point(s) of compliance, taking into consideration background concentrations. It is recommended that the liner design also consider the constructability, operation and maintenance of the waste impoundment.

This will facilitate selecting the design approach and optimizing the design specific elements and features.

Each waste impoundment shall be lined with a composite liner, a double liner system, or an alternate liner system of performance based alternative design. In addition, the facility design must include leak detection monitoring. The owner or operator of the facility shall demonstrate to the Department that the design developed for the facility will comply with this Section 9 and Sections 1 and 2 of these Solid Waste Regulations, and with BSGW/App. B.

- (1) **Composite Liner System:** A composite liner shall consist of an upper and lower component.
 - (a) The upper component shall consist of a minimum 60-mil high-density polyethylene (HDPE) liner and shall be installed in direct and uniform contact with the lower component.
 - (b) The lower component shall consist of at least a two-foot layer of compacted soil with a hydraulic conductivity less than or equal to 1×10^{-7} cm/sec.
- (2) **Double liner system:** A double liner system shall consist of an upper liner and a lower liner separated by a drainage layer.
 - (a) The upper liner shall consist of a minimum 60-mil HDPE liner and shall be installed in direct contact with the underlying underdrain material.
 - (b) The drainage layer contains transmissive material such as sand, gravel or a synthetic drainage blanket, and conveys liquid to a sump from which it can be extracted. This type of layer incorporates leak detection capability directly into the design, and may warrant a smaller scale groundwater monitoring program, subject to Department approval.
 - (c) The lower liner shall consist of a minimum 60-mil HDPE liner and shall be installed in direct contact with the underlying prepared soil.
- (3) **Performance-Based Alternative liner designs:** Alternative liner designs, including single liner systems, entailing liner designs that, in conjunction with waste characteristics and site setting, ensure

that BSGWs/App. B can be met at points of compliance, may be approved by the Department based on a demonstration of the alternate liner design's performance, the waste type and site specific technical information.

- (C) **Leak Detection Monitoring:** Owners/Operators must include leak detection monitoring consistent with the liner design specific to that impoundment.
 - (1) Single liner and composite liner systems must incorporate one or more of the following based on the evaluation above:
 - (a) Vadose Zone Monitoring (wet/dry wells);
 - (b) Resistivity net monitoring;
 - (c) Downgradient impoundment edge ground water monitoring;
or
 - (d) Another equivalently protective monitoring system as approved by the Department.
 - (2) In a double liner system, the leak detection system may be incorporated into the interstitial drainage layer. If this is done, sampling of leak detection liquids must be performed immediately upon discovery. If the leak detection system is not incorporated into the interstitial drainage layer, the requirements of Section 9.3.1(C)(1) must be met.
- (D) **Fluid Level Measurement:** Maximum liquid level in the waste impoundments shall be capable of being measured at any time or continuously so that each impoundment has a minimum of two (2) feet of freeboard (or an alternate amount of freeboard as approved by the Department), measured from the lowest elevation berm of a specific impoundment to the upper surface of the impounded waste. Fluid level measurement points for each impoundment shall be established, and continuously maintained.
- (E) **Access Control:** Owners and Operators shall control public access and prevent unauthorized access, provide for site security both during and after business hours, and prevent illegal dumping of wastes. Effective artificial or natural barriers may be used in lieu of fencing.

- (F) **Stormwater Control:** Each waste impoundment shall be designed, constructed and maintained to provide: (1) run-on control and diversion structures to prevent flow into the unit from a 25-year, 24-hour storm, and (2) a run-off control system to collect runoff from a 25-year, 24-hour storm and control run-off from a 100-year, 24-hour storm. Precipitation that cannot be diverted from the impoundment, and therefore comes in contact with impounded waste, shall be managed as solid waste. Each impoundment shall be designed, constructed and maintained to prevent damage to the containment structure from erosion.
- (G) **Embankment Durability:** Embankments shall be designed and maintained to minimize erosion and to withstand deterioration caused by the impounded waste such that the integrity of the impoundment is maintained.
- (H) **Ground Water Monitoring System:** The ground water monitoring system must comply with each requirement in Appendix B. Except as otherwise noted in this Section 9, monitoring parameters must be established based on the hydrogeologic data related to the site, background concentrations in ground water, the type of waste stream(s) accepted at the facility and waste characterization analyses performed on incoming wastes. Waste impoundments equipped with leak detection capability may have conditional groundwater monitoring requirements that are only triggered if and when a leak is detected.

9.3.2 FACILITY CONSTRUCTION REQUIREMENTS

- (A) **Construction:** Facilities with Type B impoundments must implement their approved quality assurance and quality control plan (QA/QC) during construction of all engineered structures and appurtenances. The QA/QC Plan must be reviewed and approved by the Department prior to commencing construction of any waste management features at the facility.

Note: The Department has guidance on construction quality assurance and as-built documentation on the Department's website, <http://www.cdphe.state.co.us/hm/sw/swpubs.htm>.

- (B) **Construction Certification Report:** The owner or operator of a new Type B waste impoundment shall submit a construction certification report to the Department for approval at least ninety (90) calendar days prior to the commencement of waste acceptance into the impoundment. For existing facilities, the facility may submit the report and resume waste

disposal operations. However, if a problem comes to light during Department review and prior to approval of the construction certification report, a compliance schedule will have to be developed for implementation of any corrective actions needed.

The construction certification report shall certify that the construction has been completed in accordance with the facility's approved EDOP and approved QA/QC Plan. The construction certification report shall be signed and sealed by a Colorado registered professional engineer approved by the Department prior to the acceptance of waste. Construction certification reports shall be developed, approved and implemented for all engineered structures and ancillary equipment used to manage solid waste at the facility.

- (C) **Synthetic Liners:** Synthetic liners shall be installed according to the manufacturer's instructions, which shall be submitted as part of the facility's EDOP.
- (D) **Testing:** The construction will be tested and evaluated using quality control and quality assurance measures and methods specified in the facility's approved QA/QC Plan as part of the facility's EDOP.
- (E) **Liner Protection:** During construction and prior to the addition of liquid wastes, liner systems shall be protected from erosion, desiccation, drying, degradation from ultraviolet radiation or other damage.

9.3.3 FACILITY OPERATION REQUIREMENTS

The owners or operator shall operate a Type B Waste Impoundment in accordance with the approved EDOP.

- (A) **Ground water Monitoring:** The owner or operator shall conduct groundwater monitoring in accordance with the approved ground water monitoring plan which is part of the facility's EDOP.
- (B) **Surface Water Monitoring:** The owner or operator shall conduct surface water monitoring, including monitoring of seeps, where seepage has been detected or other releases have been identified.
- (C) **Fluid Level Measurement:** The owner or operator shall conduct fluid level and freeboard level measurement for each impoundment in accordance with the approved EDOP.

- (D) **Contingencies:** The owner or operator shall implement and maintain the approved contingency plan which is part of the facility's EDOP. It will be implemented in the following situations: 1) an unplanned release from a waste impoundment, 2) leachate observed in the leak detection system for any waste impoundment outside of the normal or design range, and/or 3) any condition of noncompliance necessitating corrective action at any waste impoundment.
- (1) The owner or operator shall notify the Department within twenty-four (24) hours of any identified release from a waste impoundment or ancillary equipment or any incident requiring implementation of the Contingency Plan. Within seven (7) calendar days of the incident, the owner or operator shall provide written notification outlining immediate actions taken.
 - (2) A detailed written assessment of the impact of leakage, repair completion and verification, and the need for additional monitoring and proposed corrective action shall be submitted by the owner/operator within forty five (45) calendar days to the Department. Repairs affecting an engineered feature at the facility must be certified by a Colorado registered professional engineer in accordance with these Regulations.
- (E) **Waste Impoundment Inspections:** The owner or operator of the facility shall implement a periodic impoundment inspection program which will be described in the facility's EDOP. The inspection provisions shall cover all waste treatment, disposal, containment and storage features at each waste impoundment. At a minimum, these inspections shall examine ground movement, cracks, erosion, leaks, equipment connections, influent and effluent locations, rodent burrows, vegetation growing on a liner system, damage to ancillary equipment, spills, detection of liquids in sumps, fires or explosions, or other events or problems which could affect the operation of the facility or jeopardize the integrity of an impoundment. Leak detection and collection systems shall also be inspected weekly, or at the frequency established in the approved EDOP, for the presence of any liquids. If liquids are detected in quantities exceeding the design leakage rate, samples shall be taken and analyzed immediately, and a determination made as to the source of the liquid in the leak collection system. Other aspects of the waste containment system, including ancillary equipment, shall be inspected on a periodic basis as well.

- (F) **Waste Characterization For Impoundments Accepting Only Wastes Generated On-site:** Waste impoundments accepting only wastes generated on-site shall initially profile each waste stream entering the impoundments and then update the profile as necessary to account for significant changes to the waste generation process. Existing facilities may use the Demonstration Report to establish the initial waste profile.
- (G) **Waste Characterization For Impoundments Accepting Wastes From Third Parties:** If a facility receives wastes generated by third parties, the owner or operator of the facility shall implement its approved waste characterization plan which is part of the facility's EDOP to ensure that only approved waste is disposed of at the facility and to ensure that no hazardous waste is received at the facility. For any facility, the disposal of waste streams different from those originally approved shall constitute a significant change in operation and require an approval by the Department prior to acceptance at the facility. An amendment to the facility's EDOP or certificate of designation may be required.
- (1) The owner or operator of each waste impoundment facility shall initially profile and then conduct annual testing on each waste stream entering the impoundments to demonstrate conformance with the original analyses. Each facility must also ensure that solid waste generators using the facility notify the facility when there has been a change in their processes or waste composition.
 - (2) The owner or operator of each waste impoundment facility shall analyze at least one sample of the contents of each impoundment annually for the suite of reasonably expected constituents included in Appendix II of the Solid Waste Regulations. Such analysis shall be performed using appropriate methods to provide an accurate representation of constituents and concentration levels found in the waste. If the impounded wastes are subject to stratification, a separate sample shall be taken from each representative level, including settled sludge and oil or other surface accumulation. Analysis of such sampling results will be submitted to the Department within 30 days of when they become available to the facility, along with a proposal of the suite of analytes to be analyzed on an annual basis. The facility will annually submit results of sampling for the suite of approved analytes.

- (3) Annual testing of unannounced grab samples shall be taken from random vehicles entering the facility and analyses conducted for the original or approved amended list of parameters. If any waste is found to differ from the original analysis, the Department shall be notified in writing within seven (7) calendar days, and a request to modify the design and operation plan submitted to the Department for review and approval prior to continuing acceptance of the identified waste stream.
- (4) Solid waste disposal facilities shall not receive hazardous waste and will conduct waste profiling in accordance their approved waste characterization plan.
- (5) A facility may propose alternative waste characterization methods to those presented in Sections 9.3.3(G)(1) through (G)(4).
- (H) **Personnel Training Plan:** The facility shall implement the approved personnel training plan.
- (I) **Commingling of Waste:** Incompatible wastes shall not be commingled. The disposal of waste streams different from those originally approved shall constitute a significant change in operation and require an approval by the Department prior to acceptance at the facility. An amendment to the facility's EDOP or CD may be required.
- (J) **Financial Assurance:** The owner or operator shall maintain financial assurance of an adequate amount to cover closure and post-closure care costs in accordance with Section 1.8 of these Solid Waste Regulations.

9.3.4 ENGINEERING DESIGN AND OPERATIONS PLAN

The owner or operator of each Type B waste impoundment shall submit an engineering design and operation plan (EDOP) to the Department for review and approval, per the schedule in Section 9.1.9 for existing waste impoundments, and prior to commencing impoundment construction, storage, treatment or disposal operations for new impoundments. The EDOP shall describe how the facility will comply with all applicable requirements in these Solid Waste Regulations. Facilities may use existing general, design, construction and operating documentation to satisfy these requirements.

The EDOP shall include the following subject areas, as appropriate. Given the diverse nature of waste impoundment facilities, not all of the following information will pertain to every facility.

(A) **General Information:**

- (1) Owner and Operator mailing address, county and legal description of the facility with waste impoundments;
- (2) Map of facility property;
- (3) Type of treatment, disposal, storage and containment features, monitoring and operational practices to be used at the facility;
- (4) Discussion of facility's service area, including transportation corridors and surrounding access;
- (5) The names, qualifications and addresses of the persons operating the facility and having the authority to take corrective action in the event of noncompliance;
- (6) The hours and days of operation;
- (7) A listing of the waste stream types to be approved for routine receipt and anticipated volumes in barrels or gallons/per day of wastes to be received;
- (8) The expected life of the site;
- (9) The number and job descriptions of personnel projected to be employed in waste impoundment operations at the facility when operating;
- (10) Type of equipment projected to be used in waste impoundment operations at the facility;
- (11) The size (surface area and volume) and types of impoundments or processing areas to be constructed;
- (12) Provisions to minimize nuisance conditions on-site and prevent nuisance conditions from occurring off-site;

- (13) Provisions for fire protection, including the amounts and sources of on-site water available to be used for fire suppression; and
- (14) Facility inspections, including the frequency of inspections by the operator and associated written documentation of impoundment and ancillary equipment conditions.

(B) **Site Investigation**

- (1) **Geologic Data:** The EDOP shall include, as applicable, the following geologic data:
 - (a) Types and regional thickness of unconsolidated soils and materials;
 - (b) Types and regional thickness of consolidated bedrock materials; and
 - (c) Regional and local geologic information, including but not limited to bedrock strike and dip, fracture patterns, slope stability, faulting, folding, rockfall, landslides, and subsidence or erosion potential that may affect the design and operation of the facility for solid wastes disposal.
- (2) **Hydrologic data.** The EDOP shall include, as applicable, the following hydrological data:
 - (a) Lakes, rivers, streams, springs, or bogs, on-site and within two (2) miles of the site boundary;
 - (b) Depth to and thickness of perched ground water zones and uppermost aquifers;
 - (c) Ground water wells within one (1) mile of the point of compliance, including well depth, depth to water, screened intervals, yields and the aquifers tapped, if such information is available in the public records of the Division of Water Resources in the Department of Natural Resources;
 - (d) Hydrologic properties of the perched zones and uppermost aquifer, including flow directions, flow rates, porosity, coefficient of storage, permeability, and potentiometric surface;

- (e) Site location in relation to the base floodplain of nearby drainages;
 - (f) The separation between the wastes to be impounded and the uppermost water-bearing zone, perched or otherwise;
 - (g) An evaluation of the potential for impacts to existing surface water and ground water quality from each of the proposed impoundment units, if more than one, or the facility if only one unit exists;
 - (h) The existing quality of ground water beneath the proposed facility;
 - (i) Any other associated information related to the time of travel from the midpoint of each cell to the point of compliance;
 - (j) Climatic information;
 - (k) The estimated volume, physical and chemical characteristics of the waste;
 - (l) The distance ground water beneath the site would flow during the facility's operating life and post-closure care period; and
 - (m) The distance to existing domestic wells or springs.
- (C) **Facility Design:** The EDOP shall include specific design details for each waste impoundment and all associated structures and ancillary equipment used to store, treat or dispose of solid waste.
- (1) **Engineering Data.** The EDOP shall contain, as applicable, the following engineering data:
- (a) The types and quantity of material(s) that will be used in the different components of the liner system;
 - (b) Liner design, liner materials and specifications, liner installation requirements and procedures, and liner QA/QC procedures after installation;

- (c) Maps and plans, drawn to a common recognized engineering scale, that show the following;
 - (1) The location and depth of cut or fill for liners;
 - (2) The location, dimensions and grades of all surface water control structures;
 - (3) The location and dimensions of all surface water and groundwater containment structures, including those designed to impound contaminated runoff, sludge, or liquids for treatment;
 - (4) The spatial distribution of engineering, geologic and hydrologic data, and relationship to the proposed facility and each individual impoundment unit;
 - (5) The location of all proposed facility structures and access roads;
 - (6) The location of all proposed monitoring points for surface water and ground water quality;
 - (7) The final contours and grades of the reclaimed site after closure;
 - (8) The location of fencing or other access control features to be placed on-site;
 - (9) The location of each proposed phase of development; and
 - (10) The design details of the impoundment including size and total volume at capacity.
 - (d) All designated ancillary equipment associated with each impoundment.
- (2) **Demonstration of Performance:** The EDOP shall reasonably demonstrate that the liner system, in combination with waste characteristics and site setting, will result in constituent concentrations at the point of compliance that are below BSGWs/App. B.

- (3) **Leak Detection Monitoring:** If applicable, the EDOP for Type B impoundments shall describe the leak detection monitoring system installed at each impoundment.
 - (4) **Monitoring and Measurement Systems:** The EDOP shall include design specifications for all proposed monitoring points for surface water and groundwater quality and the monitoring system used to make volume and freeboard determinations. For waste impoundment facilities or units equipped with freeboard monitoring, the design details shall be provided in the Report.
 - (5) **Access Control:** The EDOP shall describe the access controls at the facility.
 - (6) **Stormwater Control:** The EDOP shall provide design details for the stormwater control features.
 - (7) **Embankment Durability:** The EDOP shall describe how each Type B waste impoundment shall be maintained.
 - (8) **Ground water Monitoring System:** The EDOP shall include design details for the ground water monitoring system and include a plan describing how the facility will comply with each requirement in Appendix B of these Solid Waste Regulations.
- (D) **Construction:** The EDOP for any new waste impoundments, or existing waste impoundments requiring upgrade of engineered features in order to comply with this Section 9, must include a quality assurance and quality control plan (QA/QC) for all engineered structures and appurtenances.
- (E) **Operations:**
- (1) The EDOP shall include specific operational details for each waste impoundment and all associated structures or ancillary equipment used to store, treat or dispose of solid waste. The EDOP shall demonstrate how the facility will comply with all regulatory requirements.
 - (2) **Sitewide Monitoring Plan:** The EDOP shall include a sitewide monitoring plan, inclusive of ground water monitoring, surface water monitoring, leak detection monitoring, fluid-level monitoring, and inspections.

- (3) **Contingency Plan:** The EDOP shall include a contingency plan for the facility.
- (4) **Waste Characterization Plan:** Each facility receiving waste from off-site shall have as part of its EDOP a Waste Characterization Plan (WCP). The WCP shall describe how procedures employed at the facility to demonstrate compliance with Section 2.1.2 of these Solid Waste Regulations and to ensure that only approved wastes are disposed of at the facility.
- (5) **Personnel Training Plan:** The EDOP shall include a personnel training plan that includes the following provisions:
 - (a) Annual training on the facility's EDOP , all attachments to the plan and all documents referenced in the plan that are relevant to operational compliance, and
 - (b) Annual training in the recognition and exclusion of hazardous and prohibited wastes.
- (F) **Closure Plan:** The EDOP shall include a closure plan that describes the steps necessary to close each impoundment at any point during its active life and at the end of the facility's active life. The facility may either: 1) close the waste in place as a solid waste landfill in accordance with these Solid Waste Regulations, or 2) remove all solid waste and residual contamination to meet unrestricted use concentrations. Option 2, also known as "clean closure," eliminates the need for post-closure care. Both Option 1 and Option 2 require the owner or operator of a waste impoundment to develop a closure plan.
 - (1) The closure plan shall include the following information consistent with Section 9.3.6:
 - (a) Provisions for removal of all solid waste at the site and decontamination of all ancillary equipment at the site, or closure of the waste impoundment with waste in place as a landfill;
 - (b) Provisions for removing all liquid wastes from the impoundments;

- (c) Proposed plans and procedures for sampling and testing soil and ground water at the site;
- (d) Provisions for sampling and testing of residual materials, such as sludge and soil, and provisions for final disposal.
- (e) Provisions for a Background Study which must include, at a minimum, the following:
 - (i) Sampling Plan;
 - (ii) Analysis Plan;
 - (iii) Data Evaluation Plan;
 - (iv) Determination of relevant background concentrations;
- (f) General description of the site post-closure, including:
 - (i) the final property contours, material and procedures to be used to fill the impoundments;
 - (ii) A description of final soil placement and establishment of plant life;
 - (iii) A description of anticipated land use; and
 - (iv) A schedule for completing all activities necessary to satisfy the closure criteria of this section.
- (g) An analysis of whether an environmental covenant will be necessary following closure.
- (h) An analysis of whether post-closure care will be necessary and, if so, a post-closure plan consistent with the requirements of Section 9.3.7.
- (i) Cost estimates for closure and post-closure and proof of financial assurance equal to or greater than those cost estimates consistent with Section 1.8 of the solid Waste Regulations.

9.3.5 RECORDKEEPING AND REPORTING REQUIREMENTS

Not all of the requirements below will apply to facilities disposing of or managing their own waste on their own property. Such facilities may note in their EDOP any of the requirements below that are not applicable.

- (A) **Record Availability:** For facilities with waste impoundments, all records required by Section 9.3.5, shall be maintained on-site for a minimum of three (3) years unless otherwise approved by the Department and shall be available for inspection by representatives of the Department during regular business hours.

- (B) **Incoming Shipments:** For facilities receiving third party wastes, each shipment of solid waste being disposed of in a waste impoundment shall be registered, with the following information entered on a single receipt or manifest:
 - (1) Date and time;
 - (2) Receiving impoundment identification;
 - (3) Quantity;
 - (4) Type of waste;
 - (5) Location produced;
 - (6) Waste generator;
 - (7) Hauler and truck number; and
 - (8) Driver's name and signature.

- (C) **Monthly Summaries:** All facilities shall maintain monthly summaries, including the total volume of each waste stream managed or disposed in each waste impoundment.

- (D) **Annual Report:** All facilities shall submit an annual report by March 1st of each year to the Department. The annual report shall include:
 - (1) the total volume received of each waste type during the previous calendar year;

- (2) the waste removed from each impoundment during the previous calendar year, not including interbasin transfers, with location details provided for final disposition of the waste;
 - (3) any unplanned releases from an impoundment unit at the facility during the previous calendar year; and
 - (4) for waste impoundments receiving third party wastes, documentation proving that no hazardous waste has been received (per Section 2.1.2) and random load screening results.
 - (5) an annual ground water monitoring report, where one is required in the EDOP.
- (E) **Routine Monitoring:** All facilities with Type B waste impoundments shall maintain records of monitoring data including ground water monitoring data, fluid level monitoring data, equipment and impoundment inspection logsheets, and precipitation data.
- (H) **Inspections:** Records shall be maintained by all facilities with Type B waste impoundments that fully document all inspections, fluid level measurements, damage, repairs and repair verifications to impoundments, the liner systems or ancillary equipment.
- (I) **Reporting Requirements:**
For facilities receiving third party wastes, waste characterization results indicating excursions from the facility's approved plans, such as inadvertent receipt of unapproved wastes, shall trigger notification in writing to the Department within seven (7) calendar days after receipt of such results by the owner or operator.

The owner or operator of the facility shall notify the Department within 24 hours of conditions not in substantive compliance with the approved design and operations plan and/or any situation that could cause a violation of the approved operations plan (e.g. major precipitation events, fire, other examples of force majeure). The facility shall remedy the situation as soon as possible, implement contingency plans as appropriate, and notify the Department again following any corrective actions.

9.3.6 CLOSURE REQUIREMENTS

- (A) Owners and Operators of Type B impoundments shall close the impoundments only in accordance with the approved Closure Plan in the facility's EDOP.
- (B) Individual impoundments at a facility may be closed independently of closure of the entire facility.
- (C) At least sixty (60) days in advance of the proposed closure date, the owner or operator of a facility receiving third party wastes open to the public must notify the Department and place signs of suitable size at the entrance to the site and facility.
- (D) The owner or operator of the facility must complete closure activities of the facility in accordance with the closure plan and within one hundred eighty (180) calendar days following the final receipt of waste, or according to the implementation schedule in the approved closure plan.
- (E) Following closure of an impoundment facility, the owner or operator shall work with the Department to place an Environmental Covenant on the former impoundment area in compliance with C.R.S. § 25-15-320 if waste is left in place as part of the closure or the site is not suitable for unrestricted use. If waste is left in place and/or the site is not suitable for unrestricted use, the owner or operator must comply with Section 9.3.7.
- (F) **Closure Certification:** A closure certification report is required to be submitted within sixty (60) calendar days of completion of closure activities which documents all the requirements and conditions of the closure plan have been achieved. The Report must be signed and sealed by a Colorado registered professional engineer and is subject to review and approval by the Department.

9.3.7 POST-CLOSURE CARE AND MAINTENANCE REQUIREMENTS

- (A) **Post-Closure Care Plan:** Within sixty (60) days of receiving an approved closure certification report for an impoundment with waste left in-place or with residual contamination such that the site is not suitable for unrestricted use, the owner or operator shall submit a Post-Closure Care Plan for Department review and approval that will include at least the following.
- (1) Provisions to prevent nuisance conditions;
 - (2) Provisions to maintain the integrity and effectiveness of the final cover, should waste be closed in place, including making repairs to the cover and replanting vegetation as necessary;
 - (3) Provisions to monitor ground water and maintain the ground water monitoring system, if applicable;
 - (4) The name, address, and telephone number of the person or office to contact about the facility during the post-closure period;
 - (5) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the function of the cap and monitoring systems unless reviewed and approved by the Department; and
 - (6) Provisions to comply with the Environmental Covenant or Notice of Environmental Use Restriction.
- (B) The owner or operator must implement the approved post-closure care plan in accordance with the approved schedule. This includes placing an Environmental Covenant or Notice of Environmental Use Restriction on the waste impoundment areas and any others areas with remaining contamination per Section 9.3.6(F).
- (C) **Post-Closure Certification:** Following completion of the post-closure care period the owner or operator must submit a post-closure certification signed by an independent Colorado registered professional engineer for approval, verifying that post-closure care has been completed in accordance with the post-closure plan.

- (D) **Post-Closure Duration:** Post-closure care must be conducted for a minimum of thirty (30) years. The length of the post-closure care period may be:
- (1) Decreased by the Department if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment; or
 - (2) Increased by the Department if it is determined that the lengthened period is necessary to protect human health and the environment.

SECTION 10

WASTE TIRES

- 10.1 Scope and Applicability
- 10.2 General Provisions
- 10.3 Standards for Waste Tire Haulers
- 10.4 Standards for Generators of Motor Vehicle and Trailer Waste Tires
- 10.5 Standards for Waste Tire Monofills
- 10.6 Standards for Waste Tire Processors
- 10.7 Standards for Mobile Waste Tire Processors
- 10.8 Standards for Waste Tire Collection Facilities
- 10.9 Standards for End Users
- 10.10 Standards for Management of Used Tires
- 10.11 Waste Tire Fee Administration
- 10.12 Reserved

SECTION 10.1- SCOPE and APPLICABILITY

10.1.1 PURPOSE

The purpose of this Section 10 is to implement the provisions of sections 30-20-1401 through 30-20-1417, C.R.S.

10.1.2 APPLICABILITY

This section 10 applies to all persons, unless otherwise exempted, who generate, accumulate, store, transport, dispense, or process waste tires, used tires or tire-derived product. Section 10.11 applies to all persons who sell new motor vehicle or trailer tires. Persons managing waste tires pursuant to this section 10 are exempt from section 8 of these Regulations for their waste tire management activities, except for the beneficial use of waste tires. Persons managing waste tires pursuant to this section 10 who engage in other recycling activities are subject to section 8 of these Regulations for those activities.

10.1.3 EXEMPTIONS

(A) This section 10 does not apply to:

- (1) Operation, including by a local, state or federal government agency, of a vehicle that is primarily engaged in the collection and transportation of solid wastes other than waste tires;
- (2) A person who only travels through the state with waste tires as part of interstate commerce and does not collect, deposit, transfer, store or dispose of any waste tires within this state;
- (3) Transportation of products made from waste tires for sale or other distribution;
- (4) Household Hazardous Waste roundup events, community cleanup events, and other one-time or occasional collection events where waste tires are accepted for drop-off by persons not engaged in commercial activity and where the waste tires are picked up by a registered Waste Tire Hauler and transported to the facility of a registered Waste Tire Hauler or Waste Tire Generator, Waste Tire Collection Facility, Waste Tire Processor, Waste Tire Monofill, approved beneficial user of whole waste tires, municipal or county-owned waste tire collection area, or municipal or privately owned solid waste landfill; at the conclusion of the event;
- (5) The beneficial use of less than ten (10) waste tires. A person who beneficially uses ten (10) or more waste tires must:
 - (a) Comply with section 8.6 of these Regulations;

- (b) Comply with section 10.3 if they transport their own waste tires,
 - (c) Comply with section 10.6 if they process waste tires at the facility, and
 - (d) Comply with section 10.8, if they store more than five hundred (500) waste tires at any one site at any one time.
- (B) Owners/operators of Solid Waste Landfills, Transfer Stations, and Recycling Facilities that accumulate waste tires by separating them out of the solid waste streams are exempt from section 10.8 of these Regulations if they:
- (1) Store less than five hundred (500) waste tires outdoors at their facility, and
 - (2) Store less than a total of one thousand five hundred (1,500) waste tires at their facility.
- (C) Government entities that store waste tires as part of road-side cleanup activities are exempt from section 10.8 if they:
- (1) Store less than five hundred (500) waste tires outdoors at their facility, and
 - (2) Store less than a total of one thousand five hundred (1,500) waste tires at their facility.
- (D) A government entity that removes illegally disposed waste tires from the road-side is exempt from section 10.3 if the waste tires are disposed of or recycled in accordance with this section 10.
- (E) Registered waste tire haulers, generators, monofills, processors and waste tire collection facilities who accept ten (10) or more unmanifested waste tires or ten (10) or more waste tires from unregistered waste tire haulers must submit to the Department within twenty (20) days from the end of the preceding month a Uniform Waste Tire Manifest(s) Form WT-2 for the receipt of unmanifested waste tires. The Uniform Waste Tire Manifest Form must contain the following information:
- (1) Date(s) waste tires were accepted;
 - (2) The total amount of waste tires accepted;
 - (3) License plate number of unregistered waste tire hauler vehicle used to deliver waste tires;
 - (4) If available the name, address and telephone number of the person who delivered the waste tires.

(5) If possible, the source of the tires.

SECTION 10.2 - GENERAL PROVISIONS

10.2.1 COMPLIANCE WITH OTHER LAWS

Waste Tire Haulers, Waste Tire Generators, Waste Tire Processors, Mobile Waste Tire Processors, Waste Tire Collection Facilities, Waste Tire Monofills, End Users, and Beneficial Users must comply with all local, state, and federal laws, regulations, ordinances, and other requirements.

10.2.2 OPERATIONS COVERED BY MULTIPLE PARTS OF THIS SECTION 10

Waste Tire Generators, Waste Tire Haulers, Waste Tire Collection Facilities, Waste Tire Processors, Mobile Waste Tire Processors, Waste Tire Monofills, and End Users may perform activities that are regulated by multiple parts of this section 10. If so, these entities must register accordingly and comply with the requirements of all applicable parts of these regulations, which are not duplicative or overlapping.

10.2.3 LIMITATIONS ON THE DISPOSAL OF WASTE TIRES

- (A) Except as specified in section 10.2.3(B) below, a person must dispose of waste tires only by delivery to a generator engaging in waste tire collection, to a waste tire processor, to a waste tire monofill, or to a waste tire collection facility. This prohibition on disposal also applies to waste tires that have been cut in half or otherwise modified but not processed into tire-derived product.

- (B) If an individual not engaged in commercial waste tire activities is able to establish that due diligence has been conducted and no option for disposing of a waste tire as specified by section 10.2.3(A) is available, then the individual may dispose of the waste tire in a solid waste disposal site and facility or transfer station. To establish due diligence, an individual must (1) contact the local governing authority to determine whether local recycling options are available, (2) contact the Department to determine whether local recycling options are available, and (3) contact all waste tire generators, waste tire haulers, waste tire monofills, waste tire processors and waste tire collection facilities within fifty (50) miles to determine whether alternatives to final disposal exist. The Department has discretion to determine whether this due diligence requirement has been satisfied.

10.2.4 EXEMPTION FROM ANNUAL FEES IN SECTION 1.7.3

The annual fee requirement of section 1.7.3 of these Regulations does not apply to persons registered pursuant to sections 10.3, 10.4, 10.6, 10.7, 10.8, or 10.9 for their activities governed by these sections.

10.2.5 ENFORCEMENT

The Department may enforce this section 10 through its enforcement authorities, including those specified in sections 30-20-113 and 30-20-114, C.R.S.

SECTION 10.3 - STANDARDS FOR WASTE TIRE HAULERS

10.3.1 GENERAL

(A) Unless transported out of state, a person may only transport waste tires to the following types of facilities, sites and users in Colorado:

- (1) A registered waste tire generator;
- (2) A registered waste tire hauler;
- (3) A registered waste tire collection facility;
- (4) A registered waste tire monofill;
- (5) An end user of whole waste tires in compliance with section 10.9 of these Regulations
- (6) A registered waste tire processor;
- (7) A municipal or county-owned waste tire collection area;
- (8) A municipal or privately owned solid waste landfill in compliance with this section 10.2.3 (B); or
- (9) A beneficial user of whole waste tires that has been approved by the Department.

(B) A person registered as a Waste Tire Hauler pursuant to section 10.3.3 of these Regulations may pick up waste tires from a person exempted from this section 10, who is not registered as a Waste Tire Generator, Waste Tire Hauler, Waste Tire Collection Facility, Waste Tire Processor, Mobile Waste Tire Processor, or Waste Tire Monofill, an illegal waste tire site or from a private property as long as the Waste

Tire Hauler creates a manifest for the load of waste tires pursuant to Section 10.3.5 of these Regulations, and ensures delivery of the waste tires only to a facility listed in section 10.3.1(A) above.

- (C) Waste Tire Haulers must within twenty-four (24) hours of identification notify the Solid Waste Program within the Colorado Department of Public Health and Environment in the event of a fire or other emergency involving waste tires. Within two (2) weeks of this notification, the facility must submit a written report describing the emergency to the Solid Waste Program. This report must describe the origins of the emergency, the actions that have been taken, actions that are currently being taken or are planned, results or anticipated results of these actions, and an approximate date of resolution of the issues generated by the emergency.
- (D) A Waste Tire Hauler that is not also registered as a Waste Tire Generator, Waste Tire Collection Facility, Waste Tire Processor, or Waste Tire Monofill must not have on site:
 - (1) More than one thousand five hundred (1,500) waste tires at any one time; or
 - (2) A waste tire for more than three (3) days; or
 - (3) Waste tires outside the waste hauler's vehicle or trailer.

10.3.2 REGISTRATION FOR WASTE TIRE HAULERS

- (A) No person shall transport a load of ten (10) or more waste tires at one time unless he/she has registered with the Department by submitting an application for Certificate of Registration (Form WT-1 or WT-1H) to the Hazardous Materials and Waste Management Division of the Department and received a Certificate of Registration from the Department.
- (B) An application for a Certificate of Registration as a Waste Tire Hauler must be submitted on Form WT-1 or WT-1H. The application must be delivered to the Department, electronically or by hard copy, and must include, at a minimum, the following information:
 - (1) The business name of the Waste Tire Hauler and any other names under which the Waste Tire Hauler may do business;
 - (2) The principal business address of the Waste Tire Hauler;
 - (3) A business telephone number(s);

- (4) The name and address of the responsible officer of a corporate Waste Tire Hauler or the owner(s) of a Waste Tire Hauler operating a proprietorship or partnership;
 - (5) The signature and date of signature of the Waste Tire Hauler applicant;
 - (6) The number of vehicles the Waste Tire Hauler uses to transport waste tires in Colorado; and
 - (7) A current vehicle registration for each vehicle the Waste Tire Hauler will use to haul waste tires which includes the following information for each vehicle: the license plate number, the state in which the vehicle is registered, the Vehicle Identification Number (“VIN”), the make/model and year, and the registered owner.
- (C) The Department will issue a Certificate of Registration and corresponding decal(s) to an applicant if the applicant has submitted an application to the Department containing all information required in section 10.3.2(B) and has submitted the annual report required by section 10.3.6.
- (D) The Certificate of Registration for a Waste Tire Hauler is valid from the date of issuance to March 15 of the year indicated on the Certificate of Registration.
- (E) A Waste Tire Hauler must submit an updated application for a Certificate of Registration within fifteen (15) days after the Waste Tire Hauler purchases a new vehicle, rents or leases a vehicle, or operates a facility at a new location.
- (F) A Waste Tire Hauler is not authorized to haul waste tires after the March 15 expiration date unless the Waste Tire Hauler has applied to renew the Waste Tire Hauler Certificate of Registration prior to expiration and has received a new Certificate of Registration as a Waste Tire Hauler from the Department and Waste Tire Hauler decals, pursuant to section 10.3.3 below.
- (G) All Waste Tire Haulers who wish to continue hauling waste tires must submit application for renewal no later than February 1.
- (H) A legible copy of the Certificate of Registration must be maintained and made available for inspection at the Waste Tire Hauler’s principal place of business.
- (I) A Waste Tire Hauler Certificate of Registration is not transferable by the Waste Tire Hauler to whom it was issued to any other person or entity.

(J) A Waste Tire Hauler who has previously filed an application for a Certificate of Registration as a Waste Tire Hauler (Form WT-1 or WT-1H) is required to notify the Department in writing whenever changes occur to the following:

- (1) Ownership;
- (2) Mailing address;
- (3) Business name;
- (4) Type of registration;
- (5) Contact name;
- (6) Phone number; or
- (7) The Waste Tire Hauler is no longer hauling waste tires.

(K) The Department may cancel a Certificate of Registration of a person who no longer hauls waste tires.

10.3.3 WASTE TIRE HAULER DECALS

(A) No person shall transport a load of ten (10) or more waste tires in Colorado without having received a Waste Tire Hauler decal(s). An application for a Certificate of Registration submitted pursuant to section 10.3.2 above shall also serve as the application for a Waste Tire Hauler decal(s). A Waste Tire Hauler must submit an updated application for a Certificate of Registration within 15 days after the Waste Tire Hauler purchases a new vehicle, or rents or leases a vehicle.

(B) Waste Tire Haulers will receive Waste Tire Hauler decal(s) and temporary decals (if needed) for each vehicle from the Department with their Certificate of Registration. Each decal will have a unique number.

(C) Each Waste Tire Hauler vehicle decal will be valid until March 15 of the year indicated on the vehicle decal and will have a unique number. Prior to the expiration date, a Waste Tire Hauler must submit a new application for a Certificate of Registration pursuant to section 10.3.2 above.

(D) A Waste Tire Hauler decal must be affixed to the lower left hand corner of the windshield of each vehicle the Waste Tire Hauler owns, rents, leases and/or uses to transport waste tires or in some other manner so the decal is visible on vehicles that do not have a windshield

- (E) A Waste Tire Hauler decal is not transferable by the Waste Tire Hauler to whom it was issued to any other person or entity and must not be used for any vehicle not listed by the Registered Waste Tire Hauler on its application for a Certificate of Registration as a Waste Tire Hauler.
- (F) Commercial freight carriers must obtain a temporary decal from the registered Waste Tire Hauler who contracts with them. The temporary decals must be displayed on the lower left hand side of the windshield or in some other manner so the decal is visible on vehicles that do not have a windshield at all times when the vehicle is under contract for waste tire transportation. Upon termination of contract, the temporary decal must be returned within twenty-four (24) hours to the registered Waste Tire Hauler. Commercial freight carriers must comply with sections 10.3.1 and 10.3.4.

10.3.4 MANIFEST REQUIREMENTS FOR WASTE TIRE HAULERS

- (A) No Waste Tire Hauler may accept waste tires for transportation without properly completing a paper or electronic manifest pursuant to section 10.3.4 of these Regulations unless they comply with 10.1.3 (E).
- (B) Paper or electronic copies of manifests for all transport of waste tires accepted by a Waste Tire Hauler must be maintained on-site at the Waste Tire Hauler's principal business address as identified on the Certificate of Registration and available for inspection for three (3) years from the date of delivery.
- (C) A Waste Tire Hauler must create a paper or electronic manifest for each load of waste tires. Such persons must use the Uniform Waste Tire Manifest Form WT-2, available at the Department's website. Each manifest will have a unique number. The completed Uniform Waste Tire Manifest must contain the following information:
 - (1) The name, address, telephone number, and Certificate of Registration number, if applicable, of the generator(s) or source(s) of the waste tires in the load;
 - (2) The quantity of waste tires picked up at each generator or source as measured by:
 - (a) The actual number of waste tires; or
 - (b) The weight of waste tires measured in tons;
 - (3) The name, address, telephone number and Certificate of Registration number of the Waste Tire Hauler and the Waste Tire Hauler decal number of the vehicle used to transport the waste tires and, if applicable, the name and United States Department of Transportation (USDOT) number of the contracted commercial freight carrier;

- (4) The date(s) of transport;
- (5) The name, address, telephone number and Certificate of Registration number and decal number of the destination facility to which the waste tires will be delivered;
- (6) The signatures, under penalty of perjury, of each generator/source of the waste tires, the Waste Tire Hauler, the secondary Waste Tire Hauler (if any), and the facility that is the destination of the waste tires; and
- (7) Whether the waste tires originated from an illegal waste tire site or from a private property.
- (8) Whether the waste tires originated from an unregistered waste tire hauler and license plate number of unregistered waste tire hauler.

(D) Waste Tire Haulers must:

- (1) Carry the paper or electronic Uniform Waste Tire Manifest of each load in the vehicle while hauling the waste tires described on the Manifest (the Manifest need not be displayed in the vehicle);
- (2) Provide a copy of the paper or electronic Uniform Waste Tire Manifest for each load to the applicable waste tire generator/source of the waste tires within thirty (30) days of delivery to the destination facility;
- (3) Provide a paper or electronic completed copy of the Uniform Waste Tire Manifest for each load to the destination facility when the hauler delivers the waste tires; and
- (4) Make a copy of any paper or electronic Uniform Waste Tire Manifest available to the Department upon request.

10.3.5 ANNUAL REPORT

A Waste Tire Hauler must submit an annual report to the Department on the Commercial Waste Tire Hauler Annual Report Form (Form WT-4). This form may be obtained by contacting the Department or available at the Department's website.

- (A) The report must account for the number of waste tires transported by the person during the previous calendar year (beginning January 1 and ending December 31). Waste tire quantities must be reported by actual count or by actual weight in tons.

- (B) The annual report must be delivered to the Department, via certified mail, regular mail, facsimile, hand delivery, or electronically by April 1 of each year and must include the following:
- (1) Quantity of waste tires collected by the Waste Tire Hauler from within Colorado for the applicable reporting period;
 - (2) Quantity of waste tires that are brought to Colorado locations by the Waste Tire Hauler from out-of-state sources during the applicable reporting period;
 - (3) Quantity of waste tires that are taken from Colorado locations by the Waste Tire Hauler to out-of-state destinations during the applicable reporting period;
 - (4) Quantity of waste tires identified as used tires;
 - (5) Final disposition of all the waste tires collected during the applicable reporting period by listing each waste tire collection facility, waste tire monofill, municipal or privately owned solid waste landfill, or end user or processor facility, beneficial users of waste tires and the total quantities of waste tires that the Waste Tire Hauler has delivered to each; and
 - (6) The total amount of waste tires accepted from a person exempted from section 10.

10.3.6 WASTE TIRE HAULER SELF-CERTIFICATION

- (A) The Department may require Waste Tire Haulers to furnish additional information concerning compliance with the regulatory requirements of 6 CCR 1007-2 using a self-certification process.
- (B) Any Waste Tire Hauler who receives a Self-Certification Checklist from the Department must complete and return the checklist within the time specified in the instructions provided by the Department.
- (C) The Department will provide Waste Tire Haulers a reasonable amount of time to complete and return the checklist. At a minimum, the Waste Tire Hauler will have fourteen (14) days from the date of receipt to return the checklist. A checklist is deemed returned on the date it is received by the Department. The Department may provide an extension of time to complete and return the checklist upon request.
- (D) The self-certification checklist will contain a certification in substantially the following form, which must be signed by an authorized representative of the Waste Tire Hauler:

"I, the undersigned facility representative, certify that:

- i. I have personally examined and am familiar with the information contained in this submittal;
- ii. The information contained in this submittal is to the best of my knowledge, true, accurate, and complete in all respects; and
- iii. I am fully authorized to make this certification on behalf of this facility.

I am aware that there are significant penalties, including, but not limited to, possible fines and imprisonment for willfully submitting false, inaccurate, or incomplete information."

10.4 - STANDARDS FOR GENERATORS OF MOTOR VEHICLE AND TRAILER WASTE TIRES

10.4.1 GENERAL

This section 10.4 applies to all generators of motor vehicle or trailer waste tires, including but not limited to, new tire retailers, used tire retailers, motor vehicle dealers, motor vehicle dismantlers, public and private vehicle maintenance shops, garages, service stations, car care centers, automotive fleet centers, local government fleet operators, salvage and scrap yards and rental fleet operators.

10.4.2 GENERAL STANDARDS FOR GENERATORS OF MOTOR VEHICLE AND TRAILER WASTE TIRES

- (A) All Waste Tire Generators must maintain all weather access roads to those areas of their facilities where waste tires are stored.
- (B) All Waste Tire Generators must collect litter in and around any area used to store waste tires in order to avoid a fire hazard or a nuisance condition and control the growth of vegetation to minimize potential fuel sources.
- (C) Waste Tire Generators must maintain a working telephone at their facilities.
- (D) Waste Tire Generators must comply with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire, Prevention and Control in the Department of Public Safety.
- (E) Waste Tire Generators that are not also registered as a Waste Tire Collection Facility, Waste Tire Processor, or Waste Tire Monofill must not:

- (1) Have on site more than one thousand five hundred (1,500) waste tires at any one time; or
 - (2) Store more than five hundred (500) waste tires outdoors at their facility.
- (F) Waste Tire Generators must immediately notify the Solid Waste and Materials Management Program within the Colorado Department of Public Health and Environment in the event of a fire or other emergency involving waste tires. Within two (2) weeks of this notification, the Waste Tire Generator must submit a written report describing the emergency to the Solid Waste and Materials Management Program. This report must describe the origins of the emergency, the actions that have been taken, actions that are currently being taken or are planned, results or anticipated results of these actions, and an approximate date of resolution of the issues generated by the emergency.
- (G) Waste Tire Generators must arrange for the commercial hauling or mobile processing of waste tires only with a waste tire hauler or mobile waste tire processor who is currently registered pursuant to these Regulations.
- (H) Waste Tire Generators may accept waste tires.
- (I) Waste Tire Generators that sell replacement tires in Colorado must not refuse to accept from a customer, at the point of transfer, motor vehicle or trailer waste tires of the same general type and in a quantity at least equal to the number of new tires purchased.
- (J) Waste Tire Generators must maintain records for three (3) years showing how many waste tires they generated and documenting to whom they transferred the waste tires. For loads of 10 or more waste tires, the waste tire manifesting provisions of this Section 10 satisfy this requirement. For loads of 9 or less waste tires, Waste Tire Generators may use Form WT-10, available on the Department's website.
- (K) Waste Tire Generators who accumulate at any one time more than hundred (100) waste tires must maintain security measures to prevent unlawful access to waste tires.
- (L) Waste tires must not create nuisance conditions that could attract vectors of disease.

10.4.3 WASTE TIRE GENERATOR REGISTRATION REQUIREMENTS

- (A) No person shall commercially generate motor vehicle or trailer waste tires, including but not limited to, as a new tire retailer, used tire retailer, motor vehicle dealer, motor vehicle dismantler, public or private vehicle maintenance shop, garage, service

station, car care center, automotive fleet center, local government fleet operator, salvage and scrap yards or rental fleet operator in Colorado without having received a Certificate of Registration from the Department.

- (B) An application for a Certificate of Registration must be submitted on Form WT-1 to the Solid Waste and Materials Management Program within the Hazardous Materials and Waste Management Division of the Department.
- (C) Certificate of Registration applications for the generation of waste tires must include, at a minimum:
 - (1) The business name of Waste Tire Generator and any other names under which the Waste Tire Generator may do business;
 - (2) The principal business address of the Waste Tire Generator;
 - (3) A business telephone number(s);
 - (4) The name and address of the responsible officer of a corporate Waste Tire Generator, or the owner(s) of a Waste Tire Generator operating a proprietorship or a partnership;
 - (5) Whether the Waste Tire Generator sells new motor vehicle tires or new trailer tires; and
 - (6) The signature and date of signature of the Waste Tire Generator applicant.
- (D) The Department will issue a Certificate of Registration to the applicant after approval of the application. Certificates of Registration must be maintained at the facility and made available for inspection.
- (E) A Certificate of Registration is not transferable by the Waste Tire Generator to whom it was issued to any other person or entity.
- (F) A Waste Tire Generator who has previously filed an application for a Certificate of Registration as a Waste Tire Generator (Form WT-1) is required to notify the Department in writing whenever changes occur to the following:
 - (1) Ownership;
 - (2) Mailing address;
 - (3) Business name;
 - (4) Type of registration;

(5) Contact name;

(6) Phone number;

(7) Waste tires are generated at a new location not registered with the Department;
or

(8) The Waste Tire Generator is no longer generating waste tires at the location registered with the Department.

(G) The Department may cancel a Certificate of Registration of a person who no longer generates waste tires at their registered location.

10.4.4 WASTE TIRE GENERATOR FACILITY DECAL

(A) An application for a Certificate of Registration pursuant to section 10.4.3 above shall also serve as an application for a Waste Tire Facility decal.

(B) Waste Tire Generators will receive a Waste Tire Facility decal from the Department with their Certificate of Registration.

(C) Waste Tire Facility decals will have a unique number.

(D) Waste Tire Generators must post their Waste Tire Facility decal in a prominent location at the address where the waste tires are generated and where the decal is visible to the Waste Tire Hauler.

10.4.5 WASTE TIRE GENERATOR MANIFEST REQUIREMENTS

(A) No Waste Tire Generator may accept a shipment of more than ten (10) motor vehicle or trailer waste tires without an accompanying manifest properly completed pursuant to section 10.3.4 of these Regulations unless they comply with 10.1.3 (E).

(B) No Waste Tire Generator may offer a shipment of motor vehicle or trailer waste tires without receiving a manifest properly completed by the Waste Tire Hauler pursuant to section 10.3.4 of these Regulations.

(C) No Waste Tire Generator may offer motor vehicle or trailer waste tires for mobile processing without receiving a manifest properly completed by the Mobile Waste Tire Processor pursuant to section 10.7.5 of these Regulations.

(D) Manifests for all shipments of motor vehicle or trailer waste tires must be maintained on-site at the Waste Tire Generator's facility and available for inspection for three (3) years from the date of pick-up.

10.4.6 WASTE TIRE GENERATOR SELF-CERTIFICATION

- (A) The Department may require Waste Tire Generators to furnish additional information concerning compliance with the regulatory requirements of 6 CCR 1007-2 using a self-certification process.
- (B) Any Waste Tire Generator who receives a Self-Certification Checklist from the Department must complete and return the checklist within the time specified in the instructions provided by the Department.
- (C) The Department will provide Waste Tire Generators a reasonable amount of time to complete and return a checklist. At a minimum, the Waste Tire Generator will have fourteen (14) days from the date of receipt to return the checklist. A checklist is deemed returned on the date it is received by the Department. The Department may provide an extension of time to complete and return the checklist upon request.
- (D) The self-certification checklist shall contain a certification in substantially the following form, which must be signed by an authorized representative of the Waste Tire Generator:

“I, the undersigned facility representative, certify that:

- i. I have personally examined and am familiar with the information contained in this submittal;
- ii. The information contained in this submittal is to the best of my knowledge, true, accurate, and complete in all respects; and
- iii. I am fully authorized to make this certification on behalf of this facility.

I am aware that there are significant penalties, including, but not limited to, possible fines and imprisonment for willfully submitting false, inaccurate, or incomplete information.”

10.5 - STANDARDS FOR WASTE TIRE MONOFILLS

10.5.1 GENERAL WASTE TIRE MONOFILL STANDARDS

- (A) Any person who owns or operates a Waste Tire Monofill must have and comply with a valid Certificate of Designation issued pursuant to section 1.3 of these Regulations.
- (B) A Certificate of Designation for a Waste Tire Monofill must include an Engineering Design and Operations Plan (EDOP) which includes the requirements listed in section 10.5.8, a Waste Tire Inventory Reduction Plan as required by 10.5.1 (J), the

Financial Assurance requirements in section 10.5.6, and a Closure and Post-Closure Plan as required by section 10.5.9.

- (C) Any person who owns or operates a Waste Tire Monofill must maintain all weather access roads to those areas of active operation and as necessary to meet the Fire Prevention, Training and Firefighting Plan required by subsection 10.5.8(A)(3) of these Regulations.
- (D) Any person who owns or operates a Waste Tire Monofill must collect litter in order to avoid a fire hazard or a nuisance condition and control the growth of vegetation to minimize potential fuel sources.
- (E) Any person who owns or operates a Waste Tire Monofill must implement security measures to preclude unauthorized entry.
- (F) Any person who owns or operates a Waste Tire Monofill must post signs in public view at the entrance to the Waste Tire Monofill with the name of the facility, the hours which the facility is open for public use, a listing of the wastes accepted at the facility, and a phone number for a 24 hour emergency contact. The signs must be posted in English and any other language predominant in the area surrounding the facility.
- (G) Any person who owns or operates a Waste Tire Monofill must maintain a working telephone at each Waste Tire Monofill facility.
- (H) During all stages of operation of a Waste Tire Monofill, the owner or operator must have an attendant who is responsible for site activities.
- (I) A Waste Tire Monofill owner or operator must immediately notify the Solid Waste Program within the Colorado Department of Public Health and Environment in the event of a fire or other emergency involving waste tires. Within two (2) weeks of this notification, the owner or operator must submit a written report describing the emergency to the Solid Waste Program. This report must describe the origins of the emergency, the actions that have been taken, actions that are currently being taken or are planned, results or anticipated results of these actions, and an approximate date of resolution of the issues generated by the emergency.
- (J) Waste Tire Inventory Reduction Plan: Owners/operators of a Waste Tire Monofill must on an annual basis, for every one (1) waste tire received, end use at least two (2) waste tires or process at least two (2) waste tires into tire-derived product. All owners or operators must submit for Department approval a Waste Tire Inventory Reduction Plan that shows how they will comply with this section. All owners or operators must comply with their Waste Tire Inventory Reduction Plan. An owner or operator of a Waste Tire Monofill may claim that information or data submitted in the Waste Tire Inventory Reduction Plan, should be withheld as Confidential Business

Information (“CBI”) or Trade Secret. The Department will hold information contained in the Waste Tire Inventory Reduction Plan as CBI/Trade Secret pursuant to section 7-74-102, C.R.S. and section 18-4-408(2), C.R.S. The burden of proving that the information or data is protected as CBI or Trade Secret shall be upon the party asserting the claim.

- (K) Any person who owns or operates a Waste Tire Monofill must arrange for the commercial hauling or mobile processing of waste tires only with a waste tire hauler or mobile waste tire processor who is currently registered pursuant to these Regulations.
- (L) Any person who owns or operates a Waste Tire Monofill must ensure that all waste tires collected at its facility are delivered to a waste tire monofill, a waste tire processor or to a waste tire collection facility operating in compliance with the Act and the Regulations or mobile processed. An owner/operator of a Waste Tire Monofill may ship whole waste tires to an End User who end uses whole waste tires for fuel or energy recovery.
- (M) Any person who owns or operates a Waste Tire Monofill must not place any waste tires into monofill storage after January 1, 2018. All Waste Tire Monofills must close by July 1, 2024.
- (N) Any person who owns or operates a Waste Tire Monofill must comply with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.
- (O) Any person who owns or operates a Waste Tire Monofill must comply with their facility’s EDOP.

10.5.2 WASTE TIRE MONOFILL REGISTRATION REQUIREMENTS

- (A) No person shall operate a Waste Tire Monofill without having received a Certificate of Registration from the Department.
- (B) Applications for Certificates of Registration must be submitted on Form WT-1 to the Solid Waste and Materials Management Program within the Hazardous Materials and Waste Management Division of the Department.
- (C) Certificate of Registration applications for operation of a Waste Tire Monofill must include:
 - (1) The business name of the Waste Tire Monofill and any other names under which the Waste Tire Monofill may do business;

- (2) The principal business address of the Waste Tire Monofill;
 - (3) A business telephone number(s);
 - (4) The name and address of the responsible officer of a corporate Waste Tire Monofill, or the owner(s) of a Waste Tire Monofill operating a proprietorship or a partnership; and
 - (5) The signature and date of signature of the Waste Tire Monofill applicant.
- (D) The Department will issue a Certificate of Registration to the applicant after approval of the application. Certificates of Registration must be maintained at the facility and made available for inspection.
- (E) A Certificate of Registration is not transferable by the owner or operator of a Waste Tire Monofill to whom it was issued to any other person or entity, without the Department's prior approval based on information described in section 10.5.2(F) below.
- (F) An owner or operator of a Waste Tire Monofill who has previously filed an application for a Certificate of Registration as a Waste Tire Monofill (Form WT-1) is required to notify the Department in writing whenever changes occur to the following:
- (1) Ownership;
 - (2) Mailing address;
 - (3) Business name;
 - (4) Type of registration;
 - (5) Contact name;
 - (6) Phone number; or
 - (7) The owner or operator is no longer operating a Waste Tire Monofill at the location registered with the Department.
- (G) The Department may cancel a Certificate of Registration of an owner or operator who no longer operates a Waste Tire Monofill at their registered location.

10.5.3 WASTE TIRE MONOFILL FACILITY DECAL

- (A) An application for a Certificate of Registration pursuant to section 10.5.2 above, shall also serve as an application for a Waste Tire Facility decal.
- (B) An owner or operator of a Waste Tire Monofill will receive a Waste Tire Facility decal from the Department with its Certificate of Registration. Waste Tire decals will have a unique number.
- (C) An owner or operator of a Waste Tire Monofill must post their Waste Tire Facility decal in a prominent location at the address used to store/accumulate waste tires and where the decal is visible to the Waste Tire Hauler.

10.5.4 WASTE TIRE MONOFILL MANIFEST REQUIREMENTS

- (A) No owner or operator of a Waste Tire Monofill may accept a shipment of more than ten (10) waste tires from a Waste Tire Hauler or Mobile Waste Tire Processor without an accompanying manifest properly completed pursuant to sections 10.3.4 or 10.7.5 of these Regulations unless they comply with section 10.1.3 (E).
- (B) Manifests for all shipments of waste tires accepted by an owner or operator of a Waste Tire Monofill must be maintained on-site at that facility and available for inspection for three (3) years from the date of delivery.
- (C) No owner or operator of a Waste Tire Monofill may offer a shipment of more than ten (10) waste tires without an accompanying manifest properly completed by the Waste Tire Hauler pursuant to section 10.3.4 of these Regulations.
- (D) No owner or operator of a Waste Tire Monofill may offer waste tires for processing without receiving a manifest properly completed by the Mobile Waste Tire Processor pursuant to section 10.7.5 of these Regulations.
- (E) Manifests for all shipments of waste tires offered by the owner or operator of a Waste Tire Monofill must be maintained on-site at that facility and available for inspection for three (3) years from the date of pick-up.

10.5.5 WASTE TIRE MONOFILL FINANCIAL ASSURANCE

Any person who owns or operates a Waste Tire Monofill must maintain financial assurance for any required reclamation and for closure and post-closure care of the Facility pursuant to section 1.8 of these Regulations.

10.5.6 ANNUAL REPORT

- (A) Any person who owns or operates a Waste Tire Monofill must submit an annual report to the Department and local governing body having jurisdiction by April 1 of each year on the Waste Tire Facility Annual Reporting Form (Form WT-5). The annual report must include the amount, by actual count or by actual weight in tons, of waste tires received at the facility, how many waste tires were processed or end used at the facility, how many waste tires were shipped off-site from the facility for the preceding calendar year, and the total amount of waste tires accepted from unregistered waste tire haulers.
- (B) The annual report must include, in addition to the information in section 10.5.6(A) above, information concerning compliance with the Waste Tire Inventory Reduction Plan in section 10.5.1 (J). An owner or operator of a Waste Tire Monofill may claim that information or data submitted in the annual report, including the report on the Waste Tire Inventory Reduction Plan, should be withheld as Confidential Business Information (“CBI”) or Trade Secret. The Department will hold information contained in the Waste Tire Inventory Reduction Plan as CBI/Trade Secret pursuant to section 7-74-102, C.R.S. and section 18-4-408(2), C.R.S. The burden of proving that the information or data is protected as CBI or Trade Secret shall be upon the party asserting the claim.

10.5.7 WASTE TIRE MONOFILL SELF-CERTIFICATION

- (A) The Department may require an owner or operator of a Waste Tire Monofill to furnish additional information concerning compliance with the regulatory requirements of 6 CCR 1007-2 using a self-certification process.
- (B) An owner or operator of a Waste Tire Monofill who receives a Self-Certification Checklist from the Department must complete and return the checklist within the time specified in the instructions provided by the Department.
- (C) The Department will provide the owner or operator of a Waste Tire Monofill a reasonable amount of time to complete and return a checklist. At a minimum, the owner or operator of a Waste Tire Monofill will have fourteen (14) days from the date of receipt to return the checklist. A checklist is deemed returned on the date it is received by the Department. The Department may provide an extension of time to complete and return the checklist upon request.
- (D) The self-certification checklist will contain a certification in substantially the following form, which must be signed by an authorized representative of the Waste Tire Monofill:

“I, the undersigned facility representative, certify that:

- i. I have personally examined and am familiar with the information contained in this submittal;
- ii. The information contained in this submittal is to the best of my knowledge, true, accurate, and complete in all respects; and
- iii. I am fully authorized to make this certification on behalf of this facility.

I am aware that there are significant penalties, including, but not limited to, possible fines and imprisonment for willfully submitting false, inaccurate, or incomplete information.”

10.5.8 WASTE TIRE MONOFILL FACILITY ENGINEERING DESIGN AND OPERATIONS PLAN

(A) Any person who owns or operates a Waste Tire Monofill must have an EDOP, approved by the Department, which must, at a minimum, include all of the following:

(1) General:

- (a) Nature of the activity conducted at the facility;
- (b) The capacity and type of equipment to be used at the facility;
- (c) All methods of waste tire processing and storage;
- (d) Means used to track inventory on a volume or weight basis;
- (e) Security measures;
- (f) How the facility intends to implement the requirements listed in section 10.5.1 above; and
- (g) Annual training requirements for all employees on all approved facility plans described in this section 10.5.8, and how that training will be documented and verified.

(2) Emergency Response Plan which includes:

- (a) General facility information including:
 - (i) The facility name, mailing address and telephone number;
 - (ii) The facility operator's name, mailing address and telephone number; and
 - (iii) The property owner's name, mailing address and telephone number;
- (b) An emergency contact list including the names and telephone numbers of the persons and appropriate agencies to be contacted in case of emergency, including:
 - (i) The Emergency Coordinator;
 - (ii) The Facility Owner;
 - (iii) The Facility Operator;
 - (iv) The Local Fire Authority; and
 - (v) Any additional numbers that may be needed.

- (c) Emergency Equipment available on site, including specific capabilities and uses;
- (d) A map showing the location of fire lanes, tire pile configurations, fire hydrants, power supply, and emergency response equipment; and
- (e) A description of emergency response procedures to be followed in the event of a fire or other emergency.

(3) Fire Prevention, Training and Firefighting Plan which:

- (a) Includes specification of the Facility's fire lane locations and widths;
- (b) Includes resources to extinguish fires;
- (c) Designates a Facility Emergency Coordinator;
- (d) Is written by a qualified professional in accordance with local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.
- (e) Ensures the owner or operator complies with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.
- (f) Includes specification for adequate water supply available for use by the local fire authority for firefighting. Owners and operators may demonstrate compliance with this requirement through alternative methods approved by the local fire authority;

(4) Vector Control Plan which includes:

- (a) Provisions for storage of tires in a manner which prevents the breeding and harborage of mosquitoes, rodents, and other vectors by any of the following means: (i) cover with impermeable barriers, other than soil, to prevent entry or accumulation of precipitation, or (ii) use of treatments or methods, such as pesticides, to prevent or eliminate vector breeding as necessary.
- (b) If pesticides are used in vector control efforts, they must be used in accordance with the Pesticide Applicators Act, section 35-10-101, C.R.S.

10.5.9 CLOSURE AND POST-CLOSURE CARE OF WASTE TIRE MONOFILLS

- (A) Any person who owns or operates a Waste Tire Monofill must close and maintain the Waste Tire Monofill in accordance with sections 2.5, 2.6, and 10.5 of these Regulations.
- (B) Any person who owns or operates a Waste Tire Monofill must prepare a Closure Plan as part of the Engineering Design and Operations Plan. The Closure Plan must describe the steps necessary to close the Waste Tire Monofill at any point during its active life and at the end of the facility's active life. The facility may either: 1) close the waste in place as a solid waste landfill in accordance with these Solid Waste Regulations, or 2) remove all solid waste and residual contamination to meet unrestricted use concentrations. Option 2, also known as "clean closure," eliminates the need for post closure care. Both Option 1 and Option 2 require the owner or operator of a Waste Tire Monofill to develop a closure plan.
- (1) The closure plan, at a minimum, must include the following information:
- (a) Provisions for removal of all solid waste at those facilities choosing partial or facility-wide clean closure;
 - i. Proposed plans and procedures for sampling and testing soil based on visual identification of staining or other indications of residual contamination;
 - ii. Provisions for sampling and analyses of soil for potential hazardous characteristics and provisions for final disposal. Soils will need to meet unrestricted use concentrations or background levels whichever is greater.
 - (b) Provision for the consolidation and placement of residual wastes remaining on site;
 - (c) Procedures for placement of final cover materials and final cover configurations.
- (2) General description of the site post-closure, including:
- (a) The final property contours, material and procedures to be used to cover the waste tires;
 - (b) A description of final soil placement and establishment of plant life;
 - (c) A description of anticipated post disposal land use;
 - (d) A schedule for completing all activities necessary to satisfy the closure criteria of this section; and
 - (e) An analysis of whether section 25-15-320, C.R.S. will require an environmental covenant following closure.
- (3) Owners or operators of all Waste Tire Monofills must submit a Closure Report to the Department at the time of final closure. The report must summarize the number or volume of tires disposed of in each pit, and phone number of person(s) responsible for post closure control of the facility.

- (4) At least sixty (60) days in advance of the proposed closure date, the owner or operator must notify the Department and the local governing authority of the proposed closure date.
- (5) The owner or operator must notify the general public at least sixty (60) days in advance of the proposed closure by placing signs of suitable size at the entrance to the site and facility.
- (6) The owner or operator of the facility must complete closure activities of the facility in accordance with the closure plan and within one hundred eighty (180) calendar days following the final receipt of waste. Extensions of the closure period may be granted by the Department if the owner or operator demonstrates that closure will take longer than one hundred eighty (180) calendar days and the owner/operator has taken and will continue to take all steps to prevent threats to human health and the environment.
- (7) Following closure of an Waste Tire Monofill, the owner or operator shall comply with section 25-15-320, C.R.S. unless the site is remediated to a condition that is suitable for unrestricted use. If waste is left in place as part of the closure, record a notation in the chain of title specifying that the land has been used as a Waste Tire Monofill; a copy of which must be provided to the Department prior to recording for review and approval.
- (8) Closure Certification: A closure certification report is required to be submitted within sixty (60) calendar days of completion of closure activities which documents all the requirements and conditions of the closure plan have been achieved. The Report must be signed and sealed by a Colorado registered professional engineer and is subject to review and approval by the Department.

(C) POST-CLOSURE CARE AND MAINTENANCE REQUIREMENTS FOR WASTE TIRE MONOFILLS

Post-Closure Activities: Following closure of the Waste Tire Monofill the owner or operator shall submit a Post-Closure Care Plan within sixty (60) calendar days of determining that the waste tire facility was closed as a landfill that will include at least the following:

- (1) Provisions to prevent nuisance conditions;
- (2) Maintaining the integrity and effectiveness of the final cover, should waste remain in place, including making repairs to the cover and replanting vegetation as necessary; and

- (3) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period.

10.6 - STANDARDS FOR WASTE TIRE PROCESSORS

10.6.1 GENERAL

Waste tire processing is not subject to the Recycling requirements of section 8 of these Regulations or the annual fee requirements of section 1.7.3 of these Regulations.

10.6.2 GENERAL STANDARDS FOR WASTE TIRE PROCESSORS

- (A) All Waste Tire Processors must maintain all weather access roads to those areas of active operation and as necessary to meet the Fire Prevention, Training and Firefighting Plan required by subsection 10.6.9(A)(3) of these Regulations.
- (B) All Waste Tire Processors must collect litter in order to avoid a fire hazard or a nuisance condition and control the growth of vegetation to minimize potential fuel sources.
- (C) All Waste Tire Processors must implement security measures to preclude unauthorized entry.
- (D) Prominent signs in English and any other language predominant in the area surrounding the facility must be posted in public view at the entrance to each Waste Tire Processing facility with the name of the facility, the hours which the facility is open for public use, a listing of the wastes accepted at the facility, and a phone number for a 24 hour emergency contact.
- (E) The Waste Tire Processor must maintain a working telephone at each Waste Tire Processor facility.
- (F) During all stages of operation of a Waste Tire Processor, the facility must have an attendant who is responsible for site activities.
- (G) A Waste Tire Processor operator must immediately notify the Solid Waste Program within the Colorado Department of Public Health and Environment in the event of a fire or other emergency involving waste tires. Within two (2) weeks of this notification, the facility must submit a written report describing the emergency to the Solid Waste Program. This report must describe the origins of the emergency, the actions that have been taken, actions that are currently being taken or are planned, results or anticipated results of these actions, and an approximate date of resolution of the issues generated by the emergency.

- (H) Following a one-year accumulation period, the weight or volume of waste tires that are processed must be at least 75% of the total weight or volume of waste tires received and currently in storage over a three year rolling average. A Waste Tire Processor that is also registered as a Waste Tire Monofill is exempt from this requirement and must comply with the requirement in section 10.5.1(J).
- (I) A Waste Tire Processor that is not also registered as a Waste Tire Monofill must not have at the processing facility at any one time more than the lesser of:
 - (1) One hundred thousand (100,000) waste tires;
 - (2) The amount of waste tires allowed under local requirements; or
 - (3) The amount of waste tires anticipated in the Waste Tire Processor's financial assurance instrument.
- (J) Waste Tire Processors must arrange for the commercial hauling of waste tires only with a waste tire hauler who is currently registered pursuant to section 10.3.2 of these Regulations.
- (K) Waste Tire Processors must ensure that any waste tires shipped off-site from their facilities are delivered either out of state or to a registered Waste Tire Generator, Waste Tire Hauler, Waste Tire Collection Facility, Waste Tire Monofill, or another Waste Tire Processor operating in compliance with the Act and the Regulations. Waste Tire Processors may ship whole waste tires to an End User who end uses whole waste tires for fuel or energy recovery.
- (L) Waste Tire Processors must comply with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.
- (M) Waste Tire Processors must comply with the facility's Engineering Design and Operations Plan (EDOP).

10.6.3 WASTE TIRE PROCESSORS REGISTRATION REQUIREMENTS

- (A) No person shall process waste tires without having received a Certificate of Registration from the Department.
- (B) Applications for Certificates of Registration must be submitted on Form WT-to the Solid Waste and Materials Management Program within the Hazardous Materials and Waste Management Division of the Department.

- (C) Certificate of Registration applications for operation of a Waste Tire Processor must include:
- (1) The business name of the Waste Tire Processor and any other names under which the Waste Tire Processor may do business;
 - (2) The principal business address of the Waste Tire Processor;
 - (3) A business telephone number(s);
 - (4) The name and address of the responsible officer of a corporate Waste Tire Processor, or the owner(s) of a Waste Tire Processor operating a proprietorship or a partnership; and
 - (5) The signature and date of signature of the Waste Tire Processor applicant.
- (D) The Department will issue a Certificate of Registration to the applicant after approval of the application. Certificates of Registration must be maintained at the facility and made available for inspection
- (E) A Certificate of Registration is not transferable by the Waste Tire Processor to whom it was issued to any other person or entity.
- (F) A Waste Tire Processor who has previously filed an application for a Certificate of Registration as a Waste Tire Processor (Form WT-1) is required to notify the Department in writing whenever changes to the following occur:
- (1) Ownership;
 - (2) Mailing address;
 - (3) Business name;
 - (4) Type of registration;
 - (5) Contact name;
 - (6) Phone number;
 - (7) Waste tires are processed at a new location not registered with the Department;
or
 - (8) The owner/operator is no longer operating as a Waste Tire Processor at the location registered with the Department.

- (G) The Department may cancel a Certificate of Registration of a person who no longer processes waste tires.

10.6.4 WASTE TIRE PROCESSOR FACILITY DECAL

- (A) An application for a Certificate of Registration pursuant to section 10.6.3 above, will also serve as an application for a Waste Tire Facility decal.
- (B) Waste Tire Processors will receive a Waste Tire Facility decal from the Department with their Certificate of Registration. Waste tire decals will have a unique number.
- (C) Waste Tire Processors must post their Waste Tire Facility decal in a prominent location at the address used to process tires and where the decal is visible to the Waste Tire Hauler.

10.6.5 WASTE TIRE PROCESSOR MANIFEST REQUIREMENTS

- (A) No Waste Tire Processor may accept a shipment of ten (10) or more waste tires from a Waste Tire Hauler without an accompanying manifest properly completed pursuant to section 10.3.4 of these Regulations unless they comply with section 10.1.3 (E).
- (B) Waste Tire Processors must maintain on-site at their facility manifests for all shipments of waste tires accepted and make the manifests available for inspection for three (3) years from the date of delivery.
- (C) No Tire Waste Tire Processor may offer a shipment of ten (10) or more waste tires without an accompanying manifest properly completed by the Waste Tire Hauler pursuant to section 10.3.4 of these Regulations.
- (D) Waste Tire Processors must maintain on-site at their facility manifests for all shipments of waste tires offered and make the manifests available for inspection for three (3) years from the date of pick-up.

10.6.6 WASTE TIRE PROCESSOR FINANCIAL ASSURANCE

All Waste Tire Processors must maintain financial assurance for any required reclamation and for closure and post-closure care of the Facility pursuant to section 1.8 of these Regulations.

10.6.7 ANNUAL REPORT

- (A) All Waste Tire Processors must submit an annual report to the Department and local governing body having jurisdiction by April 1 of each year on the Waste Tire Facility

Annual Reporting Form (Form WT-5). The annual report must include the amount, by actual count or by actual weight in tons, of waste tires received at the facility, how many waste tires were processed at the facility, how many waste tires were shipped off-site from the facility for the preceding year, and the total amount of waste tires accepted from unregistered waste tire haulers.

- (B) The annual report must include, in addition to the information in section 10.6.7(A) above, information concerning compliance with Section 10.6.2(H) that the Waste Tire Processor processed into tire-derived product at least 75% of the three year rolling average annual amount, by weight or number, of waste tires that the Waste Tire Processor accepted during the previous three (3) calendar years.
- (C) A Waste Tire Processor may claim that information or data submitted in the Waste Tire Annual Report should be withheld as Confidential Business Information (“CBI”) or Trade Secret. The Department will hold information contained in the Waste Tire Inventory Reduction Plan as CBI/Trade Secret pursuant to section 7-74-102, C.R.S. and section 18-4-408(2), C.R.S. The burden of proving that the information or data is protected as CBI or Trade Secret shall be upon the party asserting the claim.

10.6.8 WASTE TIRE PROCESSOR SELF-CERTIFICATION

- (A) The Department may require Waste Tire Processors to furnish additional information concerning compliance with the regulatory requirements of 6 CCR 1007-2 using a self-certification process.
- (B) Any Waste Tire Processor who receives a Self-Certification Checklist from the Department must complete and return the checklist within the time specified in the instructions provided by the Department.
- (C) The Department will provide Waste Tire Processors a reasonable amount of time to complete and return a checklist. At a minimum, the Waste Tire Processor will have fourteen (14) days from the date of receipt to return the checklist. A checklist is deemed returned on the date it is received by the Department. The Department may provide an extension of time to complete and return the checklist upon request.
- (D) The self-certification checklist shall contain a certification in substantially the following form, which must be signed by an authorized representative of the Waste Tire Processor:

“I, the undersigned facility representative, certify that:

- i. I have personally examined and am familiar with the information contained in this submittal;
- ii. The information contained in this submittal is to the best of my knowledge, true, accurate, and complete in all respects; and

iii. I am fully authorized to make this certification on behalf of this facility.

I am aware that there are significant penalties, including, but not limited to, possible fines and imprisonment for willfully submitting false, inaccurate, or incomplete information.”

10.6.9 WASTE TIRE PROCESSOR ENGINEERING DESIGN AND OPERATIONS PLAN

(A) Each Waste Tire Processor must have an Engineering Design and Operations Plan, approved by the Department, which must, at a minimum, include all of the following:

(1) General:

- (a) Nature of the activity conducted at the facility;
- (b) The capacity and type of equipment to be used at the facility;
- (c) All methods of processing and storage;
- (d) Means used to track inventory on a volume or weight basis;
- (e) Security measures;
- (f) How the facility intends to implement the requirements listed in section 10.6.2 above; and
- (g) Annual training requirements for all employees on all approved facility plans described in section 10.6.9, and how that training will be documented and verified.

(2) Emergency Response Plan which includes:

(a) General facility information including:

- (i) The facility name, mailing address and telephone number;
- (ii) The facility operator’s name, mailing address and telephone number; and
- (iii) The property owner’s name, mailing address and telephone number.

(b) An emergency contact list including the names and telephone numbers of the persons and appropriate agencies to be contacted in case of emergency, including:

- (i) The Emergency Coordinator;
- (ii) The Facility Owner;
- (iii) The Facility Operator;
- (iv) The Local Fire Authority; and
- (v) Any additional numbers that may be needed.

- (c) Emergency Equipment available on site, including specific capabilities and uses.
- (d) A map showing the location of fire lanes, tire pile configurations, fire hydrants, power supply, and emergency response equipment.
- (e) A description of emergency response procedures to be followed in the event of a fire or other emergency.

(3) Fire Prevention, Training and Firefighting Plan which:

- (a) Includes specification of the Facility's fire lane locations and widths;
- (b) Includes resources to extinguish fires;
- (c) Designates a Facility Emergency Coordinator;
- (d) Is written by a qualified professional in accordance with local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety; and
- (e) Ensures the Waste Tire Processor complies with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.

(4) Vector Control Plan which includes:

- (a) Provisions for storage of tires in a manner which prevents the breeding and harborage of mosquitoes, rodents, and other vectors by any of the following means: (i) cover with impermeable barriers, other than soil, to prevent entry or accumulation of precipitation, or (ii) use of treatments or methods, such as pesticides, to prevent or eliminate vector breeding as necessary; and
- (b) Provisions ensuring that if pesticides are used in vector control efforts, they must be used in accordance with the Pesticide Applicators Act, section 35-10-101, C.R.S.

10.6.10 CLOSURE AND POST-CLOSURE CARE OF WASTE TIRE PROCESSOR FACILITIES

- (A) Waste Tire Processors must close and maintain their facilities in accordance with sections 2.5, 2.6, and 10.6 of these Regulations.
- (B) Closure Plan Requirements for Waste Tire Processors: The closure plan must be prepared as part of an Engineering Design and Operations Plan and must describe the steps necessary to close the Waste Tire Processor's facility at any point during its active life and at the end of the facility's active life. The Waste Tire Processor must remove all solid waste and residual contamination to meet unrestricted use concentrations. The closure plan, at a minimum, must include the following information:
- (1) Provisions for removal of all solid waste at the site, including:
 - (a) Proposed plans and procedures for sampling and testing soil based on visual identification of staining or other indications of residual contamination;
 - (b) Provisions for sampling and analyses of soil for potential hazardous characteristics and provisions for final disposal. Soils will need to meet unrestricted use concentrations or background levels whichever is greater; and
 - (c) A schedule for completing all activities necessary to satisfy the closure criteria of this section.
 - (2) Waste Tire Processors must submit a Closure Certification Report to the Department at the time of final closure. The report must summarize and document the closure activities, including any analytical results, needed to support the unrestricted use condition of the facility.
 - (3) At least sixty (60) days in advance of the proposed closure date, the Waste Tire Processor must notify the Department and the local governing authority of the proposed closure date.
 - (4) The owner or operator must notify the general public at least sixty (60) days in advance of the proposed closure by placing signs of suitable size at the entrance to the site and facility.
 - (5) Waste Tire Processors must complete closure activities of their facility in accordance with the closure plan and within one hundred eighty (180) calendar days following the final receipt of waste tires. Extensions of the closure period may be granted by the Department if the Waste Tire Processor demonstrates that closure will take longer than one hundred eighty (180) calendar days and the

owner/operator has taken and will continue to take all steps to prevent threats to human health and the environment.

- (6) Closure Certification: Waste Tire Processors must submit a closure certification report within sixty (60) calendar days of completion of closure activities which documents all the requirements and conditions of the closure plan have been achieved. The Report must be signed and sealed by a Colorado registered professional engineer and is subject to review and approval by the Department.

10.7 - STANDARDS FOR MOBILE WASTE TIRE PROCESSORS

10.7.1 GENERAL

Mobile waste tire processing is not subject to the Recycling requirements of section 8 of these Regulations or the annual fee requirements of section 1.7.3 of these Regulations.

10.7.2 GENERAL STANDARDS FOR MOBILE WASTE TIRE PROCESSORS

- (A) All Mobile Waste Tire Processors must collect litter around their mobile processing operation in order to avoid a fire hazard or a nuisance and control the growth of vegetation to minimize potential fuel sources.
- (B) The operator must ensure access to a working telephone at each Mobile Waste Tire Processor site.
- (C) During all stages of operation at a mobile processing site, a Mobile Waste Tire Processor must ensure that an attendant who is responsible for mobile processing site activities is present.
- (D) A Mobile Waste Tire Processor operator must immediately notify the Solid Waste and Materials Management Program within the Colorado Department of Public Health and Environment in the event of a fire or other emergency involving waste tires. Within two weeks of this notification, the facility must submit a written report describing the emergency to the Solid Waste and Materials Management Program. This report must describe the origins of the emergency, the actions that have been taken, actions that are currently being taken or are planned, results or anticipated results of these actions, and an approximate date of resolution of the problems generated by the emergency.
- (E) A Mobile Waste Tire Processor must not lease or own the property on which the processing occurs. Persons who own or lease the property on which they process waste tires are Waste Tire Processors and are not Mobile Waste Tire Processors.

- (F) A Mobile Waste Tire Processor must not accept or accumulate waste tires unless also registered as a Waste Tire Processor at the property on which the processing occurs.
- (G) A Mobile Waste Tire Processor must receive permission from the local governing authority prior to beginning to process waste tires at the location for any period of time.
- (H) A Mobile Waste Tire Processor must notify the Department fourteen (14) days prior to beginning processing, the location where mobile processing will occur, the dates of processing, and the number of days processing at the site.
- (I) A Mobile Waste Tire Processor must not process waste tires at a location for more than thirty (30) consecutive days unless the Mobile Waste Tire Processor:
 - (1) Is registered as a Waste Tire Processor at that location; or
 - (2) Receives Departmental approval to process for more than thirty (30) consecutive days at the location and remains in compliance with all state and local environmental requirements at the location of mobile processing.
- (J) Mobile Waste Tire Processors must comply with their Engineering Design and Operations Plan (EDOP).

10.7.3 MOBILE WASTE TIRE PROCESSORS REGISTRATION REQUIREMENTS

- (A) No person shall operate as a Mobile Waste Tire Processor without having received a Certificate of Registration from the Department.
- (B) Applications for Certificates of Registration must be submitted on Form WT-1 or WT-1M to the Solid Waste and Materials Management Program within the Hazardous Materials and Waste Management Division of the Department.
- (C) Certificate of Registration applications for operating as a Mobile Waste Tire Processor must include:
 - (1) The business name of the Mobile Waste Tire Processor and any other names under which the Mobile Waste Tire Processor may do business;
 - (2) The permanent business address of the Mobile Waste Tire Processor;
 - (3) A business telephone number(s);

- (4) The name and address of the responsible officer of a corporate Mobile Waste Tire Processor, or the owner(s) of a Mobile Waste Tire Processor operating a proprietorship or a partnership;
 - (5) The signature and date of signature of the Mobile Waste Tire Processor applicant; and
 - (6) The types of mobile processing equipment the Mobile Waste Tire Processor uses to process waste tires in Colorado.
- (D) The Department will issue a Certificate of Registration to the applicant after approval of the application. Certificates of Registration must be maintained at the permanent address of the Mobile Waste Tire Processor and made available for inspection.
- (E) A Certificate of Registration is not transferable by the Mobile Waste Tire Processor to whom it was issued to any other person or entity.
- (F) The Certificate of Registration for a Mobile Waste Tire Processor is valid from the date of issuance to March 15 of the year indicated on the Certificate of Registration.
- (G) A Mobile Waste Tire Processor is not authorized to mobile process waste tires after the March 15 expiration date unless the Mobile Waste Tire Processor has applied to renew the Certificate of Registration prior to expiration and has received a new Certificate of Registration as a Mobile Waste Tire Processor from the Department and Mobile Waste Tire Processor decals, pursuant to section 10.7.4 below.
- (H) All Mobile Waste Tire Processors who wish to continue mobile processing waste tires must submit application for renewal no later than February 1.
- (I) A Waste Tire Mobile Processor who has previously filed an application for a Certificate of Registration as a Waste Tire Mobile Processor (Form WT-1 or WT-1M) is required to notify the Department in writing whenever changes occur to the following:
- (1) Ownership;
 - (2) Mailing address;
 - (3) Business name;
 - (4) Type of registration;
 - (5) Contact name;

(6) Phone number; or

(7) The Waste Tire Mobile Processor is no longer mobile processing waste tires.

(J) The Department may cancel a Certificate of Registration of a person who no longer mobile processes waste tires.

10.7.4 MOBILE WASTE TIRE PROCESSOR DECAL

(A) No person shall mobile process waste tires in Colorado without having received a Mobile Waste Tire Processor decal. An application for a Certificate of Registration pursuant to section 10.7.3 above, shall also serve as an application for a Mobile Waste Tire Processor decal(s). A Mobile Waste Tire Processor must submit an updated application for a Certificate of Registration within fifteen (15) days after the Mobile Waste Tire Processor purchases new mobile processing equipment or rents or leases mobile processing equipment.

(B) Mobile Waste Tire Processors will receive from the Department Mobile Waste Tire Processor decal(s) for each type of mobile processing equipment with their Certificate of Registration. Each decal will have a unique number.

(C) Each Mobile Waste Tire Processor decal will be valid until March 15 of the year indicated on the vehicle decal and will have a unique number. Prior to the expiration date, a Mobile Waste Tire Processor must submit a new application for a Certificate of Registration pursuant to section 10.7.3 above.

(D) A Mobile Waste Tire Processor decal must be affixed to the mobile processing equipment. If the decal cannot be affixed to the mobile processing the equipment, the operator must have the decal available at all times for inspection.

(F) A Mobile Waste Tire Processor decal is not transferable by the Mobile Waste Tire Processor to whom it was issued to any other person or entity and must not be used for any vehicle not listed by the Registered Mobile Waste Tire Processor on its application for a Certificate of Registration as a Mobile Waste Tire Processor.

10.7.5 MOBILE WASTE TIRE PROCESSOR MANIFEST REQUIREMENTS

(A) No person may accept waste tires for mobile processing without completing a paper or electronic manifest to section 10.7.5 of these Regulations.

(B) Paper or electronic manifests for all waste tires shipped, accepted and/or processed by a Mobile Waste Tire Processor must be maintained on-site at the principal business address as identified on the Certificate of Registration and available for inspection for three (3) years from the date of delivery.

(C) At the conclusion of the mobile processing at the location, the Mobile Waste Tire Processor must create a paper or electronic manifest for waste tires that are processed. Such persons must use the Uniform Mobile Waste Tire Processor Manifest Form (Form WT-7), available at the Department's website. Each manifest will have a unique number. The completed Uniform Mobile Waste Tire Processor Manifest must contain the following information:

- (1) The name, address, telephone number, and Certificate of Registration number and decal number, if applicable, of the location where waste tires were processed;
- (2) The quantity of waste tires processed at each location as measured by:
 - (a) The actual number of waste tires by category (e.g. passenger car/light duty truck tires, semi-truck tires, etc); or
 - (b) The weight of waste tires measured in tons;
- (3) The name, address, telephone number and Certificate of Registration number of the Mobile Waste Tire Processor and the Mobile Waste Tire Processor decal number of the equipment used to process the waste tires;
- (4) The date(s) of processing;
- (5) The signatures, under penalty of perjury, of the responsible party at the location where waste tires were processed and the mobile processor; and
- (6) If the waste tires originated from an illegal waste tire site or from a private property.

D) Mobile Waste Tire Processors must:

- (1) Make a copy of any paper or electronic Uniform Waste Tire Manifest available to the Department upon request.
- (2) Maintain all manifests at the permanent business address of the Mobile Waste Tire Processor and available for inspection for three (3) years from the date of processing.
- (3) Provide a copy of the paper or electronic Uniform Mobile Waste Tire Processor Manifest Form to the Waste Tire Generator/source of waste tires processed within thirty (30) days of completion of mobile processing.

10.7.6 MOBILE WASTE TIRE PROCESSOR FINANCIAL ASSURANCE

All Mobile Waste Tire Processors must establish and maintain financial assurance in the amount of ten thousand dollars (\$10,000.00), unless they maintain financial assurance as a Waste Tire Processor, Waste Tire Collection Facility or a Waste Tire Monofill.

10.7.7 ANNUAL REPORT

- (A) All Mobile Waste Tire Processors must submit an annual report to the Department and local governing body having jurisdiction by April 1st of each year on the Mobile Waste Tire Processor Annual Reporting Form (Form WT-8). The annual report must include the amount, by actual count or by actual weight in tons, of waste tires processed at each mobile processing location during the previous year.
- (B) A Mobile Waste Tire Processor may claim that information or data submitted in the Waste Tire Annual Report should be withheld as Confidential Business Information ("CBI") or Trade Secret. The burden of proving that the information or data is protected as CBI or Trade Secret shall be upon the party asserting the claim.

10.7.8 MOBILE WASTE TIRE PROCESSOR SELF-CERTIFICATION

- (A) The Department may require Mobile Waste Tire Processors to furnish additional information concerning compliance with the regulatory requirements of 6 CCR 1007-2 using a self-certification process.
- (B) Any Mobile Waste Tire Processor who receives a Self-Certification Checklist from the Department must complete and return the checklist within the time specified in the instructions provided by the Department.
- (C) The Department will provide Mobile Waste Tire Processors a reasonable amount of time to complete and return a checklist. At a minimum, the Mobile Waste Tire Processor will have fourteen (14) days from the date of receipt to return the checklist. A checklist is deemed returned on the date it is received by the Department. The Department may provide an extension of time to complete and return the checklist upon request.
- (D) The self-certification checklist shall contain a certification in substantially the following form, which must be signed by an authorized representative of the Mobile Waste Tire Processor:

"I, the undersigned facility representative, certify that:

- i. I have personally examined and am familiar with the information contained in this submittal;

- ii. The information contained in this submittal is to the best of my knowledge, true, accurate, and complete in all respects; and
- iii. I am fully authorized to make this certification on behalf of this facility.

I am aware that there are significant penalties, including, but not limited to, possible fines and imprisonment for willfully submitting false, inaccurate, or incomplete information.”

10.7.9 MOBILE WASTE TIRE PROCESSOR ENGINEERING DESIGN AND OPERATIONS PLAN

(A) Each Mobile Waste Tire Processor must have an Engineering Design and Operations Plan, approved by the Department, which must, at a minimum, include all of the following:

(1) General:

- (a) Nature of the activity conducted at each mobile processor site;
- (b) The capacity and type of equipment to be used at each site;
- (c) All methods of processing and storage;
- (d) Means used to track inventory on a volume or weight basis;
- (e) Security measures;
- (f) How the Mobile Waste Tire Processor intends to implement the requirements listed in section 10.7.2 above; and
- (g) Annual training requirements for all employees on all approved facility plans described in section 10.7.9, and how that training will be documented and verified.

(2) Emergency Response Plan which includes:

(a) General information including:

- (i) The Mobile Processor’s name, mailing address and telephone number; and
- (ii) Potential emergencies and how the Mobile Processor will respond to these.

(b) An emergency contact list including the names and telephone numbers of the persons and appropriate agencies to be contacted in case of emergency, including:

- (i) The Emergency Coordinator; and
 - (ii) Any additional numbers that may be needed.
 - (c) A description of emergency response procedures to be followed in the event of a fire or other emergency.
- (3) Fire Prevention, Training and Firefighting Plan which:
- (a) Includes resources to extinguish fires;
 - (b) Designates an onsite Emergency Coordinator;
 - (c) States how the Mobile Waste Tire Processor will comply with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.

10.8 - STANDARDS FOR WASTE TIRE COLLECTION FACILITIES

10.8.1 GENERAL

The requirements of this section 10.8 apply to facilities where ten (10) or more waste tires are stored awaiting pickup by a Registered Waste Tire Hauler or processed by a Mobile Waste Tire Processor.

10.8.2 GENERAL STANDARDS FOR WASTE TIRE COLLECTION FACILITIES

- (A) Any person who owns or operates a Waste Tire Collection Facility must maintain all weather access roads to those areas of active operation and as necessary to meet the Fire Protection, Training and Firefighting Plan required by subsection 10.8.9(A)(3) of these Regulations.
- (B) Any person who owns or operates a Waste Tire Collection Facility must collect litter in order to avoid a fire hazard or a nuisance condition and control the growth of vegetation to minimize potential fuel sources.
- (C) Any person who owns or operates a Waste Tire Collection Facility must implement security measures to preclude unauthorized entry.
- (D) Any person who owns or operates a Waste Tire Facility Collection Facility must place prominent signs in English and any other language predominant in the area surrounding the facility must be posted in public view at the entrance to each Waste

Tire Collection Facility with the name of the facility, the hours which the facility is open for public use, a listing of the wastes accepted at the facility, and a phone number for a 24 hour emergency contact.

- (E) Any person who owns or operates a Waste Tire Facility Collection Facility must maintain a working telephone at each Waste Tire Collection Facility.
- (F) During all stages of operation of a Waste Tire Collection Facility, the facility must have an attendant who is responsible for site activities.
- (G) A Waste Tire Collection Facility owner or operator must immediately notify the Solid Waste and Materials Management Program within the Colorado Department of Public Health and Environment in the event of a fire or other emergency involving waste tires. Within two (2) weeks of this notification, the owner or operator must submit a written report describing the emergency to the Solid Waste and Materials Management Program. This report must describe the origins of the emergency, the actions that have been taken, actions that are currently being taken or are planned, results or anticipated results of these actions, and an approximate date of resolution of the issues generated by the emergency.
- (H) Any person who owns or operates a Waste Tire Collection Facility must arrange for the commercial hauling or mobile processing of waste tires only with a waste tire hauler or mobile processor who is currently registered pursuant to these Regulations.
- (I) Any person who owns or operates a Waste Tire Collection Facility must ensure that all waste tires collected at its facility are delivered to a registered waste tire generator, waste tire hauler, another waste tire collection facility, waste tire monofill, waste tire processor, an approved beneficial user of whole waste tires, a municipal or county owned waste tire collection area, or to a municipal or privately owned solid waste landfill operating in compliance with the Act and the Regulations or processed by a mobile processing. An owner/operator of a Waste Tire Monofill may ship whole waste tires to an End User who end uses whole waste tires for fuel or energy recovery.
- (J) Any person who owns or operates a Waste Tire Collection Facility that is not also registered as a Waste Tire Processor or Waste Tire Monofill must not have onsite at any one time more than seven thousand five hundred (7,500) waste tires.
- (K) Any person who owns or operates a Waste Tire Collection Facility must comply with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.

(L) Any person who owns or operates a Waste Tire Collection Facility must comply with the facility's Engineering Design and Operations Plan (EDOP).

10.8.3 WASTE TIRE COLLECTION FACILITY REGISTRATION REQUIREMENTS

(A) No person shall operate a Waste Tire Collection Facility without having received a Certificate of Registration from the Department.

(B) Applications for Certificates of Registration must be submitted on Form WT-1 to the Solid Waste and Materials Management Program within the Hazardous Materials and Waste Management Division of the Department.

(C) Certificate of Registration applications for operation of a Waste Tire Collection Facility must include:

- 1) The business name of the Waste Tire Collection Facility and any other names under which the Waste Tire Collection Facility may do business;
- 2) The principal business address of the Waste Tire Collection Facility;
- 3) A business telephone number(s);
- 4) The name and address of the responsible officer of a corporate Waste Tire Collection Facility, or the owner(s) of a Waste Tire Collection Facility operating a proprietorship or a partnership; and
- 5) The signature and date of signature of the Waste Tire Collection Facility applicant.

(D) The Department will issue a Certificate of Registration to the applicant after approval of the application. Certificates of Registration must be maintained at the facility and made available for inspection.

(E) A Certificate of Registration is not transferable by the owner or operator of a Waste Tire Collection Facility to whom it was issued to any other person or entity.

(F) An owner or operator of a Waste Tire Collection Facility who has previously filed an application for a Certificate of Registration as a Waste Tire Collection Facility (Form WT-1) is required to notify the Department in writing whenever changes occur to the following:

- (1) Ownership;
- (2) Mailing address;

- (3) Business name;
 - (4) Type of registration;
 - (5) Contact name;
 - (6) Phone number;
 - (7) The owner or operator of a Waste Tire Collection Facility will be operating at a new location not registered with the Department; or
 - (8) The owner or operator is no longer operating a Waste Tire Collection Facility at the location registered with the Department.
- (G) The Department may cancel a Certificate of Registration of an owner or operator who no longer operates a Waste Tire Collection Facility at their registered location.

10.8.4 WASTE TIRE COLLECTION FACILITY DECAL

- (A) An application for a Certificate of Registration pursuant to section 10.8.3 above, shall also serve as an application for a Waste Tire Collection Facility decal.
- (B) An owner or operator of a Waste Tire Collection Facility will receive a Waste Tire Collection Facility decal from the Department with its Certificate of Registration.
- (C) Waste Tire decals will have a unique number.
- (D) An owner or operator of a Waste Tire Collection Facility must post their Waste Tire Facility decal in a prominent location at the address used to store/accumulate tires and where the decal is visible to the Waste Tire Hauler or Mobile Waste Tire Processor.

10.8.5 WASTE TIRE COLLECTION FACILITY MANIFEST REQUIREMENTS

- (A) No owner or operator of a Waste Tire Collection Facility may accept a shipment of ten (10) or more waste tires from a Waste Tire Hauler without an accompanying manifest properly completed pursuant to section 10.3.4 of these Regulations unless they comply with section 10.1.3 (E).
- (B) Manifests for all shipments of waste tires accepted by an owner or operator of a Waste Tire Collection Facility must be maintained on-site at that facility and available for inspection for three (3) years from the date of delivery.

- (C) No owner or operator of a Waste Tire Collection Facility may offer a shipment of ten (10) or more waste tires without an accompanying manifest properly completed by the Waste Tire Hauler pursuant to section 10.3.4 of these Regulations.
- (D) No owner or operator of a Waste Tire Collection Facility may offer waste tires for mobile processing without receiving a manifest properly completed by the Mobile Waste Tire Processor pursuant to section 10.7.5 of these Regulations.
- (E) Manifests for all shipments of waste tires shipped off-site and accepted on-site by the owner or operator of a Waste Tire Collection Facility must be maintained on-site at that facility and available for inspection for three (3) years from the date of delivery.

10.8.6 WASTE TIRE COLLECTION FACILITY FINANCIAL ASSURANCE

All owners or operators of Waste Tire Collection Facilities must maintain financial assurance for any required reclamation and for closure and post-closure care of the Facility pursuant to section 1.8 of these Regulations.

10.8.7 ANNUAL REPORT

Any person who owns or operates a Waste Tire Collection Facility must submit an annual report to the Department and local governing body having jurisdiction by April 1 of each year on the Waste Tire Facility Annual Reporting Form (Form WT-5). The annual report must include, by actual count or by actual weight in tons, the amount of waste tires received at the facility, how many waste tires were shipped off-site from the facility for the preceding calendar year, and the total amount of waste tires accepted from unregistered waste tire haulers.

10.8.8 WASTE TIRE COLLECTION FACILITY SELF-CERTIFICATION

- (A) The Department may require an owner or operator of a Waste Tire Collection Facility to furnish additional information concerning compliance with the regulatory requirements of 6 CCR 1007-2 using a self-certification process.
- (B) An owner or operator of a Waste Tire Collection Facility who receives a Self-Certification Checklist from the Department must complete and return the checklist within the time specified in the instructions provided by the Department.
- (C) The Department will provide the owner or operator of a Waste Tire Collection Facility a reasonable amount of time to complete and return a checklist. At a minimum, the owner or operator of a Waste Tire Collection Facility will have fourteen (14) days from the date of receipt to return the checklist. A checklist is deemed returned on the date it is received by the Department. The Department may provide an extension of time to complete and return the checklist upon request.

(D) The self-certification checklist shall contain a certification in substantially the following form, which must be signed by an authorized representative of the Waste Tire Collection Facility:

"I, the undersigned facility representative, certify that:

- i. I have personally examined and am familiar with the information contained in this submittal;
- ii. The information contained in this submittal is to the best of my knowledge, true, accurate, and complete in all respects; and
- iii. I am fully authorized to make this certification on behalf of this facility.

I am aware that there are significant penalties, including, but not limited to, possible fines and imprisonment for willfully submitting false, inaccurate, or incomplete information."

10.8.9 WASTE TIRE COLLECTION FACILITY ENGINEERING DESIGN AND OPERATIONS PLAN

(A) Any person who owns or operates a Waste Tire Collection Facility must have and comply with an Engineering Design and Operations Plan approved by the Department, which must, at a minimum, include all of the following:

(1) General:

- (a) Nature of the activity conducted at the facility;
- (b) The capacity and type of equipment to be used at the facility;
- (c) All methods of storage;
- (d) Means used to track inventory on a volume or weight basis;
- (e) Security measures;
- (f) How the facility intends to implement the requirements listed in section 10.8.2 above; and
- (g) Annual training requirements for all employees on all approved facility plans described in this section 10.8.9, and how that training will be documented and verified.

(2) Emergency Response Plan which includes:

(a) General facility information including:

- (i) The facility name, mailing address and telephone number;
- (ii) The facility operator's name, mailing address and telephone number; and
- (iii) The property owner's name, mailing address and telephone number.

(b) An emergency contact list including the names and telephone numbers of the persons and appropriate agencies to be contacted in case of emergency, including:

- (i) The Emergency Coordinator;
- (ii) The Facility Owner;
- (iii) The Facility Operator;
- (iv) The Local Fire Authority; and
- (v) Any additional numbers that may be needed.

(c) Emergency Equipment available on site, including specific capabilities and uses.

(d) A map showing the location of fire lanes, tire pile configurations, fire hydrants, power supply, and emergency response equipment.

(e) A description of emergency response procedures to be followed in the event of a fire or other emergency.

(3) Fire Prevention, Training and Firefighting Plan which:

- (a) Includes specification of the Facility's fire lane locations and widths;
- (b) Includes resources to extinguish fires;
- (c) Designates a Facility Emergency Coordinator;
- (d) Is written by a qualified professional in accordance with local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.

- (e) Ensures the owner or operator of a Waste Tire Collection Facility complies with the applicable local fire codes or, where no code exists or the local code does not provide equivalent or greater level of fire protection, the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety.

(4) Vector Control Plan which includes:

- (a) Provisions for storage of tires in a manner which prevents the breeding and harborage of mosquitoes, rodents, and other vectors by any of the following means: (i) cover with impermeable barriers, other than soil, to prevent entry or accumulation of precipitation, or (ii) use of treatments or methods, such as pesticides, to prevent or eliminate vector breeding as necessary.
- (b) Provisions ensuring that if pesticides are used in vector control efforts, they are used in accordance with the Pesticide Applicators Act, section 35-10-101, C.R.S.

10.8.10 CLOSURE AND POST-CLOSURE CARE OF WASTE TIRE COLLECTION FACILITIES

- (A) Any person who owns or operates a Waste Tire Collection Facility must close and maintain the closed facility in accordance with sections 2.5, 2.6, and 10.8 of these Regulations.
- (B) Any person who owns or operates a Waste Tire Collection Facility must prepare a closure plan as part of an Engineering Design and Operations Plan and must describe the steps necessary to close the Waste Tire Collection Facility at any point during its active life and at the end of the facility's active life. The owner or operator of a Waste Tire Collections Facility must remove all solid waste and residual contamination to meet unrestricted use concentrations. The closure plan, at a minimum, must include the following information:
 - (1) Provisions for removal of all solid waste at the site, including:
 - (a) Proposed plans and procedures for sampling and testing soil based on visual identification of staining or other indications of residual contamination;
 - (b) Provisions for sampling and analyses of soil for potential hazardous characteristics and provisions for final disposal. Soils will need to meet unrestricted use concentrations or background levels whichever is greater; and

- (c) A schedule for completing all activities necessary to satisfy the closure criteria of this section.
- (2) The owner or operator of all Waste Tire Collection Facilities must submit a Closure Certification Report to the Department at the time of final closure. The report must summarize the document the closure activities, including any analytical results, needed to support the unrestricted use condition of the facility.
- (3) At least sixty (60) days in advance of the proposed closure date, the owner or operator must notify the Department and the local governing authority of the proposed closure date.
- (4) The owner or operator must notify the general public at least sixty (60) days in advance of the proposed closure by placing signs of suitable size at the entrance to the site and facility.
- (5) The owner or operator of the facility must complete closure activities of the facility in accordance with the closure plan and within one hundred eighty (180) calendar days following the final receipt of waste tires. Extensions of the closure period may be granted by the Department if the owner or operator demonstrates that closure will take longer than one hundred eighty (180) calendar days and the owner/operator has taken and will continue to take all steps to prevent threats to human health and the environment.
- (6) Closure Certification: Any person who owns or operates a Waste Tire Collection Facility must submit a closure certification report within sixty (60) calendar days of completion of closure activities which documents all the requirements and conditions of the closure plan have been achieved. The Report must be signed and sealed by a Colorado registered professional engineer and is subject to review and approval by the Department.

10.9 - STANDARDS FOR END USERS

10.9.1 GENERAL

The requirements of this section 10.9 apply to End Users who end use more than ten (10) tons of tire-derived product or who end use more than ten (10) tons of whole waste tires for energy or fuel in any one calendar year.

10.9.2 GENERAL STANDARDS FOR END USERS

- (A) End Users must arrange for the commercial hauling or mobile processing of waste tires only with a Waste Tire Hauler or Mobile Waste Tire Processor who is currently registered pursuant to these Regulations.

- (B) An End User that is not also registered as a Waste Tire Processor, Waste Tire Collection Facility or Waste Tire Monofill must not have onsite at any one time ten (10) or more whole waste tires.

10.9.3 END USER REGISTRATION REQUIREMENTS

- (A) End Users described in section 10.9.1 must register with and receive a Certificate of Registration from the Department.
- (B) Applications for Certificates of Registration must be submitted on Form WT-1 to the Solid Waste and Materials Management Program within the Hazardous Materials and Waste Management Division of the Department.
- (C) Certificate of Registration applications for operation as an End User must include:
- 1) The business name of the End User and any other names under which the End User may do business;
 - 2) The principal business address of the End User;
 - 3) A business telephone number(s);
 - 4) The name and address of the responsible officer of a corporate End User, or the End User operating a proprietorship or a partnership; and
 - 5) The signature and date of signature of the End User applicant.
- (D) The Department will issue a Certificate of Registration to the applicant after approval of the application. Certificates of Registration must be maintained at the facility and made available for inspection
- (E) A Certificate of Registration is not transferable by the End User to whom it was issued to any other person or entity.
- (F) An End User who has previously filed an application for a Certificate of Registration as an End User (Form WT-1) is required to notify the Department in writing whenever changes to the following occur:
- (1) Ownership;
 - (2) Mailing address;
 - (3) Business name;

- (4) Type of registration;
 - (5) Contact name;
 - (6) Phone number;
 - (7) End use is occurring at a new location not registered with the Department; or
 - (8) End use is no longer occurring at the location registered with the Department.
- (G) The Department may cancel a Certificate of Registration of a person who is no longer an end user.

10.9.4 WASTE TIRE MANIFESTS

- (A) No End User may accept a shipment of waste tires from a Waste Tire Hauler without an accompanying manifest properly completed pursuant to section 10.3.4 of these Regulations.
- (B) Manifests for all shipments of waste tires accepted by an End User must be maintained on-site at that facility and available for inspection for three (3) years from the date of delivery.
- (C) No End User may offer a shipment of waste tires without an accompanying manifest properly completed by the Waste Tire Hauler pursuant to section 10.3.4 of these Regulations.
- (D) No End User may offer more waste tires for processing without receiving a manifest properly completed by the Mobile Waste Tire Processor pursuant to section 10.7.5 of these Regulations.
- (E) Manifests for all shipments of waste tires shipped off-site and accepted on-site by an End User must be maintained on-site at that facility and available for inspection for three (3) years from the date of delivery.

10.9.5 ANNUAL REPORT

- (A) End Users described in section 10.9.1 must submit an annual report to the Department and local governing body having jurisdiction by April 1st of each year on the Waste Tire Facility Annual Reporting Form (Form WT-5). The annual report must include the amount, by actual count or by actual weight in tons, of waste tires and tire derived product received at the End User's facility during the previous year, and how many waste tires were used to generate energy or fuel during the previous year.

- (B) An End User may claim that information or data submitted in the Waste Tire Annual Report should be withheld as Confidential Business Information (“CBI”) or Trade Secret. The burden of proving that the information or data is protected as CBI or Trade Secret shall be upon the party asserting the claim.

10.10 - STANDARDS FOR THE MANAGEMENT OF USED TIRES

10.10.1 GENERAL

The requirements of this section 10.10 apply to any person who commercially accumulates, stores, transports, or dispenses used tires.

- (A) All persons who accumulate, store, transport, or dispense used tires must develop and maintain on site and in the vehicle used for transport written criteria for distinguishing waste tires from used tires. Such criteria must be made available for inspection.
- (B) All persons who accumulate, store, transport, or dispense used tires must clearly identify waste tires and used tires using the criteria developed pursuant paragraph (A) above.
- (C) All persons who accumulate, store, transport, or dispense used tires must develop and maintain on site and in the vehicle used for transport written criteria for distinguishing used tires being held for sale in Colorado from used tires being held for sale outside Colorado. Such criteria must be made available for inspection.
- (D) All persons who accumulate, store, transport, or dispense used tires must clearly identify used tires being held for sale in Colorado and used tires being held for sale outside Colorado according to the criteria developed pursuant to paragraph (C) above.
- (E) All persons who accumulate, store, transport, or dispense used tires must organize used tires for sale in a manner that allows the inspection of each individual tire.
- (F) Any person may claim that information or data contained in their written criteria described in this section 10.10.1 should be withheld as Confidential Business Information (“CBI”) or Trade Secret. The Department will hold such information contained as CBI/Trade Secret pursuant to section 7-74-102, C.R.S. and section 18-4-408(2), C.R.S. The burden of proving that the information or data is protected as CBI or Trade Secret shall be upon the party asserting the claim.

10.11 WASTE TIRE FEE ADMINISTRATION

10.11.1 Any person who sells new motor vehicle or new trailer tires must collect and remit to the Department monthly the Waste Tire Fee pursuant to section 1.7.6 of these Regulations. This Waste Tire Fee applies to all new automobile, trailer, truck, motor home and motorcycle tires sold in Colorado.

10.11.2 Any person who has sold a new motor vehicle or new trailer tire in the previous twelve (12) months must submit to the Department monthly the applicable New Tire Fee Return Form available on the Department's website. The New Tire Fee Return Form must include, at a minimum, the following information:

- (1) The account number;
- (2) The time period (month/year) new tires were sold;
- (3) The business name;
- (4) The business mailing address;
- (5) The business telephone number;
- (6) The name of the business contact;
- (7) The number of stores included in the New Tire Fee Return Form;
- (8) If the New Tire Fee Return Form was amended;
- (9) The number of tires sold (if applicable);
- (10) The amount owed; and
- (11) An authorized signature, title and date.

10.11.3 The payment of the Waste Tire Fee (if applicable) and the New Tire Fee Return Form must be delivered to the Department electronically or by hard copy and must be postmarked or submitted electronically by the 20th of each month for tires sold the previous month. Payments and forms received after the 20th of the month may be assessed a late fee of ten (10) percent in addition to the Waste Tire Fee.

10.11.4 Online payment of the Waste Tire Fee must be made by electronic check or credit card. Payments by mail must be by money order, cashier check or personal check. All other payment types, including cash payments or in-person payments will not be accepted.

- 10.11.5 The Department may deny a submittal made pursuant to this Section 10.11 if the Department determines a person has submitted an incorrect payment amount. In such cases, the Department will reimburse the incorrect payment and the person must resubmit the New Tire Fee Return Form with the correct payment within thirty (30) days.
- 10.11.6 Any person who aggregates monthly fees from multiple stores must submit monthly to the Department the Monthly New Tire Self Certification Form (Form WT-9) available on the Department's website. Form WT-9 must be delivered to the Department electronically or by hard copy and must be postmarked or submitted electronically by the 20th of each month for new tires sold the previous month.
- 10.11.7 Any person who sells new motor vehicle or new trailer tires must retain and make available any documentation, including the receipt provided to customers, to ensure compliance with section 30-20-1403 (1)(a) C.R.S., of the sale of these tires for the Department to review. Documentation must be retained for three (3) years from the date of sale.

10.12 RESERVED

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March 1, 2018

SECTION 11

SOLID WASTE INCINERATION FACILITIES

11.1 GENERAL PROVISIONS The following provisions apply to solid waste incineration facilities and privately operated Solid Waste-to-Energy facilities not under contract to a county and/or municipality. Solid Waste-to-Energy incineration facilities sited and operated by a county and/or municipality are regulated under the Solid Waste-to-Energy Incineration Systems Act and regulations promulgated thereunder. Approval by the Hazardous Materials and Waste Management Division shall not relieve the applicant from its obligation to comply with the requirements of other public agencies including but not limited to the Air Pollution Control Division, the Water Quality Control Division and local government permitting and zoning authorities.

11.1.1 The Department shall approve or deny the facility within 180 days of the application being determined complete by the Department. The Department will make the determination as to whether or not the application is complete within 30 days of receipt. If the application is deemed incomplete, the Department shall notify the applicant of such deficiencies. The applicant must submit the required information within 20 days or the application will automatically be denied.

11.2 ENGINEERING DESIGN AND OPERATION REQUIREMENTS: The engineering design and operations report shall include at a minimum, the following:

11.2.1 General Information

(A) Name, address and telephone number of the owner and operator of the solid waste incineration facility.

(B) Location of the site and facility giving the county and legal description of the facility, mailing address, and township, section and range to the nearest one-quarter ($\frac{1}{4}$) of a quarter-section.

(C) Area of the site.

(D) General description of the solid waste incineration facility.

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(E) Discussion of the facilities service area, including transportation corridors and surrounding access.

(F) Listing of all permits or construction approvals received or applied for including:

(1) Water Quality Permits;

(2) Air Quality Permits;

(3) Local Wastewater Treatment or other Local Permits.

11.2.2 Maps and related information:

(A) The application shall contain a topographic map which shows names of present land owners, property boundaries, including easements, rights of way, internal access roads, and other property interests for the proposed solid waste incineration site and adjacent area; and a description of title, deed, liens or usage restrictions affecting the proposed solid waste incineration facility.

(B) Other major maps and documentation shall be provided to show:

(1) The land use, zoning and population densities of the area within one mile of the proposed facility.

(2) The regional and site drainage conditions including the location of any floodplain boundaries, springs, streams, lakes, wetlands, constructed or natural drains and irrigation ditches located on the proposed site and or adjacent area which could affect the site;

(3) Counties and municipalities in which the site and facility is proposed to be located.

(4) The location of barriers, fences and other similar structures;

(5) All solid waste storage and loading areas;

(6) The location of any scales and weigh stations to be used in the operation;

(7) The location, size and use of buildings and related facilities which will be used in the operation, including their horizontal and vertical dimensions;

(8) Utilities to be installed at the facility.

(C) The applicant shall submit all construction plans, cross-sections, specifications and details.

(D) The Department may request additional information if necessary to complete its review of the facility.

11.2.3 Engineering Design Information The application shall contain a detailed description of:

(A) The waste stream including sources, general waste composition, estimated volumes of solid waste to be processed, recycled or landfilled, estimated BTU values and estimated seasonal and compositional variability of the waste stream or specifications, volumes and estimated BTU values for refuse derived fuel if used in place of unprocessed solid waste.

(B) A flow chart showing the mechanical components of the system and a materials balance depicting all process variables including waste volumes, energy, ash, air and water inputs and outputs.

(C) Expected materials to be stored prior to sale, recycling or disposal, the minimum and maximum volumes and weight, minimum and maximum time frames for storage and specific plans for separation and storage of these materials and for disposal of any bulky, unmarketable or noncombustible items.

(D) The orientation, interior dimensions and specifications of the tipping floor, storage area and ingress and egress there to.

(E) The size, type, capacity and general specifications and anticipated performance of equipment for the handling, processing and storage of waste, energy recovery, air emissions control and process monitoring systems.

(F) Any water collection, storage, treatment or discharge facilities to be used in the process.

(G) Identification of sufficient support equipment to maintain operation of equipment functions.

(H) The anticipated recovery rate of marketable materials or energy.

(I) A detailed engineering description of the incinerator including:

- (1) Type of incinerator and manufacturer's name and model number;
- (2) Construction materials and specifications;
- (3) Description of auxiliary fuel system and type of auxiliary fuel to be used;
- (4) Capacity of feed charging system;
- (5) Description of the combustion control system: air control, warning systems, auxiliary fuel/waste feed cutoff, waste moving/mixing system;
- (6) The design and operating conditions for the proposed incinerator for the most efficient combustion of solid waste including:
 - (a) Expected carbon monoxide (CO) level in the stack exhaust gas
 - (b) Waste feed rate
 - (c) Combustion zone temperature and location and method of measurement.
 - (d) Expected stack gas volume, flow rates and temperatures.
 - (e) Computed residence time for waste in the combustion zone

(f) Proposed waste feed cut off-limits based on identified significant operating parameters.

(g) Air pollution control equipment, operations variables and normal operating ranges, methods of monitoring, and actions to be taken in the event the equipment and instruments exceed normal operating ranges.

(J) The actual or expected physical and chemical composition of the ash or residue produced by operation of the facility including moisture density relationships, particle size distribution, volume and weight of ash generated.

(K) The proposed location and method for disposal, storage or processing of the ash, scrubber residue, or quench or wash water produced by operation of the facility.

(L) A plan for disposal or processing of waste if the facility is temporarily shut down. A description of the maintenance plan, design redundancy, and plans to minimize unscheduled downtime.

(M) Utilities to be installed at the facility.

(N) Plans and designs for operating and maintaining the proposed facility to prevent fires, explosions, emissions of toxic gases or other emergencies.

(O) A closure plan for decommissioning of the facility addressing removal of all unprocessed solid waste, ash, wash water or any other process residuals.

(P) Other information the Department may require including, but not limited to, calculations and drawings.

11.2.4 Facility Operating Plan The application shall contain a facility operating plan which includes:

(A) A narrative description of the general operating plan for the proposed facility, including hours of operation, daily operational methodology, procedures for facility start-up, scheduled and unscheduled shutdown operations, including utilization of process and instrumentation controls for

start-up and shutdown, anticipated throughput design capacity, and expected life of the facility.

(B) Provisions for alternative waste handling or disposal during periods when the facility is not in operation, including procedures to be followed in case of equipment breakdown, such as the use of standby equipment, extension of operating hours or arrangements for diversion of waste to other facilities.

(C) Description of procedures to be used for removal of solid waste or ash from the system in the event of mechanical system breakdown.

(D) An operational safety, fire prevention and contingency plan to minimize hazards to human health and the environment resulting from fires, explosions, or release of pollutants into the air, onto the soil or into ground or surface water.

(E) Provisions assuring that the facility does not accept hazardous waste and also assuring that only wastes approved by the Department are accepted by the facility.

(F) The number, classification and job descriptions of personnel projected to be employed at the facility when operating at full capacity.

(G) A plan for hiring and training equipment operators and other personnel in the design and operation of the facility.

(H) Measures to prevent hazards or nuisances from vectors, litter, odors, dust, noise or other potential sources.

(I) An inventory and location of all facility records and as built drawings.

(J) Provisions for providing monitoring results to the Department.

11.3 OPERATING REQUIREMENTS

11.3.1 The solid waste program of the Department and the local governing body having jurisdiction shall be notified in writing of the anticipated date of initial start-up of the facility not more than 60 days nor less than 30 days prior to such date and shall be notified in writing of the actual date of commencement of start-up within 15 days after such date.

- 11.3.2 A solid waste incineration facility must be operated in accordance with the operating procedures specified in the approved engineering design and operations report and in the air emissions permit. Facilities incinerating solid waste not typical of municipal solid waste will be evaluated on a case-by-case basis for specific handling and combustion requirements to ensure the waste is handled and burned in a manner that minimizes possible environmental or health impacts.
- 11.3.3 Design, Construction, Operation and Monitoring of Solid Waste Incineration Facilities
- All solid waste incineration facilities shall be designed, constructed, operated, and monitored in compliance with all applicable requirements of the Colorado Air Pollution Prevention and Control Act, §§ 25-7-101 to 610, C.R.S., and its implementing regulations promulgated by the Air Quality Control Commission, 5 CCR 1001-1 to 22. All monitoring results shall be reported quarterly to the Department and the local governing body having jurisdiction, except that upset conditions, and corrective action taken in response to the upset condition, shall be reported to the Department and the local governing body having jurisdiction as soon as possible, but no later than one business day after the occurrence of the upset condition.
- 11.3.4 No hazardous waste as defined in Section 25-15-101(9) C.R.S. (1989) of the Colorado Hazardous Waste Act may be received at the solid waste incineration facility.
- 11.3.5 “Wastes” that are incinerated at solid waste incineration facilities must have specific approval from the Hazardous Materials and Waste Management Division and the Air Pollution Control Division with the exception of asbestos, which must be handled and disposed of according to Section 5 of the Colorado Regulations pertaining to Solid Waste Disposal Sites and Facilities.
- 11.3.6 Municipal solid waste must be stored inside an enclosed structure or building under negative air pressure which provides a minimum of three days storage, considering both volume (cubic yards) and weight (tons) at the installed design capacity of the combustion units. Storage of recovered or rejected, oversized and bulky non combustible material must be in accordance with the approved engineering design and operations plan for the facility.

- 11.3.7 All solid waste shall be handled in such a way as to maximize complete combustion of the waste and minimize any potential for fire, explosion, safety hazard or adverse public health effects. Adequate visual screening must be conducted to ensure removal of hazardous or other unacceptable wastes such as large bulky appliances, asbestos not approved for incineration at the facility.
- 11.3.8 Operations must be conducted in such a way as to prevent litter and nuisance conditions from occurring. Refuse should be confined to the tipping area and utilized on a first-in first-out basis.
- 11.3.9 Floors must have adequate drainage and be free of standing water.
- 11.3.10 The facility must be inspected daily or more frequently as necessary to detect problems with vectors, litter, fugitive dust, odors or equipment malfunctions, with inspection records maintained and corrective action implemented when problems are detected.
- 11.3.11 Discharge of quenching and/or scrubber water must be in compliance with all state and local water quality control regulations and sewer district requirements.
- 11.3.12 The alternative waste handling or backup disposal plan as approved in the Engineering Design and Operations report must be implemented for periods of facility shutdown.
- 11.3.13 Access to the facility must be controlled at all times to preclude unauthorized disposal.
- 11.3.14 All equipment operators and personnel shall be trained in the design and operation of the facility.
- 11.3.15 Ash shall be handled in closed conveyors and containers at the facility and shall be stored and transported in a manner to prevent leakage and dispersal.
- 11.3.16 No person shall close an approved solid waste incineration facility without notifying the Department and the local governing body having jurisdiction in writing at least 120 days prior to the closure date.

- 11.3.17 The facility shall be closed in accordance with all new applicable regulations in effect at the time of closure and with the closure plan, which if amended, must be submitted for review and approval by the Department 120 days prior to closure.
- 11.3.18 The operator of an approved municipal Solid Waste-to-Energy facility shall notify the general public at least 60 days in advance of the proposed closure date by placing signs of suitable size at the entrance of the facility.

11.4 RECORDS

- 11.4.1 The following records must be maintained by the facility and made available to the Department and the local governing body having jurisdiction.

(A) Operating records - (1) A daily log or an equivalent tracking system must be maintained by the facility operator to record operational information such as: (A) Hours of operation; (B) Total number of incoming vehicles using the facility; (C) Quantities of refuse derived fuel, residential and commercial refuse received, industrial other waste streams, and residues or recyclables shipped for disposal or recycling; (2) Records to identify sources of the incoming waste and to support the mechanism to preclude hazardous or unacceptable wastes from entering the facility; (3) Equipment maintenance or replacement; (4) Variations from approved operational procedures; (5) Inspections performed at the facility and any necessary action taken in response to them.

(B) Monitoring Records - The operator must maintain records of all stack tests and continuous monitoring results for the facility operations, any testing of ash residues, and information regarding water discharges pursuant to city ordinances, pretreatment standards or COPDES permits.

(C) Personnel Training Records

(D) Other Records:

(1) As-built construction details;

(2) Contingency plans and emergency procedures;

(3) Maintenance plans and schedules

11.5 REQUIREMENTS FOR MANAGEMENT OF RESIDUAL ASH FROM SOLID WASTE INCINERATION FACILITIES.

- 11.5.1 All residual ash from solid waste incineration facilities and associated waste water and fugitive dust handling and disposal shall comply with all applicable laws and regulations, and with all applicable local zoning laws and ordinances.
- 11.5.2 Residual ash shall be dewatered to remove any free liquids prior to shipment to a disposal site in accordance with the approved engineering design and operations plan for the incineration facility.
- 11.5.3 Transportation of ash shall occur in equipment designed and utilized to prevent leakage, spillage or dispersion of the material during transportation.
- 11.5.4 Residual ash from solid waste incineration facilities must either be beneficially used or reused, as defined in paragraph 11.5.5, or finally disposed in accordance with all applicable Solid Waste Disposal Sites and Facilities Act regulations.
- 11.5.5 For beneficial use or reuse of residual ash from a solid waste incineration facility to be approved by the Department after consultation with the local governing body having jurisdiction, the following must be demonstrated by the applicant:
 - (A) That the waste material can meet the same specifications as alternative non-waste materials, and
 - (B) That the beneficially used waste materials will not release contaminants into the environment.

[RESERVED]

Pages 200-204 are Reserved

SECTION 12

WATER TREATMENT PLANT SLUDGE

12.1 GENERAL PROVISIONS The following general provisions apply to all water treatment plant sludge disposal facilities except as provided in 12.1.4 for facilities in operation prior to adoption of these regulations.

12.1.1 (A) Any person who disposes of water treatment plant sludge, receives water treatment plant sludge for disposal or permits water treatment plant sludge to be disposed of on any facility or property which he operates or possesses shall do so in compliance with the requirements of Sections 1 through 3, and 12 of these regulations.

(B) If a conflict exists between the requirements of Sections 1 through 3 and the requirements of this Section 12, the requirements of Section 12 shall control.

(C) Notwithstanding the provisions of (A) and (B) Above, a person who disposes of water treatment plant sludge, receives water treatment plant sludge for disposal or permits water treatment plant sludge to be disposed of on any facility or property which he operates or possesses is not required to comply with subsections 1.4.4, 2.1.8, 2.1.9, 2.3, 3.1.1 of these regulations.

12.1.2 Each water treatment plant sludge disposal facility shall comply with Colorado health laws and with the standards, rules and regulations of the Department and the water quality control commission and with all applicable local zoning laws and ordinances.

12.1.3 These regulations do not apply to water treatment plant sludges which are beneficially used under the authority of the Colorado Domestic Sewage Sludge Regulations.

12.1.4 (A) Surface and ground water monitoring may be required by the Department at existing facilities where impairment of existing or future use of surface or ground water is determined to be probable.

(B) Those facilities in operation prior to adoption of these regulations may be required to come into compliance with these regulations upon a determination by the Department after consultation with the local

governing body having jurisdiction that such facilities are causing impairment of existing or future use of surface water or ground water.

12.2 APPLICATION INFORMATION ALTERNATIVES For the purposes of this Section 12 only as applied to the disposal of water treatment plant sludge, a person who disposes of water treatment plant sludge, receives water treatment plant sludge for disposal or permits water treatment plant sludge to be disposed of on any facility or property which he operates or possesses shall also comply with the following modifications to Sections 2 and 3 of these regulations:

- 12.2.1 If the total alpha activity of the sludge exceeds 40 picocuries per gram of dry sludge, the sludge generator shall contact the Department's Radiation Control Division for further disposal guidance.
- 12.2.2 A facility that operated as a water treatment sludge landfill shall: provide compacted fill material; provide adequate cover with suitable material; provide surface drainage designed to prevent ponding of water, wind erosion; prevent water and air pollution; and upon being filled, shall be left in a condition of orderliness and aesthetic appearance capable of blending with the surrounding area. In the operation of such a site and facility, the sludges shall be distributed in the smallest area consistent with handling traffic to be unloaded and shall be placed in the most dense volume practicable.
- 12.2.3 Adequate fencing, natural barriers or other security measures to preclude public entry shall extend around the entire perimeter of the facility and shall include a lockable gate or gates.
- 12.2.4 All ground water monitoring points shall be installed in accordance with applicable rules and regulations of the "Water Well and Pump Installation Contractor's Act," Title 37, Article 91, Part 1, CRS 1973 as amended. The facility operator shall be responsible for conducting a program of ground water sampling to document and monitor the water quality in such wells.
- 12.2.5 Ground water quality concentrations shall be monitored regularly, as deemed necessary by the Department on a site specific basis.
- 12.2.6 The type and quantity of material to be used as intermediate cover shall be identified in the engineering design and operations report of each water treatment plant sludge facility.

- 12.2.7 The following information shall be provided in the engineering design and operations report of each water treatment plant sludge facility: the type and quantity of material that will be required for use as a liner, if a liner is required; and the type and quantity of material that will be required for use as final cover, including its compaction density, moisture content specifications and the design permeability.
- 12.2.8 Maps and plans, drawn to a convenient common scale, showing the location and depth of cut for liners (if required), shall be submitted as part of the engineering design and operations report.
- 12.2.9 Maps and plans, drawn to a convenient common scale, showing the intermediate and final cover, shall be submitted as part of the engineering design and operations report.
- 12.2.10 Maps and plans, drawn to a convenient common scale, showing the location of all proposed monitoring points for surface water and ground water, shall be submitted as part of the engineering design and operations report.
- 12.2.11 Construction details for all proposed monitoring points for surface water stations and ground water monitoring wells shall be submitted as part of the engineering design and operations report.
- 12.2.12 The daily operating hours of the facility, the frequency of operation including the number of days per month and the number of months per year, the daily volume in cubic yards to be received on operating days, and the expected life of the site shall be included in the engineering design and operations report.
- 12.2.13 The engineering design and operations report shall specify the systems of records to be maintained documenting incoming waste volumes, water quality monitoring results, as-built construction details and variations from approved operating procedures.
- 12.2.14 The amounts and sources of water to be used on-site for the control of nuisance conditions, construction purposes, and personnel use shall be identified in the engineering design and operations report.
- 12.2.15 Provisions for the monitoring of ground water and surface water after closure shall be identified in the engineering design and operations report.

12.3 SLUDGE ACCEPTANCE CRITERIA In addition to compliance with Sections 1 through 3 of these regulations, a person who disposes of water treatment plant sludge, receives water treatment plant sludge for disposal or permits water treatment plant sludge to be disposed of on any facility or property which he operates or possesses shall also comply with the following:

- 12.3.1 Facilities shall not accept water treatment plant sludges containing any free liquids. U.S. Environmental Protection Agency laboratory method 9095, the "Paint Filter Liquids Test", shall be used to determine compliance with the requirements of this subsection.
- 12.3.2 Facilities shall not accept water treatment sludges having a pH less than 6.0 standard units.
- 12.3.3 No water treatment plant sludge disposal facility shall accept waste of any other kind without approval from the County Board of Commissioners or City governing body and the Department.

SECTION 13
MEDICAL WASTE

- 13.1** **Scope and Applicability**
- 13.2** **General Provisions**
- 13.3** **Certificate of Designation Required**
- 13.4** **Standards for Medical Waste Generators**
- 13.5** **Standards for Commercial Medical Waste Storage Facilities**
- 13.6** **Standards for Medical Waste Treatment**
- 13.7** **Engineering Design and Operation Plan Requirements for
Commercial Storage and Treatment Facilities**
- 13.8** **Operating Requirements for Commercial Storage and Treatment
Facilities**
- 13.9** **Standards for Medical Waste Disposal**
- 13.10** **Transportation Requirements**

13.1 SCOPE AND APPLICABILITY

- 13.1.1 This Section 13 applies to all medical waste generators, transporters and treatment, storage and/or disposal facilities, unless otherwise exempted, that generate, store, consolidate, treat, process, transport or dispose of non-hazardous (i.e., not regulated under § 25-15-101 et. seq. CRS) medical waste as defined in Section 1.2 of these regulations.
- 13.1.2 Household medical waste generators shall be exempt from this Section 13.

13.2 GENERAL PROVISIONS

- 13.2.1 Under no circumstance shall a site or facility that generates, stores, consolidates, treats, processes, transports or disposes of medical wastes become a health or environmental hazard or allow nuisance conditions as defined in Section 1.2 of these regulations to develop. Medical waste that causes nuisance conditions shall be immediately refrigerated, frozen, treated and/or disposed.
- 13.2.2 Sites and facilities that generate, store, consolidate, treat, process, transport or dispose of medical wastes must comply with all local, state and federal laws, regulations, ordinances and other requirements.
- 13.2.3 All records required by this Section 13 must be maintained onsite for three (3) years in an easily retrievable format.
- 13.2.4 There shall be no compaction of infectious waste before treatment.
- 13.2.5 Incorporation by Reference.

(A) References to material incorporated by reference in this Section 13 refer to 2011 editions unless otherwise expressly noted, and do not include any later amendments or editions.

(B) Information concerning all materials or regulations incorporated by reference may be obtained by contacting:

Regulatory and Program Authorization Coordinator
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530

(C) The specific materials or regulations incorporated by reference in these regulations are listed in the Statement of Basis and Purpose for this rulemaking, and are available for examination on the Internet and at the Department.

13.3 CERTIFICATE OF DESIGNATION REQUIRED

13.3.1 Exemptions - the following sites and facilities shall be approved sites and facilities for which it shall not be necessary to obtain a Certificate of Designation unless the Department determines that the site or facility may adversely affect human health and the environment:

(A) Medical waste generators that temporarily accumulate their own medical waste for onsite treatment or offsite shipment to a commercial medical waste treatment, storage or disposal facility, that are in compliance with:

- (1) Section 13.4 Standards for Medical Waste Generators.
- (2) Section 13.9 Standards for Medical Waste Disposal.
- (3) Section 13.10 Transportation Requirements.

For purposes of this section, “temporarily accumulate” means the generator may:

- (i) Store putrescible medical waste onsite for up to thirty (30) calendar days without refrigeration if the waste is packaged consistent with US DOT requirements for infectious substances (49 CFR Part 173.196 or 173.197) prior to being placed in the accumulation area.

(ii) Store putrescible medical waste onsite for up to ninety (90) calendar days if the waste is packaged consistent with US DOT requirements for infectious substances (49 CFR Part 173.196 or 173.197) and placed in refrigeration (45 degrees Fahrenheit or less) or frozen.

(iii) Store non-putrescible medical wastes, such as sharps containers, waste pharmaceutical containers and trace chemotherapy waste, onsite for up to ninety (90) calendar days if the waste is packaged in containers that are taken out of service and are in good condition and secured to prevent unauthorized access.

A Certificate of Designation is required for accumulation and/or storage of medical waste onsite by the generator if all of the requirements of this subpart 13.3.1 (A) are not met.

(B) Medical waste generators that operate equipment for treatment of medical wastes generated onsite or that is generated through the normal operation of their business at other locations operated by the same business and self-transported by private motor carrier from their other locations for consolidation and/or treatment that are in compliance with:

(1) Section 13.3.1(A).

(2) Section 13.6 Standards for Medical Waste Treatment.

Such facilities may also treat household medical waste collected as a community service.

(C) Those entities that conduct medical waste consolidation and storage activities as a community service limited to only households, such as a household medical waste collection program, a sharps collection program or a pharmaceutical take-back program, if they are in compliance with the requirements for medical waste generators in Section 13.3.1(A). Such entities must ensure consolidated wastes are sent to an approved medical waste treatment or disposal facility in compliance with Section 13.9, or other solid waste management program as authorized by the Department.

(D) Those facilities for hazardous waste disposal that have been issued a Certificate of Designation pursuant to Title 25 Article 15 Parts 1, 2, 3 and 5, CRS, as amended, and are in compliance with 6 CCR 1007-3.

- 13.3.2 No person, unless exempted under Section 13.3.1, shall operate a medical waste consolidation, storage, treatment, processing or disposal facility without having received a Certificate of Designation in accordance with Section 1.6 of these regulations.
- 13.3.3 All applications for a Certificate of Designation must be submitted for review and approval by the Department and the local governing body with jurisdiction and include an Engineering Design and Operations Plan prepared in accordance with Section 13.7 of these regulations.
- 13.3.4 The owner or operator of an existing solid waste disposal site or facility for which a Certificate of Designation has been issued shall submit an amended Engineering Design and Operations Plan for approval prior to receiving untreated medical waste as a new waste stream for consolidation, storage, treatment, processing or disposal.

13.4 STANDARDS FOR MEDICAL WASTE GENERATORS

- 13.4.1 Medical Waste Generators are required to develop and implement an onsite medical waste management plan for each facility. At least one employee at the facility must be designated with the responsibility of implementing the medical waste management plan.

(A) The plan must identify the types of medical waste generated and where each type of medical waste is generated in the facility.

(B) The plan must describe how each type of medical waste will be identified, segregated, packaged, stored, treated, transported and disposed.

(C) The plan must include a contingency plan for responding to spills or loss of containment of medical waste in order to minimize hazards to human health and the environment.

(D) The plan must identify medical waste training that will be provided to employees.

- 13.4.2 The plan must be maintained onsite in an easily retrievable format and be available for inspection by the regulatory agency, the transporter and the disposal facility. The plan must be updated whenever changes related to medical waste generation or handling occur.

13.5 STANDARDS FOR COMMERCIAL MEDICAL WASTE STORAGE FACILITIES

13.5.1 Commercial medical waste storage facilities shall be used for the consolidation and short-term storage of untreated medical wastes from multiple medical waste generators that will be taken to an approved medical waste treatment or disposal facility. It does not include storage of medical waste for less than seventy-two (72) hours incidental to transportation to an approved treatment, storage or disposal facility.

13.5.2 Commercial medical waste storage facilities must comply with:

(A) Section 13.1 Applicability.

(B) Section 13.2 General Provisions.

(C) Section 13.3 Certificate of Designation.

(D) Section 13.7 Engineering Design and Operations Plan Requirements.

(E) Section 13.8 Operating Requirements.

(F) Section 13.10 Transportation Requirements.

13.6 STANDARDS FOR MEDICAL WASTE TREATMENT

13.6.1 Treatment must be appropriate to the type of medical waste. All waste must be handled in a manner to ensure complete treatment of the waste such that no portion of the container or bulk volume of waste remains untreated.

(A) Acceptable methods of treatment for infectious wastes shall be those methods that render the waste non-infectious. Such methods may include but are not limited to thermal (e.g., autoclaving, incineration, heat, microwaving, macrowaving, pyrolysis or gasification), chemical (e.g., chlorine or chlorine derivatives, ozone, enzymes or sodium hydroxide), irradiation, other mechanisms designed for specific medical waste categories (e.g., gas/vapor sterilization), or other methods as approved by the Department that will not present an endangerment to facility personnel or the public.

(1) Infectious waste must be treated to achieve at least a 4 Log₁₀ reduction in *Bacillus stearothermophilus*, *Bacillus subtilis* or *Bacillus atrophaeus* endospores and at least a 6 Log₁₀ reduction in *Mycobacterium phlei* or *Mycobacterium bovis*.

(2) Encapsulation, solidification and/or compaction without rendering the waste non-infectious are not adequate forms of treatment.

(B) Acceptable methods of treatment for trace chemotherapy and waste pharmaceuticals include incineration, encapsulation, stabilization or other method approved by the Department.

13.6.2 The treatment technology manufacturer must incorporate recognized standards for determining appropriate validation and verification testing methodology and protocols to verify for the Department that the overall technology and the specific equipment perform as designed and are capable of consistently treating the waste to meet at least the minimum treatment standards in 13.6.1 of these regulations. This information must be made available to the prospective medical waste treater for inclusion in their medical waste management plan or application for Certificate of Designation as applicable.

13.6.3 Unless exempted in Section 13.3.1 of these regulations, medical waste treatment facilities must comply with:

(A) Section 13.1 Applicability.

(B) Section 13.2 General Provisions.

(C) Section 13.3 Certificate of Designation.

(D) Section 13.7 Engineering Design and Operations Plan Requirements.

(E) Section 13.8 Operating Requirements.

(F) Section 13.9 Standards for Disposal.

13.7 ENGINEERING DESIGN AND OPERATION PLAN REQUIREMENTS FOR COMMERCIAL STORAGE AND TREATMENT FACILITIES

13.7.1 Prohibited waste.

(A) Hazardous wastes as defined in Section 25-15-101(6) of the Colorado Revised Statutes and Part 261 of the Colorado Hazardous Waste Regulations (6 CCR 1007-3).

(B) Radioactive material as defined in the Rules and Regulations Pertaining to Radiation Control (6 CCR 1007-1).

(C) Controlled substances as defined by the Controlled Substances Act (21 United States Code (USC) Sec. 802(6)), unless the facility is also a US Drug Enforcement Administration (US DEA) registrant and is authorized to accept and manage these substances. Controlled substances from household medical waste generators are exempt from this Section 13.7.1.

13.7.2 Engineering Design and Operations Plan – Commercial medical waste storage and treatment facilities shall provide an Engineering Design and Operations Plan for review and approval to the Department and local governing body having jurisdiction prior to the acceptance of any untreated medical waste. The plan shall describe in detail how the facility will comply with all applicable requirements in these regulations. All engineered features of the facility design shall be reviewed and sealed by a registered Colorado Professional Engineer.

(A) The Engineering Design and Operations Plan shall contain the following general facility data:

- (1) The names, mailing addresses, telephone numbers and e-mail addresses of the facility owners and operators.
- (2) The names, addresses, telephone numbers and e-mail addresses of one or more persons having authority to take actions at the facility in the event of an emergency.
- (3) The mailing address and physical address of the facility, including the county and legal description as well as the quarter-section, section, township and range.
- (4) A general description of the medical waste storage or treatment facility.
- (5) A listing of all permits or construction approvals received by or applied for, including air quality, water quality, local wastewater treatment, and other State or local permits.

(B) The Engineering Design and Operations Plan shall contain, at a minimum, the following maps:

- (1) A vicinity map, drawn at a recognized engineering scale, that has been certified by a registered Colorado Professional Engineer showing access and service roads to the facility; zoning and land use; present land owners; property boundaries; easements; rights of way; residences; wells; location of floodplain boundaries; locations of all springs, lakes, streams, wetlands, constructed or natural drainages, and irrigation ditches; and all man-made or natural features relating to the facility within a 1/2-mile radius.
- (2) A site map, drawn at a recognized engineering scale, that has been certified by a registered Colorado Professional Engineer showing facility boundaries; location, size, and use of existing or proposed structures or other storage units; areas to be used for unloading, storage, and loading of wastes; general process flow; existing or proposed water diversion, collection, conveyance, treatment, storage and discharge facilities; and any other information requested if necessary to complete review of the plan.

(C) The Engineering Design and Operations Plan shall contain the following operational information.

(1) A narrative description of the general operating plan for the facility, including hours of operation, daily operations methodology, and expected facility capacity.

(2) Descriptions of the job titles, duties, responsibilities and training requirements of all employees who manage medical waste at the site.

(3) For sites where medical waste treatment is to be conducted, the plan shall also include:

(i) Technology validation process - A detailed description of the technology validation process steps and the waste treatment process including capacity of the unit, composition and volume of waste the technology is designed to treat and the composition and volume of waste representing the worst case scenario for this technology. For infectious waste treatment processes, this shall also include a description of the time intervals and locations for biological indicator samples that were placed in the load, and the procedures for testing the biological indicator samples to determine final concentrations after treatment. This information should be provided by the technology manufacturer.

(ii) Technology verification process – A detailed description of the verification testing procedures to be used on a routine basis by the waste treater to verify for the Department that the technology remains effective onsite under actual operating conditions.

(a) Onsite verification testing must be completed on representative test loads before production startup of a newly installed treatment system at the waste treater's facility. The waste treater must maintain documentation of onsite verification testing and monitoring results for each test load, including any deviations from the critical limits and corrective actions taken.

- (b) For infectious waste treatment processes, verification procedures shall use biological monitoring. Parametric monitoring may be allowed if the technology manufacturer has successfully demonstrated to the Department that appropriate critical limits are met to achieve adequate biological inactivation and that the parameters to be monitored are directly correlated to biological inactivation.
- (c) A description of the treatment technology including manufacturer's name and equipment model number or description, standard operating procedures which have been proven to be effective, and a description of preventive maintenance procedures. For infectious waste treatment processes, a description of the required residence time for waste in the treatment zone and a description of the type and frequency of biologic and/or parametric verification monitoring, including calibration of parametric controls, should also be included.
- (d) The waste treater must provide a detailed written operations and maintenance plan that includes the technology manufacturer's specifications and instructions.
- (e) The waste treater must follow the written operations and maintenance procedures provided by the technology manufacturer and maintain documentation of onsite treatment and monitoring results for each waste load, including any deviations from the critical limits and corrective actions taken in the event of a deviation.
- (iii) A detailed engineering description of the facility with a flow chart showing the components of the treatment system.
- (iv) A description of annual operator training requirements including loading and unloading of the treatment system to minimize occupational exposure and physical injury, emergency procedures for handling malfunctioning systems, and documentation requirements for system failure during operation.

(v) A description of waste loads that can be processed, waste feed capacity and rate, and limitations on waste composition and types.

(vi) A description of control systems including air flow, waste moving/mixing systems, procedures to be used for facility startup and scheduled and/or unscheduled shutdown, warning systems and waste feed cutoff, if applicable.

(4) A waste characterization and acceptance plan, including waste screening methods to be used, waste exclusion procedures and rejection of prohibited wastes, handling methods for wastes that require special or non-standard handling, and a contingency plan for handling prohibited wastes.

(5) A detailed description of the on- and offsite controls to be used to prevent nuisance conditions, including dust, noise, mud, odors, and control of disease vectors including the attraction, breeding and emergence of insects, birds or rodents.

(6) A waste handling and storage plan, including a detailed description of the unloading, monitoring, handling and storage practices to be used and information on methods to secure access and set up barriers to prevent unauthorized entry to areas where waste is stored.

(i) All exterior doors, gates or lids to medical waste storage areas shall be marked with the biohazard symbol, if applicable, and the words "Caution – Medical Waste Storage Area – Unauthorized Persons Keep Out". Letters on signs shall be at least two inches in height and legible.

(ii) Medical waste shall be stored in a manner and location that maintains the integrity of the packaging and provides protection from water, precipitation and wind. Storage units shall be constructed of easily cleanable materials that are impervious to liquids and resistant to corrosion from disinfectants, have adequate drainage, and are free of standing water.

(iii) Medical waste shall be stored for no more than fourteen (14) calendar days from the date of receipt at the storage facility before being transported to an approved treatment or disposal facility.

(iv) If odors or other nuisance conditions develop, the waste shall immediately be placed in an enclosed unit maintained at or below 45 degrees Fahrenheit or transported to an approved treatment or disposal facility.

(7) A description of the tracking system to be used to maintain control of waste flow. The system shall include: the source, volume, and types of waste received; the date the waste was received; for storage facilities, the date the waste was shipped to the treatment or disposal facility; for treatment facilities, the date the waste was treated and sent for disposal. Documentation, including copies of waste tracking logs, shipping papers and/or manifests, shall be retained for a minimum of three (3) years from the date the waste was shipped from the facility.

(8) An operational safety, fire prevention and contingency plan to minimize hazards. The plan shall include:

(i) A plan for the alternate management of wastes in the event the facility is not in operation due to equipment failure or closure due to unforeseen circumstances, or if the permitted capacity of the facility will be exceeded.

(ii) Cleanup procedures to be implemented in the event of a loss of containment, spill or release.

(iii) The location and use of all spill response supplies and personal protective equipment and the methods to be used to manage recovered waste and contaminated spill response supplies and personal protective equipment.

(iv) The designated person or persons responsible for implementing the plan.

(v) Spill reporting provisions.

(vi) A fire protection plan in compliance with local fire codes.

(9) A personnel training plan identifying training to be received by each employee based on the responsibilities associated with their job duties. Training shall be conducted, at a minimum:

(i) When the employee starts a new position or receives additional duties related to medical waste management.

(ii) When new medical waste management procedures are implemented.

(iii) On an annual basis.

Employee training shall include, but not be limited to: medical waste identification, bloodborne pathogens, waste containment and labeling; storage requirements; equipment operations including equipment startup, shutdown, maintenance, and associated procedures to assure safe operation; and roles and responsibilities when implementing the facility contingency plan. Training for employees that prepare waste for shipment shall be consistent with US DOT requirements.

(10) A closure plan providing information on the actions to be taken at the time of final facility closure, including:

(i) The Department, the local governing body having jurisdiction, and customers serviced by the facility shall be notified in writing at least sixty (60) calendar days in advance of the proposed closure date. If applicable, signs of a suitable size notifying drop-off customers of the site closure shall be placed in a conspicuous area at the entrances to the facility at least sixty (60) calendar days in advance of the proposed closure date.

(ii) The facility shall not accept new or additional waste shipments for storage and/or treatment fourteen (14) calendar days prior to the date of anticipated closure. All wastes shall be transported offsite to an approved solid waste site or facility within fourteen (14) calendar days of receipt of the final waste load.

(iii) Waste storage units and waste management areas shall be cleaned to disinfect and/or remove visible traces of medical waste.

(iv) Within thirty (30) calendar days of completing closure activities, the owner and operator shall provide written notification to the Department and the local governing body having jurisdiction to document that proper treatment and disposal of all wastes has taken place in accordance with the approved closure plan and that facility closure standards have been achieved.

13.7.3 Fees and financial assurance - All medical waste facilities subject to regulation under this Section 13.7 shall be subject to applicable solid waste fees as required under Section 1.7 and financial assurance as required under Section 1.8 of these regulations.

13.7.4 Inspections - All medical waste facilities subject to regulation under this Section 13.7 shall be subject to inspection and enforcement requirements in Section 1.9 of these regulations.

13.8 OPERATING REQUIREMENTS FOR COMMERCIAL STORAGE AND TREATMENT FACILITIES

13.8.1 Facilities shall notify the Department and the local governing body having jurisdiction in writing of the anticipated date of startup not more than sixty (60) calendar days and not less than thirty (30) calendar days prior to the date of startup.

13.8.2 Facilities shall be operated in accordance with their approved Engineering Design and Operations Plan and all other applicable permits.

13.8.3 Facilities shall conduct daily inspections to detect disease vectors, leaks, odors, dust, equipment malfunctions and other site conditions that may cause nuisance conditions to occur. If problems are found during the inspection, measures to correct the problems shall be implemented immediately. Inspections and any corrective measures taken shall be documented by the facility in an easily retrievable format.

13.8.4 Access controls shall be used to prevent unauthorized access to areas where wastes are stored, treated or otherwise managed.

13.8.5 Record Keeping - The facility shall maintain the following records onsite in an easily retrievable format:

(A) The facility's Certificate of Designation.

(B) The facility's approved Engineering Design and Operations Plan.

(C) For storage facilities - copies of waste manifests or shipping papers showing incoming volumes of waste, waste types, container types, types of transport, generator names and addresses, dates of waste pick/drop-off, and destinations for waste.

(D) For treatment facilities - copies of waste manifests or shipping papers showing incoming volumes of waste, waste types, container types, types of transport, generator names and addresses, treatment methods, dates of pickup /drop-off and treatment, copies of all verification testing results and results of treatment system monitoring applicable to the type of treatment, and final disposition of the treated waste.

(E) Records indicating instances when the facility's plan to prevent acceptance or treatment of prohibited wastes was put into effect and actions taken, including disposal destinations for such wastes.

(F) A daily log or equivalent mechanism indicating inspections and necessary actions taken to resolve conditions not in compliance with the approved Engineering Design and Operations Plan.

(G) For treatment facilities, copies of all verification testing results and results of treatment system monitoring applicable to the type of treatment.

(H) Copies of personnel training records.

13.8.6 The facility shall be closed in accordance with the closure plan in its approved Engineering Design and Operations Plan.

13.9 STANDARDS FOR MEDICAL WASTE DISPOSAL

13.9.1 Final disposition of medical waste consisting of recognizable human anatomical remains must be by interment, cremation, incineration or entombment, or by acceptance by a representative of the State Anatomical Board.

13.9.2 Infectious waste.

(A) Untreated infectious waste from non-household sources may not be disposed of in a solid waste disposal site or facility unless the facility has an approved Engineering Design and Operations Plan that specifically allows these wastes.

(B) Once treated to achieve the required standard of biological inactivation, infectious waste is considered to have been rendered non-infectious and may be discharged into a sanitary sewer system that provides secondary treatment of waste or be disposed of with other non-medical and non-hazardous solid waste as appropriate.

(C) Discharge to a sanitary sewage treatment system is permitted only if discharged in accordance with the wastewater treatment facility's requirements, as applicable, and may require notification to and approval from the wastewater treatment authority.

(D) Treated infectious waste must be clearly identified as treated waste or the waste treater must notify the waste transporter and disposal facility in writing that their general solid waste includes infectious waste that has been treated to render it non-infectious.

13.9.3 Trace chemotherapy waste and waste pharmaceuticals.

(A) Trace chemotherapy waste must be disposed of in an approved solid waste disposal site or facility that has an approved Engineering Design and Operations Plan that specifically allows this waste, or may be incinerated at an approved solid or hazardous waste incinerator.

(B) Waste pharmaceuticals that are not hazardous wastes and that do not contain controlled substances may be:

(1) Sent to a reverse distributor that collects unused, expired and recalled pharmaceuticals for proper disposal or returned to the manufacturer for credit.

(2) Sent to a mail-back service for proper disposal.

(3) Treated to encapsulate or stabilize the waste at an approved medical waste treatment facility prior to disposal in a solid waste disposal site or facility. All activities involved in the disposal of treated pharmaceuticals shall be conducted in a manner that minimizes the potential to release the waste or damage the containers holding the waste.

(4) Incinerated at an approved solid or hazardous waste incinerator.

or

(5) Must be disposed of in an approved solid waste disposal site or facility that has an approved Engineering Design and Operations Plan that specifically allows this waste.

(C) Hazardous waste pharmaceuticals must be managed in accordance with the Colorado Hazardous Waste Act (Title 25 Article 15 Parts 1, 2, 3, and 5 CRS, as amended) and implementing regulations (6 CCR 1007-3).

(D) Waste pharmaceuticals that contain controlled substances must be managed in accordance with the US DEA requirements in 21 CFR 1307.11 or 1307.21.

(E) Waste pharmaceuticals that are both hazardous waste and contain controlled substances must be managed in accordance with the Colorado Hazardous Waste Act (Title 25 Article 15 Parts 1, 2, 3, and 5 CRS, as amended) and implementing regulations (6 CCR 1007-3) and the US DEA requirements in 21 CFR 1307.11 or 1307.21.

13.10 TRANSPORTATION REQUIREMENTS

- 13.10.1 Except as provided for in Section 13.3.1, medical waste may only be transported to an approved commercial medical waste storage, treatment or disposal facility.

- 13.10.2 Spills or releases of medical waste which occur during transportation shall be cleaned up immediately by the transporter according to generally accepted procedures. Spills to the environment or those exposing workers or the general public to potential infection shall be reported to the Colorado Department of Public Health and Environment, to the local governing body having jurisdiction, and to the wastewater treatment facility if discharged to the sewer system, within twenty-four (24) hours. A written summary report describing the spill or release and the actions taken to remediate it shall be submitted to the Department within fifteen (15) calendar days of the incident.

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SECTION 14
COMPOSTING

- 14.1 General Provisions
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SECTION 14.1- GENERAL PROVISIONS

14.1.1 Scope and Applicability

This section 14 applies to all persons, local governing authorities, and municipalities who compost solid waste. Compliance with this Section 14 does not relieve any facility owner or operator from his/her obligation to comply with any other applicable federal, state or local statutes, regulations, requirements or ordinances.

Sections 1 and 2 of these Solid Waste Regulations are applicable to all solid waste composting facilities, unless specifically otherwise noted herein. For ease of use, this Section 14 includes those Section 2 requirements that usually apply to the operation of composting facilities; however, there may be unique features at a particular facility that trigger additional site-specific Section 2 requirements not referenced in this Section 14.

Facilities subject to this Section 14 must obtain a certificate of designation (CD) unless otherwise exempt per Section 30-20-102, C.R.S., or these Regulations. The CD will include, at a minimum, the engineering, design and operations plan (EDOP) for the facility required by this Section 14. Facilities that require a CD must follow the CD application process in Section 30-20-103, C.R.S., and these Regulations. See section 1.6 of these Solid Waste Regulations. Facilities subject to this Section 14, but exempt from the requirement to obtain a CD, must provide an EDOP to the Department for review and approval prior to implementation or maintain a Composting Plan onsite. Nothing in this section shall preclude any review action that may be required by the local governing authority under appropriate local ordinance or rule. See sections 1.3.9 and 1.4.1 of these Solid Waste Regulations.

Section 30-20-100.5(1)(a), C.R.S. provides that proper disposal of solid wastes is a matter of mixed statewide and local concern. Because a facility may also need to comply with applicable local requirements in addition to this Section 14, facilities should check with the local governing authority for their submittal, notification, and approval requirements. The phrase "Department and local governing authority approval, as appropriate," as used in this Section 14 acknowledges that the Solid Waste Act and Regulations establish shared authority over solid waste. Facilities should review Title 30, Article 20, Part 1, C.R.S., and the Solid Waste Regulations to determine which authorities apply. Compliance with this Section 14 shall not relieve the facility owner or operator from the obligation to comply with the facility's CD and any other applicable federal, state or local statute, regulation, requirement or ordinance.

14.1.2 Compost Feedstock Types

The categories described below are not intended to be all-inclusive, but rather are set forth to assist owners and operators in determining the appropriate classification of a proposed or existing composting facility. The Department recognizes that case-by-case determinations may be necessary concerning selection of an appropriate category for a particular feedstock. Accordingly, the Department may require that analytical and/or

process information be supplied by the owner or operator to assist in making such determinations.

Type 1: Vegetative waste, and other materials determined by the Department to pose a low risk to human health and the environment.

Type 2: Animal waste, manure, source-separated organics, food residuals and food processing vegetative waste.

Type 3: Biosolids, mixed solid waste, processed solid waste and sludges and food processing residuals not covered in Type 2, fats, oils, greases, dairy manufacturing wastes, dissolved air flotation (DAF) skimmings, paunch and any other compostable material not covered in Type 1 or Type 2.

Prohibited Wastes: Composting facilities may not accept asbestos or asbestos containing materials, infectious waste, hazardous waste, Polychlorinated biphenyl waste or lead-acid batteries.

14.1.3 General Exemptions

This Section 14 does not apply to the following:

(A) Backyard composting as defined by these Solid Waste Regulations;

(B) Owner/operators of composting facilities where only agricultural wastes are composted such that;

(1) The compost is produced at a manufacturing facility registered by the Colorado Department of Agriculture (CDA), pursuant to § 35-12-101 et seq., C.R.S.; and

(2) Finished compost distributed off-site shall meet the specifications for compost established by the CDA.

(C) The composting of biosolids at a wastewater treatment plant provided that the facility has received a permit in accordance with the Department's Biosolids Regulations No. 64, 5 CCR 1002-64, promulgated pursuant to Section 25-8-205(1)(e), C.R.S.

14.1.4 Conditional Exemptions

(A) Conditionally Exempt Small Quantity Composting Operations: Any composting facility with up to: (1) 100 cubic yards of Type 1 feedstock onsite or in process; (2) 100 cubic yards of Type 1 feedstock and up to 5 cubic yards of Type 2 feedstock onsite or in process; or (3) 100 cubic yards of Type 1 and up to 10 cubic yards of

Type 2 feedstock on site or in process when composted in vessel, that complies with the following conditions is exempt from the balance of this Section 14:

- (1) Such facilities must maintain records of feedstock types and quantities for Department inspection;
- (2) Facilities operating commercially must register with the Department as a Conditionally Exempt Small Quantity Composting Facility;
- (3) Facilities operating commercially must submit an annual report to the Department by March 1st each calendar year for the previous calendar year. The report must provide all information required by the Department to properly complete the legislative requirement of collecting waste diversion data including:
 - i. Types of materials recovered for composting; and
 - ii. Amount in tons or cubic yards of material recovered for composting.
- (4) Facilities operating commercially must submit a final closure report to the Department no later than ninety (90) days after ceasing composting operations.
- (5) Facilities operating commercially must sample and test finished compost in accordance with the minimum requirements of Section 14.6 of these Solid Waste Regulations.

(B) Conditionally Exempt Agricultural Composting Operations that compost only agricultural waste generated on-site and imported wood chips, tree branches, sawdust, leaves or untreated lumber that comply with the following are exempt from the balance of this Section 14:

- (1) Importation of wood chips, tree branches, sawdust, leaves or untreated lumber occurs only in quantities necessary for effective composting of the agricultural waste generated on-site;
- (2) Storage of imported wood chips, tree branches, sawdust, leaves or untreated lumber is limited to nine (9) months and the owner/operator of the facility maintains records to demonstrate adherence to this time limit;
- (3) The composting facility is operated in such a manner that noise, dust, and odors do not constitute a nuisance or health hazard and does not cause or contribute to surface or groundwater pollution;
- (4) The owner/operator of the facility registers with the Colorado Department of Agriculture, pursuant to § 35-12-101, et seq., C.R.S.;

(5) The owner/operator of the facility complies with all Colorado Department of Agriculture requirements and specifications; and

(6) The finished compost is only used on agricultural zoned property, as defined by the local requirements.

14.1.5 Compliance Schedule

(A) Class II and Class III composting facilities that do not have an EDOP approved after the November 18, 2008 revisions of this Section 14, Solid Waste Composting Regulations, must submit to the Department and the local governing authority, for review and approval, a revised EDOP within eighteen (18) months of the effective date of this Section 14.

(B) Within six (6) months of the effective date of this Section 14, facilities that cannot meet the compliance schedule specified in 14.1.5(A) must make a demonstration to the Department showing why this compliance schedule cannot be met, and must request an alternate schedule for coming into compliance with this Section 14. Such extension shall be subject to Department approval, but the deadline for coming into compliance may be extended no longer than eighteen (18) months after the effective date of this Section 14.

(C) Within twelve (12) months of the effective date of this Section 14, any Class I composting facility must have onsite a completed Composting Plan that complies with Section 14.2.

SECTION 14.2 – CLASS I COMPOSTING FACILITIES

14.2.1 Scope and Applicability

Section 14.2 applies to any persons, local governing authorities, and municipalities who owns or operates a Class I composting facility. A Class I composting facility is a facility that:

(A) Composts only Type 1 feedstocks, and who has less than 50,000 cubic yards of feedstocks and in-process material onsite at any one time (finished compost does not count toward this total); or

(B) Composts only source separated organics and/or food residuals generated onsite together with other compatible materials as defined in Section 1 of these regulations, with the following limits:

1. A total volume of no greater than 5,000 cubic yards of source separated organics onsite at any one time (finished qualified product does not count toward this total); and

2. A composting area of two (2) acres in size or less; or

(C) Composts at the site of generation or on agriculturally zoned property owned by the generator using only agricultural waste generated onsite together with other compatible materials as defined in Section 1 of these regulations and does not meet one of the general exemptions or conditional exemptions in Sections 14.1.3 or 14.1.4.

14.2.2 Class I Composting Facility Pre-Operations Requirements

(A) **Registration:** Prior to commencing composting or feedstock storage, the owner/operator of a Class I composting facility must submit for Department review and approval a registration as a Class I composting facility. Neither composting nor feedstock storage may commence without a current approved Class I composting facility registration. The registration must provide the following information:

(1) Name of the composting facility, the physical address and legal description, location with respect to the nearest town, and mailing address, if different from physical address;

(2) Names, addresses, and telephone numbers of the owner and the operator, and at least one person having the authority to take action in the event of an emergency;

(3) Maximum facility capacity and description and volume estimate of the types of materials to be composted;

(4) Documentation demonstrating that the local governing authority has approved the composting operation, including all conditions of approval;

(5) Closure plan demonstrating compliance with Section 14.2.6;

(B) **Financial Assurance:** Prior to commencing composting or feedstock storage, the owner/operator Class I composting facility must establish financial assurance in accordance with Section 1.8 of these Regulations.

(C) **Composting Plan:** Prior to commencing composting or feedstock storage, the owner or operator of a Class I composting facility must develop a written Composting Plan for the facility. The Composting Plan must include a description of the site, including site maps and plans drawn to a commonly recognized engineering scale illustrating the facility's surveyed property boundaries, location of processing and storage areas, adjoining properties, roads, fencing, existing and proposed structures, contact water containment and control structures. The Composting Plan must document how the facility meets the requirements of Sections 14.2.3, 14.2.4,

14.2.5, 14.2.6, 14.2.7 and 14.6 of this regulation. The Composting Plan must be maintained at the facility and available for review upon request by the Department or local governing authority during business hours.

(D) **Certificate of Designation:** Class I composting facilities are not required to obtain a Certificate of Designation from the local governing authority.

14.2.3 Class I Composting Facility Design Requirements

(A) **Surface Water Control:** The Composting Plan for Class I composting facility must describe how the surface water control system features of the facility will be designed, constructed and maintained:

- (1) Prevent negative impacts to surface water and groundwater;
- (2) Control surface water, including:
 - (a) stormwater run on and run off control features with a slope of one (1) to six (6) percent, or meeting other design criteria as approved by the department;
 - (b) features to contain and manage contact water;
 - (c) features to prevent contact water from negatively impacting groundwater, as determined by a Colorado licensed professional engineer or a professional geologist;
 - (d) features to prevent ponding of stormwater and contact water within the composting process area;
 - (e) contact water/stormwater containment structures with a minimum of 2 feet of freeboard measured from the lowest elevation at any given time.

(B) **Surface Water Control for Class I Composting Facilities Composting Manure, Animal Mortalities and/or Source Separated Organics:** In addition to the surface water management requirements in 14.2.3(A), the owner/operator of a Class I composting facility composting manure, animal mortalities and/or source separated organics must design, construct and maintain stormwater and contact water controls that meet the following requirements:

- (1) Prevent flow onto the facility during peak discharge from a 25-year, 24- hour storm event;
- (2) Control and collect the on-site run-off water volume resulting from a 25- year, 24-hour storm event;

(3) All stormwater/contact water containment structures must be constructed of a minimum of eighteen (18) inches of compacted soil or in-situ earthen material or other low permeability materials (e.g., geomembrane) to achieve a hydraulic conductivity of less than or equal to 1×10^{-6} cm/sec; and

(C) Engineered features or operational plans already approved by the Department would not need to be re-submitted if equivalence is demonstrated (e.g., stormwater control features that meet the requirements in the Confined Animal Feeding Operations Control Regulation, 5 CCR 1002-81).

(D) All engineered features must be reviewed and sealed by a Colorado licensed professional engineer or reviewed and signed by a professional geologist, as appropriate.

14.2.4 Class I Composting Facility Operational Requirements

The owner/operator of a Class I composting facility must operate the facility in accordance with their Department-approved registration, with their Composting Plan, and with the following operational requirements:

(A) The owner/operator of a Class I composting facility must comply with the operational requirements provided in Sections 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.7, 2.1.8, 2.1.9, 2.1.11, 2.1.15, 2.1.17, and 2.1.18 of these Solid Waste Regulations;

(B) **Financial Assurance:** The owner/operator of a Class I composting facility must maintain financial assurance in accordance with Section 1.8 of these Regulations.

(C) **Material Acceptance:** The owner/operator of a Class I composting facility may only accept Type 1 feedstocks, or other compatible materials if the composting facility is operating under the provisions of Section 14.2.1(B) or Section 14.2.1(C) and as specified in the approved registration.

(D) **Surface Water Control:** The owner/operator of a Class I composting facility must control surface water entering the site, must prevent contact water from leaving the site, and must manage contact water to ensure groundwater protection. Stormwater leaving the site must be managed through best management practices approved by the Water Quality Control Division's National Pollution Discharge Elimination System Program or stormwater may be managed within the contact water management system. Following a storm event that causes the available capacity of an impoundment to be less than the volume required to store runoff from the designed storm event, the impoundment must be dewatered to a level that restores the required capacity within thirty (30) calendar days. Alternative stormwater and contact water management methods and designs must be approved by the Department. Freeboard must be maintained at a minimum of two (2) feet at all times.

(E) **Access Control:** The owner/operator of a Class I composting facility must control access to prevent illegal dumping, prevent unauthorized access and provide for site security both during and after business hours. Effective artificial barriers or natural barriers may be used in lieu of fencing.

(F) **Nuisance Conditions:** The owner/operator of a Class I composting facility must control on-site and prevent off-site nuisance conditions such as noise, dust, mud, odors, vectors and windblown debris.

(G) **Signage:** The owner/operator of a Class I composting facility shall erect and maintain signage that identifies the facility name, emergency contact information, and the materials that will and will not be accepted, and that ensures adequate traffic control.

(H) **Contingency Plan:** The owner/operator of a Class I composting facility must develop, maintain for current site conditions, and keep available at all times, a contingency plan which outlines the corrective or remedial procedures to be taken in the event of:

- (1) The delivery of unapproved feedstock, bulking material, liquid waste or other waste materials;
- (2) Contamination of surface water or groundwater; and
- (3) The occurrence of nuisance conditions either on-site or off-site.

(I) **Fire Protection:** The owner/operator of a Class I composting facility must properly implement its approved fire protection plan as required by local fire codes, and such plan must be kept current with site conditions and compliant with local fire codes.

(J) **Odor Control:** The owner/operator of a Class I composting facility must develop and implement an odor management plan as necessary to control on-site and prevent off-site nuisance conditions, including the following:

- (1) Develop operational procedures to minimize on-site odors and prevent off-site odors (e.g., incorporating feedstocks with bulking material as soon as practical).
- (2) Develop operational procedures to mitigate odors when they occur either on-site or off-site (e.g., use of biofilters).
- (3) Develop strategies for mitigating off-site odors (e.g., communication with neighbors, responding to complaints within 24 hours).

(K) **Personnel Training:** Class I composting facilities must operate under the control of properly trained individuals. Personnel must be trained to recognize prohibited materials, take action when nuisance conditions occur, and implement emergency procedures when necessary.

(L) **Compost processing time and temperatures:** The owner/operator of a Class I composting facility must ensure that the composting process is sufficient to reduce pathogens and vector attraction. Processes to reduce pathogens and vector attraction must include, but are not limited to:

(1) **Windrow composting:** the compost material must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for fifteen (15) days or longer. The fifteen days do not need to be consecutive. During the period when the compost is maintained at 55 degrees Celsius or higher, there must be a minimum of five (5) turnings of the windrow.

(2) **In-vessel composting:** Compost material must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for three (3) consecutive days.

(3) **Aerated static pile composting process:** All in-process compost must be covered with sufficient insulating material, and the pile must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a pathogen reduction period of three (3) consecutive days.

(4) **Alternative methods of compliance:** To meet requirements of this section, alternative processing methods may be approved by the Department based on a demonstration that these methods achieve an equivalent pathogen reduction. Vermicomposting is an example of an alternative method of compliance.

(M) **Compost sampling and testing:** The owner/operator of a Class I composting facility must sample and test finished compost in accordance with the minimum requirements of Section 14.6 of these Solid Waste Regulations.

(N) **Feedstock processing areas:** The owner/operator of a Class I composting facility must maintain all-weather feedstock processing areas of sufficient slope to direct stormwater and contact water to appropriate collection and storage features and prevent significant ponding of water. The feedstock processing areas must be of sufficient construction and firmness so that composting equipment can manage the process without significant damage or failure following inclement weather.

14.2.5 Class I Composting Facility Record Keeping and Reporting Requirements

(A) The owner/operator of a Class I composting facility must complete the Composting Facility Annual Reporting Form and submit to the Department by March

1st of each year for the previous calendar year. The annual report must provide all information required by the Department including:

- (1) The types of materials received for composting;
- (2) Amount in tons or cubic yards of each material received for composting;
- (3) Amount of unprocessed feedstock and feedstock in process onsite at the beginning of the previous calendar year;
- (4) Amount of unprocessed feedstock and feedstock in process onsite at the end of the previous calendar year; and
- (5) Amount of compost distributed the previous calendar year.

(B) The owner/operator of a Class I composting facility must maintain, at a minimum, the following records:

- (1) Windrow/ pile aeration data;
- (2) Financial assurance documentation;
- (3) Operational monitoring data including time and temperature readings;
- (4) Facility personnel training records;
- (5) Compost analytical data; and
- (6) Feedstock analytical data.

14.2.6 Class I Composting Facility Closure Requirements

(A) Upon closure of a Class I composting facility, the owner/operator of the facility must provide a written notice to the Department no later than ninety (90) days after the facility stops accepting solid waste;

(B) Within one hundred and eighty (180) days of notifying the Department of closure, the owner/operator of a Class I composting facility must remove all waste from the site and dispose of at an appropriate solid waste disposal site; and

(C) Facilities must submit a final report to the Department within ninety (90) calendar days of completing closure.

14.2.7 Class I Composting Facility Post Closure Care and Maintenance

(A) Following closure of the Class I composting facility the owner/operator must conduct post-closure care, which must consist of at least the following:

- (1) Continued monitoring and maintenance as defined in the post-closure plan;
- (2) Inspection and maintenance of any cover material or vegetation; and
- (3) An annual report submitted to the Department and local governing authority detailing post-closure care activities during the prior year.

(B) The post-closure care and maintenance period must be for a minimum of three (3) years. The length of the post-closure care period may be:

- (1) Decreased by the Department after consultation with the local governing authority if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment; or
- (2) Increased by the Department after consultation with the local governing authority if it is determined that the lengthened period is necessary to protect human health and the environment.

(C) Following completion of the post-closure care period the owner or operator must submit a certification signed by an independent professional for approval by the Department and the local governing authority, verifying that post-closure care has been completed in accordance with the post-closure plan and has been placed in the operating record.

SECTION 14.3 – CLASS II COMPOSTING FACILITIES

14.3.1 Scope and Applicability

Section 14.3 applies to any persons, local governing authorities and municipalities who owns or operates a Class II composting facility. A Class II composting facility is a facility that composts Type 1 feedstocks and manure and has less than 50,000 cubic yards of feedstocks and in-process material onsite at any one time (finished compost does not count toward this total).

14.3.2 Class II Composting Facility Pre-Operations Requirements

(A) **Review and Approval of Engineering Design and Operations Plan:** Prior to commencing composting or feedstock storage, the owner or operator of a Class II composting facility must have an Engineering Design and Operations Plan (EDOP) for the facility approved by the Department and the local governing authority. The

EDOP must document how the facility meets the requirements of Sections 14.3.3, 14.3.4, 14.3.5, 14.3.6, 14.3.7, 14.3.8 and 14.6 of this regulation. The EDOP must be maintained at the facility and available for review upon request by the Department or local governing authority during business hours.

(B) **Financial Assurance:** Prior to commencing composting or feedstock storage, the owner/operator Class II composting facility must establish financial assurance in accordance with Section 1.8 of these Regulations.

(C) **Certificate of Designation:** Class II composting facilities are not required to obtain a Certificate of Designation from the local governing authority.

14.3.3 Class II Composting Facility Engineering Design and Operations Plan: General

(A) All portions of the facility design and site investigation must be reviewed and sealed by a Colorado licensed professional engineer or reviewed and signed by a professional geologist, as appropriate.

(B) A Class II composting facility must be designed, constructed, operated, closed and maintained in post closure in accordance with its approved EDOP.

(C) Each EDOP for a Class II composting facility must include, at a minimum:

(1) Names, addresses, and telephone numbers of the owner and operator, and at least one person having the authority to take action in the event of an emergency;

(2) Name of the composting facility, the physical address and legal description, location with respect to the nearest town, and mailing address, if different from physical address;

(3) Site maps and plans drawn to a common recognized engineering scale illustrating the facility's surveyed property boundaries, location of processing and storage areas, adjoining properties, roads, fencing, existing and proposed structures, contact water containment and control structures.

(4) A description of the Type 1 feedstocks and manure to be processed and composted.

(5) An evaluation of potential impacts to existing surface water and groundwater quality, including but not limited to:

(a) A description of site geological and hydrogeological conditions based on an onsite geotechnical investigation;

- (b) Floodplain information including evidence that the proposed site is not located within a 100-year floodplain;
- (c) Public water supply information including the location of all water supply wells, springs, and surface water intakes within one-half mile of the proposed facility boundary;
- (d) Identification of all lakes, rivers, streams, springs, or bogs, on-site or within one-half mile of the proposed facility boundary;
- (e) Depth to the uppermost aquifer;
- (f) The hydrologic properties of the uppermost aquifer;
- (g) The existing quality of groundwater beneath the proposed facility if groundwater monitoring is required for the facility;
- (h) The types and regional thickness of unconsolidated soils materials;
- (i) The types and regional thickness of consolidated bedrock materials; and
- (j) Geologic hazards such as slope stability, faulting, folding, rockfall, landslides, subsidence or erosion potential.

14.3.4 Class II Composting Facility Design and Operations Plan: Design

(A) **General:** The EDOP for a Class II composting facility must document how the facility will be designed in a manner that:

- (1) Prevents negative impacts to surface water and groundwater;
- (2) Clearly defines the feedstock receiving, processing and storage areas;
- (3) Specifies the maximum throughput capacity;

(B) **Feedstock Processing Areas:** The EDOP for a Class II composting facility must describe how the areas where all mixing, tipping and composting occur will be designed and constructed to:

- (1) Ensure groundwater protection;
- (2) Have a slope of one (1) to six (6) percent, or meets alternative slope design criteria as approved by the department;

(3) Withstand varying temperatures; and

(4) Allow for heavy equipment operation other vehicular access, without damage or failure that creates ponding or infiltration of surface water greater than the designed permeability rate; and in some cases:

(5) The Department may require a low permeability workpad area to manage contact water generated from composting operations. Site-specific conditions, operational practices, feedstock, bulking material and liquid wastes will be evaluated to determine the necessity for a low permeability workpad and low permeability liquid mixing pad/basin.

(C) Surface Water Containment: The EDOP for a Class II composting facility must describe how the surface water control system features of the facility will be designed, constructed and maintained:

To control stormwater run on and run off during peak discharge from a 25-year, 24-hour storm event;

(1) Such that contact water/stormwater containment structures are designed and maintained with a minimum of 2 feet of freeboard measured from the lowest elevation at any given time;

(2) Such that all stormwater/contact water containment structures must be constructed of a minimum of eighteen (18) inches of compacted soil or in-situ earthen material or other low permeability materials to achieve a hydraulic conductivity of less than or equal to 1×10^{-6} cm/sec. Alternative liner designs that perform in an equivalent manner may be approved by the Department based on a demonstration of the alternative liner design's equivalent performance, the waste type and site specific technical information;

(3) Such that stormwater/contact water containment structure liners are protected to prevent damage from weather and equipment;

(D) Quality Assurance and Quality Control Plan: The EDOP for a Class II composting facility must include a quality assurance and quality control plan for all engineered structures at the facility.

(1) The owner/operator of a Class II composting facility must implement their approved quality assurance and quality control plan in constructing all engineered structures at the facility.

(2) The owner/operator of a Class II composting facility must submit a construction certification report to the Department for review and approval, at a minimum, sixty (60) calendar days prior to acceptance of feedstock, liquid waste or bulking material.

(3) The owner/ operator of a Class II composting facility must provide copies of the construction record drawings for engineered features at the site and a report documenting facility construction, including the results of observations and testing carried out as part of the construction quality assurance plan, to the Department and local governing authority.

(4) Class II composting facilities must not commence operation until the Department has determined that the construction was completed in accordance with the approved engineering report/plans and specifications and has approved the construction documentation in writing.

14.3.5 Class II Composting Facility Design and Operations Plan: Operations

Class II composting facilities must comply with their Department-approved EDOP. The EDOP must include the following operation requirements:

(A) **General:** The EDOP for a Class II composting facility must describe how the facility will comply with the operational requirements provided in Sections 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.7, 2.1.8, 2.1.9, 2.1.11, 2.1.15, 2.1.17, and 2.1.18 of these Solid Waste Regulations;

(B) **Financial Assurance:** The EDOP for a Class II composting facility must include current financial assurance estimates in accordance with Section 1.8 of these Solid Waste Regulations. A Class II composting facility must maintain adequate financial assurance in accordance with its EDOP and with Section 1.8 of these Solid Waste Regulations.

(C) **Material Acceptance:** The EDOP for a Class II composting facility must describe the Type 1 feedstocks and manure that the facility accepts. A Class II Composting facility must not accept a feedstock other than those specified in its EDOP or as approved by the department.

(D) **Surface Water Control:** The EDOP for a Class II composting facility must describe how the facility will manage stormwater and prevent contact water from leaving the site. The EDOP must describe how the impoundment will be dewatered to a level that restores the required capacity within thirty (30) calendar days following a storm event that causes the available capacity of an impoundment to be less than the volume required to store runoff from the designed storm event. Freeboard must be maintained at a minimum of two (2) feet at all times.

(E) **Access Control:** The owner/operator of a Class II composting facility must control access to prevent illegal dumping, prevent unauthorized access and provide for site security both during and after business hours. Effective artificial barriers or natural barriers may be used in lieu of fencing. The EDOP for a Class II composting facility must describe how the facility will comply with this requirement.

(F) **Signage:** The owner/operator of a Class II composting facility shall erect and maintain signage that identifies the facility name, emergency contact information, and the materials that will and will not be accepted, and that ensures adequate traffic control.

(G) **Nuisance Conditions:** A Class II composting facility must control on-site and prevent off-site nuisance conditions such as noise, dust, mud, odors, vectors and windblown debris. The EDOP for a Class II composting facility must describe how the facility will comply with this requirement.

(H) **Contingency Plan:** The EDOP for a Class II composting facility must include a contingency plan which outlines the corrective or remedial procedures to be taken in the event of:

- (1) The delivery of unapproved feedstock, bulking material, liquid waste or other waste materials;
- (2) Contamination of surface water or groundwater; and
- (3) The occurrence of nuisance conditions either on-site or off-site.

(I) **Fire Protection Plan:** A Class II composting facility must comply with local fire codes or, where no local fire code exists or where the local fire code does not provide equivalent or greater level of fire protection, with the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety. The EDOP for a Class II composting facility must include a current fire protection plan that describes how the facility will comply with this requirement.

(J) **Odor Management Plan:** The EDOP for a Class II composting facility must include an odor management plan that describes how the facility will control on-site and prevent off-site nuisance conditions, including the following:

- (1) Operational procedures to minimize on-site odors and prevent off-site odors (e.g., incorporating feedstocks with bulking material as soon as practical).
- (2) Operational procedures to mitigate odors when they occur either on-site or off-site (e.g., use of biofilters).
- (3) Strategies for mitigating off-site odors (e.g., communication with neighbors, responding to complaints within 24 hours).

(K) **Personnel Training:** A Class II composting facility must operate under the control of properly trained individuals. Personnel must be trained to recognize prohibited materials, take action when nuisance conditions occur, and implement emergency procedures when necessary. The EDOP for a Class II composting facility must describe how the facility will comply with these requirements.

(L) **Compost processing time and temperatures:** The owner/operator of a composting facility must ensure that the composting process is sufficient to reduce pathogens and vector attraction. The processing methods, including processing times and temperatures must be described in the facility's EDOP per Section 14.6 (testing section). Processes to reduce pathogens and vector attraction must include, but are not limited to:

(1) **Windrow composting:** the compost material must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for fifteen (15) days or longer. The fifteen days do not need to be consecutive. During the period when the compost is maintained at 55 degrees Celsius or higher, there must be a minimum of five (5) turnings of the windrow.

(2) **In-vessel composting:** Compost material must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for three (3) consecutive days.

(3) **Aerated static pile composting process:** All in-process compost must be covered with sufficient insulating material, and the pile must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a pathogen reduction period of three (3) consecutive days.

(4) **Alternative methods of compliance:** To meet requirements of this section, alternative processing methods may be approved by the Department based on a demonstration that these methods achieve an equivalent pathogen reduction. Vermicomposting is an example of an alternative method of compliance.

(M) **Groundwater Monitoring Plan:** The EDOP for a Class II composting facility must include a Groundwater Monitoring Plan pursuant Section 2.2 of these Solid Waste Regulations. Monitoring parameters will be established based on the hydrogeologic data related to the site, the type of waste stream(s) accepted at the facility and the waste characterization analyses performed on incoming wastes. A Class II composting facility may receive a specific waiver from groundwater monitoring from the Department and local governing authority pursuant to Section 1.5 and Appendix B of these Solid Waste Regulations.

(N) **Compost sampling and testing:** The EDOP for A Class II composting facility must describe how the facility will sample and test finished compost in accordance with the minimum requirements of Section 14.6 of these Solid Waste Regulations.

(O) **Feedstock Processing Areas:** The owner/operator of a Class II composting facility must maintain all weather feedstock processing areas of sufficient slope to direct stormwater and contact water to appropriate collection and storage features and prevents significant ponding of water. The feedstock processing areas must be of sufficient construction and firmness so that composting equipment can manage the process without significant damage or failure following inclement weather.

14.3.6 Class II Composting Facility Design and Operations Plan: Record Keeping and Reporting

(A) The EDOP for a Class II composting facility must include a record keeping and reporting section that describes the records the facility will maintain for department review, including, at a minimum, the following:

- (1) Windrow/ pile aeration data;
- (2) Financial assurance documentation;
- (3) Operational monitoring data including time and temperature readings;
- (4) Engineering Design and Operations Plan;
- (5) Facility personnel records;
- (6) Compost analytical data;
- (7) Feedstock analytical data;
- (8) Liquid waste analytical data;
- (9) The types of materials received for composting;
- (10) Amount in tons or cubic yards of each material received for composting;
- (11) Amount of unprocessed feedstock and feedstock in process onsite at the beginning of the previous calendar year;
- (12) Amount of unprocessed feedstock and feedstock in process onsite at the end of the previous calendar year; and
- (13) Amount of compost distributed the previous calendar year.

(B) A Class II composting facility must complete the Composting Facility Annual Reporting Form and submit to the Department by March 1st of each year for the previous calendar year. The annual report must provide all information required by the Department, including but not limited to the information describe in section 14.3.6(A).

14.3.7 Class II Composting Facility Engineering Design and Operations Plan: Closure

(A) The EDOP for a Class II composting facility must include a closure plan which contains at a minimum a complete and accurate description and schedule of all steps necessary to achieve closure of the composting facility. Such steps must include the following criteria:

(1) The removal of all stored raw feedstock, bulking material, and liquid waste to a permitted solid waste facility or a facility where the wastes may be beneficially reused with approval from the Department and local governing authority;

(2) The removal of all other wastes on-site, including those wastes generated by closure activities, to a permitted solid waste facility;

(3) The removal of all workpad area unless, specifically approved by the Department and local governing authority to remain on-site;

(4) The removal of all stormwater control and collection structures, unless specifically approved by the Department and local governing authority to remain on-site;

(5) The removal of all tanks, structures and equipment unless specifically approved by the Department and local governing authority to remain onsite;

(6) Site restoration including regrading and revegetation; and

(7) The removal of partially composted feedstocks and bulking material to a permitted solid waste facility or another compost facility with approval from the Department and local governing authority.

(8) Closure activities must not exceed ninety (90) days in length. Extension of the closure period may be granted by the Department and the local governing authority if the owner or operator demonstrates that closure will, of necessity, take longer than ninety (90) days and all measures necessary to prevent threats to human health and the environment will be taken.

(B) If at any time a composting facility ceases operation, including the discontinued receipt, processing and sale of materials for more than one hundred eighty (180) days, the owner or operator must notify the Department and local governing authority and unless otherwise approved by the Department and the local governing authority, the owner or operator must begin implementation of its Closure Plan. Within fourteen (14) calendar days of commencing implementation of the Closure Plan, the facility must provide written notification to the Department and the local governing authority.

(C) Within thirty (30) calendar days of completing closure activities the owner/operator of the facility must provide written notification to the Department and local governing authority to document that all the requirements and conditions of the closure plan have been achieved.

14.3.8 Class II Composting Facility Engineering Design and Operations Plan: Post Closure Care and Maintenance

(A) Following closure of the Class II composting facility the owner or operator must conduct post-closure care, which must consist of at least the following:

- (1) Continued monitoring, sampling and testing of soil, groundwater or surface water as defined in the post-closure plan;
- (2) Inspection and maintenance of any cover material or vegetation; and
- (3) An annual report submitted to the Department and local governing authority detailing post-closure care activities during the prior year.

(B) The post-closure care and maintenance period must be for a minimum of five (5) years. The length of the post-closure care period may be:

- (1) Decreased by the Department after consultation with the local governing authority if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment; or
- (2) Increased by the Department after consultation with the local governing authority if it is determined that the lengthened period is necessary to protect human health and the environment.

(C) Following completion of the post-closure care period the owner or operator must submit a certification signed by an independent Colorado licensed professional engineer for approval by the Department and the local governing authority, verifying that post-closure care has been completed in accordance with the post-closure plan and has been placed in the operating record.

14.4 – CLASS III COMPOSTING FACILITIES

14.4.1 Scope and Applicability

Section 14.4 applies to any persons, local governing authorities, and municipalities composting Type 1, Type 2 and/or Type 3 feedstocks or other materials approved by the Department.

14.4.2 Class III Composting Facility Pre-Operations Requirements

(A) **Review and Approval of Engineering Design and Operations Plan:** Prior to commencing composting or feedstock storage, the owner or operator of a Class III composting facility must have an Engineering Design and Operations Plan (EDOP) for the facility approved by the Department and the local governing authority. The EDOP must document how the facility meets the requirements of Sections 14.4.3, 14.4.4, 14.4.5, 14.4.6, 14.4.7, 14.4.8 and 14.6 of this regulation. The EDOP must be maintained at the facility and available for review upon request by the Department or local governing authority during business hours.

(B) **Financial Assurance:** Prior to commencing composting or feedstock storage, the owner/operator Class III composting facility must establish financial assurance in accordance with Section 1.8 of these Regulations.

(C) **Certificate of Designation:** Class III composting facilities must obtain a Certificate of Designation from the local governing authority.

14.4.3 Class III Composting Facility Engineering Design and Operations Plan: General

(A) All portions of the facility design and site investigation must be reviewed and sealed by a Colorado licensed professional engineer or reviewed and signed by a professional geologist, as appropriate.

(B) A Class III composting facility must be designed, constructed, operated, closed and maintained in post closure in accordance with its approved EDOP.

(C) Each EDOP must include, at a minimum:

(1) Names, addresses, and telephone numbers of the owner and operator, and at least one person having the authority to take action in the event of an emergency;

(2) Name of the composting facility, the physical address and legal description, location with respect to the nearest town, and mailing address, if different from physical address;

(3) Site maps and plans drawn to a common recognized engineering scale illustrating the facility's surveyed property boundaries, location of processing and storage areas, adjoining properties, roads, fencing, existing and proposed structures, contact water containment and control structures.

(4) A description of the feedstocks to be processed and composted.

(5) An evaluation of potential impacts to existing surface water and groundwater quality, including but not limited to:

(a) A description of site geological and hydrogeological conditions based on an onsite geotechnical investigation;

(b) Floodplain information including evidence that the proposed site is not located within a 100-year floodplain;

(c) Public water supply information including the location of all water supply wells, springs, and surface water intakes within one-half mile of the proposed facility boundary;

(d) Identification of all lakes, rivers, streams, springs, or bogs, on-site or within one-half mile of the proposed facility boundary;

(e) Depth to the uppermost aquifer;

(f) The hydrologic properties of the uppermost aquifer;

(g) The existing quality of groundwater beneath the proposed facility if groundwater monitoring is required for the facility;

(h) The types and regional thickness of unconsolidated soils materials;

(i) The types and regional thickness of consolidated bedrock materials; and

(j) Geologic hazards such as slope stability, faulting, folding, rockfall, landslides, subsidence or erosion potential.

14.4.4 Class III Composting Facility Design and Operations Plan: Design

(A) **General:** The EDOP for a Class III composting facility must document how the facility will be designed in a manner that:

- (1) Prevents negative impacts to surface water and groundwater;
- (2) Clearly defines the feedstock receiving, processing and storage areas;
- (3) Specifies the maximum throughput capacity;

(B) **Feedstock Processing Areas:** The EDOP for a Class III composting facility must describe how the areas where all mixing, tipping and composting occur will be designed and constructed to:

- (1) Ensure groundwater protection;
- (2) Have a slope of one (1) to six (6) percent, or meets alternative slope design criteria as approved by the department;
- (3) Withstand varying temperatures; and
- (4) Allow for heavy equipment operation other vehicular access, without damage or failure that creates ponding or infiltration of surface water greater than the designed permeability rate; and in some cases:
 - (5) The Department may require a low permeability workpad area to manage contact water generated from composting operations. Site-specific conditions, operational practices, feedstock, bulking material and liquid wastes will be evaluated to determine the necessity for a low permeability workpad and low permeability liquid mixing pad/basin.

(C) **Surface Water Containment:** The EDOP for a Class III composting facility must describe how the surface water control system features of the facility will be designed, constructed and maintained:

- (1) To control stormwater run on and run off during peak discharge from a 25-year, 24-hour storm event;
- (2) Such that contact water/stormwater containment structures are designed and maintained with a minimum of 2 feet of freeboard measured from the lowest elevation at any given time;

(3) Such that all stormwater/contact water containment structures must be constructed of a minimum of eighteen (18) inches of compacted soil or in-situ earthen material or other low permeability materials to achieve a hydraulic conductivity of less than or equal to 1×10^{-6} cm/sec. Alternative liner designs that perform in an equivalent manner may be approved by the Department based on a demonstration of the alternative liner design's equivalent performance, the waste type and site specific technical information;

(4) Such that stormwater/contact water containment structure liners are protected to prevent damage from weather and equipment;

(D) Quality Assurance and Quality Control Plan: The EDOP for a Class III composting facility must include a quality assurance and quality control plan for all engineered structures at the facility.

(1) The Owner/Operator of a Class III composting facility must implement their approved quality assurance and quality control plan in constructing all engineered structures at the facility.

(2) The Owner/Operator of a Class III composting facility must submit a construction certification report to the Department for review and approval, at a minimum, sixty (60) calendar days prior to acceptance of feedstock, liquid waste or bulking material.

(3) The owner or operator of a Class III composting facility must provide copies of the construction record drawings for engineered features at the site and a report documenting facility construction, including the results of observations and testing carried out as part of the construction quality assurance plan, to the Department and local governing authority.

(4) Class III composting facilities must not commence operation until the Department has determined that the construction was completed in accordance with the approved engineering report/plans and specifications and has approved the construction documentation in writing.

14.4.5 Class III Composting Facility Design and Operations Plan: Operations

Class III composting facilities must comply with their Department-approved EDOP. The EDOP must include the following operation requirements:

(A) General: The EDOP for a Class III composting facility must describe how the facility will comply with the operational requirements provided in Sections 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.7, 2.1.8, 2.1.9, 2.1.11, 2.1.15, 2.1.17, and 2.1.18 of these Solid Waste Regulations.

(B) **Financial Assurance:** The EDOP for a Class III composting facility must include current financial assurance estimates in accordance with Section 1.8 of these Solid Waste Regulations. A Class III composting facility must maintain adequate financial assurance in accordance with its EDOP and with Section 1.8 of these Solid Waste Regulations.

(C) **Material Acceptance:** The EDOP for a Class III composting facility must describe the feedstocks that the facility accepts. A Class III Composting facility must not accept a feedstock other than those specified in its EDOP or as approved by the department. The EDOP for a facility that accepts sludges, liquid waste or materials not identified in Section 14.1.2 of the Solid Waste Regulations must include a waste characterization plan that meets the procedural requirements of Section 2.1.2(C)(2), (3), and (4) of these Solid Waste Regulations to ensure protection of human health and the environment.

(D) **Surface Water Control:** The EDOP for a Class III composting facility must describe how the facility will manage stormwater and prevent contact water from leaving the site. The EDOP must describe how the impoundment will be dewatered to a level that restores the required capacity within thirty (30) calendar days following a storm event that causes the available capacity of an impoundment to be less than the volume required to store runoff from the designed storm event. Freeboard must be maintained at a minimum of two (2) feet at all times.

(E) **Access Control:** A Class III composting facility must control access to prevent illegal dumping, prevent unauthorized access and provide for site security both during and after business hours. Effective artificial barriers or natural barriers may be used in lieu of fencing. The EDOP for a Class III composting facility must describe how the facility will comply with this requirement.

(F) **Signage:** The owner/operator of a Class III composting facility shall erect and maintain signage that identifies the facility name, emergency contact information, and the materials that will and will not be accepted, and that ensures adequate traffic control.

(G) **Nuisance Conditions:** A Class III composting facility must control on-site and prevent off-site nuisance conditions such as noise, dust, mud, odors, vectors and windblown debris. The EDOP for a Class III composting facility must describe how the facility will comply with this requirement.

(H) **Contingency Plan:** The EDOP for a Class III composting facility must include a contingency plan which outlines the corrective or remedial procedures to be taken in the event of:

- (1) The delivery of unapproved feedstock, bulking material, liquid waste or other waste materials;

(2) Contamination of surface water or groundwater; and

(3) The occurrence of nuisance conditions either on-site or off-site.

(I) **Fire Protection Plan:** The owner/operator of a Class III composting facility must comply with local fire codes or, where no local fire code exists or where the local fire code does not provide equivalent or greater level of fire protection, with the fire code currently adopted by the Colorado Division of Fire Prevention and Control in the Department of Public Safety. The EDOP for a Class III composting facility must include a current fire protection plan that describes how the facility will comply with this requirement.

(J) **Odor Management Plan:** The EDOP for a Class III composting facility must include an odor management plan that describes how the facility will control on-site and prevent off-site nuisance conditions, including the following:

(1) Operational procedures to minimize on-site odors and prevent off-site odors (e.g., incorporating feedstocks with bulking material as soon as practical).

(2) Operational procedures to mitigate odors when they occur either on-site or off-site (e.g., use of biofilters).

(3) Strategies for mitigating off-site odors (e.g., communication with neighbors, responding to complaints within 24 hours).

(K) **Personnel Training:** A Class III composting facility must operate under the control of properly trained individuals. Personnel must be trained to recognize prohibited materials, take action when nuisance conditions occur, and implement emergency procedures when necessary. The EDOP for a Class III composting facility must describe how the facility will comply with these requirements.

(L) **Compost processing time and temperatures:** The owner/operator of a composting facility must ensure that the composting process is sufficient to reduce pathogens and vector attraction. The processing methods, including processing times and temperatures must be described in the facility's EDOP per Section 14.6 (testing section). Processes to reduce pathogens and vector attraction must include, but are not limited to:

(1) **Windrow composting:** the compost material must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for fifteen (15) days or longer. The fifteen days do not need to be consecutive. During the period when the compost is maintained at 55 degrees Celsius or higher, there must be a minimum of five (5) turnings of the windrow.

(2) **In-vessel composting:** Compost material must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for three (3) consecutive days.

(3) **Aerated static pile composting process:** All in-process compost must be covered with sufficient insulating material, and the pile must be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a pathogen reduction period of three (3) consecutive days.

(4) **Alternative methods of compliance:** To meet requirements of this section, alternative processing methods may be approved by the Department based on a demonstration that these methods achieve an equivalent pathogen reduction. Vermicomposting is an example of an alternative method of compliance.

(M) **Groundwater Monitoring Plan:** The EDOP for a Class III composting facility must include a Groundwater Monitoring Plan pursuant Section 2.2 of these Solid Waste Regulations. Monitoring parameters will be established based on the hydrogeologic data related to the site, the type of waste stream(s) accepted at the facility and the waste characterization analyses performed on incoming wastes. A Class III composting facility may receive a specific waiver from groundwater monitoring from the Department and local governing authority pursuant to Section 1.5 and Appendix B of these Solid Waste Regulations.

(N) **Compost sampling and testing:** The EDOP for A Class III composting facility must describe how the facility will sample and test finished compost in accordance with the minimum requirements of Section 14.6 of these Solid Waste Regulations.

(O) **Feedstock Processing Areas:** The owner/operator of a Class III composting facility must maintain all weather feedstock processing areas of sufficient slope to direct stormwater and contact water to appropriate collection and storage features and prevents significant ponding of water. The feedstock processing areas must be of sufficient construction and firmness so that composting equipment can manage the process without significant damage or failure following inclement weather.

14.4.6 Class III Composting Facility Design and Operations Plan: Record Keeping and Reporting

(A) The EDOP for a Class III composting facility must include a record keeping and reporting section that describes the records the facility will maintain for department review, including, at a minimum, the following:

- (1) Windrow/ pile aeration data;
- (2) Financial assurance documentation;

- (3) Operational monitoring data including time and temperature readings;
- (4) Engineering Design and Operations Plan;
- (5) Facility personnel records;
- (6) Compost analytical data;
- (7) Feedstock analytical data;
- (8) Liquid waste analytical data;
- (9) The types of materials received for composting;
- (10) Amount in tons or cubic yards of each material received for composting;
- (11) Amount of unprocessed feedstock and feedstock in process onsite at the beginning of the previous calendar year;
- (12) Amount of unprocessed feedstock and feedstock in process onsite at the end of the previous calendar year; and
- (13) Amount of compost distributed the previous calendar year.

(B) A Class III composting facility must complete the Composting Facility Annual Reporting Form and submit to the Department by March 1st of each year for the previous calendar year. The annual report must provide all information required by the Department, including but not limited to the information describe in section 14.4.6(A).

14.4.7 Class III Composting Facility Design and Operations Plan: Closure

(A) The EDOP for a Class III composting facility must include a closure plan which contains at a minimum a complete and accurate description and schedule of all steps necessary to achieve closure of the composting facility. Such steps must include the following criteria:

- (1) The removal of all stored raw feedstock, bulking material, and liquid waste to a permitted solid waste facility or a facility where the wastes may be beneficially reused with approval from the Department and local governing authority;
- (2) The removal of all other wastes on-site, including those wastes generated by closure activities, to a permitted solid waste facility;

(3) The removal of all workpad area unless, specifically approved by the Department and local governing authority to remain on-site;

(4) The removal of all stormwater control and collection structures, unless specifically approved by the Department and local governing authority to remain on-site;

(5) The removal of all tanks, structures and equipment unless specifically approved by the Department and local governing authority to remain on-site;

(6) Site restoration including regrading and revegetation; and

(7) The removal of partially composted feedstocks and bulking material to a permitted solid waste facility or another compost facility with approval from the Department and local governing authority.

(8) Closure activities must not exceed ninety (90) days in length. Extension of the closure period may be granted by the Department and the local governing authority if the owner or operator demonstrates that closure will, of necessity, take longer than ninety (90) days and all measures necessary to prevent threats to human health and the environment will be taken.

(B) If at any time a composting facility ceases operation, including the discontinued receipt, processing and sale of materials for more than one hundred eighty (180) days, the owner or operator must notify the Department and local governing authority and unless otherwise approved by the Department and the local governing authority, the owner or operator must begin implementation of its Closure Plan. Within fourteen (14) calendar days of commencing implementation of the Closure Plan, the facility must provide written notification to the Department and the local governing authority.

(C) Within thirty (30) calendar days of completing closure activities the owner/operator of the facility must provide written notification to the Department and local governing authority to document that all the requirements and conditions of the closure plan have been achieved.

14.4.8 Class III Composting Facility Design and Operations Plan: Post Closure Care and Maintenance

(A) Following closure of the Class III composting facility the owner or operator must conduct post-closure care, which must consist of at least the following:

(1) Continued monitoring, sampling and testing of soil, groundwater or surface water as defined in the post-closure plan;

(2) Inspection and maintenance of any cover material or vegetation; and

(3) An annual report submitted to the Department and local governing authority detailing post-closure care activities during the prior year.

(B) The post-closure care and maintenance period must be for a minimum of five (5) years. The length of the post-closure care period may be:

(1) Decreased by the Department after consultation with the local governing authority if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment; or

(2) Increased by the Department after consultation with the local governing authority if it is determined that the lengthened period is necessary to protect human health and the environment.

(C) Following completion of the post-closure care period the owner or operator must submit a certification signed by an independent Colorado licensed professional engineer for approval by the Department and the local governing authority, verifying that post-closure care has been completed in accordance with the post-closure plan and has been placed in the operating record.

14.5 – COMPOSTING PILOT PROJECTS

(A) The Department will consider composting pilot projects on a case-by-case basis. Composting pilot projects must be performed for the following purposes:

(1) Academic research;

(2) Compost market analysis;

(3) Determining composting method viability; or

(4) Other as approved by the Department.

(B) Composting pilot project must demonstrate that they meet the design and operations requirements for the corresponding facility classification based on feedstock type collected.

(C) Composting pilot project must not exceed two (2) years in length without written approval from the Department.

14.6 – SAMPLING OF FINISHED COMPOST AND SOILS AMENDMENTS

(A) **Compost Standards:** The owner or operator of any class of compost facility (unless exempt under Section 14.1.3) must ensure that compost to be sold or distributed for off-site use meets the standards set forth in Table 1 of this Section 14, and with Section 14.6 below. Compliance with these standards must not relieve any owner or operator from their obligation to comply with any other applicable agency standards, such as those of the Colorado Department of Agriculture.

(B) Compost facilities processing mixed solid waste must remove non-compostable waste prior to product distribution.

(C) Facilities composting to create soil amendments may submit a request for alternative testing requirements to the Division and local governing authority for review and approval. Alternative testing demonstrations must include an agronomic evaluation with examples of application rates for specific crop types and a demonstration that the beneficial use of the soil amendment will not have a greater impact to public health and the environment than similar products on the market used for similar purposes.

TABLE 1
Maximum Constituent Concentration For Compost
Sold Or Distributed For Off-site Use
(mg/kg dry weight basis)

CONSTITUENTS	MAXIMUM LEVEL
INORGANICS¹ (mg/kg)	
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2800
BIOLOGICAL	
Fecal coliform	see 14.6 (D)
Salmonella	see 14.6 (D)

¹Inorganic Methodology: Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846) Third Edition, December 1996: As, Cd, Cu, Pb, Ni, Se and Zn by Method 6010 or 7000. Hg by 7471. These documents are available for review at the Colorado Department of Public Health and Environment (See § 1.1.2 of these Regulations) and the State Publications Depository Libraries.

(D) The owner or operator of a composting facility must ensure that:

(1) The density of the fecal coliform present in the compost is less than 1000 Most Probable Number per gram of total solids (dry weight basis); or

(2) The density of Salmonella sp. bacteria in the compost is less than three (3) Most Probable Number per four (4) grams of total solids (dry weight basis) at the time the compost is to be sold or otherwise distributed for use; or

(3) An owner/operator of a composting facility may receive an approval from the Department and local governing authority for alternate testing after demonstrating how the alternative testing is protective of human health and the environment.

(E) **Sampling Frequency:** Finished compost must be sampled and tested once every 10,000 cubic yards of compost produced, or annually, whichever is more frequent. The Department, in consultation with the local governing authority, may impose site-specific EDOP provisions requiring a greater testing frequency on finished compost, especially from a Class III composting facility, in cases where the feedstocks and liquid waste accepted or the compost process warrants greater frequency.

(F) **Reintroduction of Finished Product into Compost Process:** Finished compost which has been sampled and tested, but to which raw or partially composted feedstock, bulking material, or liquid waste is added prior to, or during distribution, must be reintroduced into the composting process, re-sampled and re-tested prior to commencing or continuing distribution.

(G) **Sampling Methodology:** Sample collection, preservation, and analysis must assure valid and representative analytical results. Sampling procedures must be described in the facility's design and operation plan.

(H) **Additional Testing:** The Department may require additional testing of finished compost for constituents not found in Table 1 and at a frequency greater than specified in Section 14.6(E) of this Section 14.

(I) **Exceedances:** Compost that exceeds the levels specified in Table 1 or as specified in the approved EDOP must be:

(1) Reintroduced into the composting process; or

(2) Disposed of at a permitted solid waste disposal facility; or

(3) Otherwise used in a manner approved by the Department and local governing authority.

(J) **Unrestricted Use:** Compost that satisfies the levels specified in Table 1 and all other parameters identified by the Department per Section 14.6 is determined by these criteria to be finished compost and acceptable for unrestricted use. The finished compost is considered to be a product not a waste, and is no longer subject to these Solid Waste Regulations. For those additional constituents identified by the Department under Section 14.6 and not found on Table 1, the Department will approve protective unrestricted use constituent concentrations.

SECTION 15

[RESERVED]

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SECTION 16

MATERIALS PROHIBITED FROM DISPOSAL

16.1 SCOPE AND APPLICABILITY

16.1.1 Purpose. These regulations apply to the management and disposal of materials prohibited from land disposal in a solid waste site and facility under authority of CRS Title 30, Article 20, Part 1 and Part 10 and CRS Title 25, Article 17, Part 3. These Section 16 regulations are classified into the following sub-categories:

- 16.2 Management of Residentially Generated Used Lead-acid Batteries
- 16.3 Management of Residentially Generated Used Oil
- 16.4 [Reserved]
- 16.5 Management of Residentially Generated Waste Electronic Devices.

16.1.2 General Provisions

- (A) Land disposal of residentially generated waste electronic devices, used lead-acid batteries and used oil is prohibited. Land disposal includes, but is not limited to, placing, discarding, or otherwise disposing of these wastes:
 - (1) At a solid waste disposal site and facility;
 - (2) At a transfer station;
 - (3) At a hazardous waste treatment, storage or disposal facility;
 - (4) In sewers;
 - (5) In septic tanks;
 - (6) In drainage systems;
 - (7) In surface or groundwaters;
 - (8) In watercourses;
 - (9) In any body of water; or
 - (10) On the ground.

- (B) Placement of these wastes in a receptacle or collection device destined for land disposal, such as a dumpster, is prohibited.
- (C) Acceptance of these wastes at a solid waste disposal site or facility or transfer station is prohibited, except for the purpose of recycling or collection facility operations.
- (D) Each entity affected by this Section must comply with all other applicable Colorado statutes and Regulations of the Department, and with all applicable local zoning laws and ordinances.

16.1.3 Due Diligence Exemption

(A) Individuals

Individuals residing in areas without recycling facilities or collection facilities are given the opportunity to demonstrate a lack of reasonable recycling options. In order to exercise this option, the individual must conduct due diligence to establish that reasonable options are not available. A finding of due diligence shall be based, at a minimum, on an individual's inquiry into local recycling options accomplished by querying the local telephone directory and contacting the county or municipality of residence regarding the availability of local recycling facilities, collection centers, or collection events. In the event that due diligence is exercised and no reasonable recycling option is identified, an individual may dispose of used lead-acid batteries and/or used oil in a solid waste disposal site and facility or transfer station. The individual must contact the intended recipient solid waste disposal site and facility or transfer station to make sure that the facility will accept the used lead-acid batteries and/or used oil. Nothing in this Section precludes any solid waste disposal site and facility or transfer station from refusing to accept these items on a site-specific basis.

(B) Solid Waste Disposal Sites and Facilities

Each solid waste disposal site and facility must evaluate any due diligence determinations made by individuals, consistent with waste screening criteria already implemented for other waste streams in accordance with Section 2.1.2 of these Regulations. The individual may be required by the solid waste disposal site and facility to document the due diligence that was performed if such a requirement is identified in the facility's waste characterization plan required in Section 16.6 of these Regulations.

(C) **Collection Facilities**

Due diligence is only available to individuals; collection facilities are prohibited from the provisions of due diligence under this exemption.

16.2 MANAGEMENT OF RESIDENTIALLY GENERATED USED LEAD-ACID BATTERIES

16.2.1 Used Lead-acid Battery Disposal

- (A) Land disposal of residentially generated used lead-acid batteries is prohibited.
- (B) A person shall manage residentially generated used lead-acid batteries by delivery to one of the following entities:
 - (1) A retailer or wholesaler engaged in used lead-acid battery collection or recycling;
 - (2) A secondary lead smelter;
 - (3) A collection facility engaged in used lead-acid battery collection; or
 - (4) A recycling facility engaged in used lead-acid battery recycling.

16.2.2 Used Lead-acid Battery Management Standards

- (A) A retailer, wholesaler, or collection facility that accepts and stores residentially generated used lead-acid batteries shall manage the batteries in a manner that prevents the release of waste or waste constituents to the environment, as follows:
 - (1) Any used lead-acid battery that shows evidence of leakage, spillage, or damage that could cause leakage, shall be placed in a container. The container must be closed, labeled as to its contents, structurally sound, compatible with the contents of the battery, and must lack evidence of leakage, spillage, or damage that could cause leakage;
 - (2) Batteries that are not leaking and are in good condition must be stored on pallets or in a comparable manner that keeps all batteries off the ground;
 - (3) Batteries stored outside shall be protected from the weather;

- (4) Used lead-acid batteries must be stored in a designated accumulation area indicated by signs, markings, or other identifiers; and
 - (5) Any release associated with the storage or recycling of lead-acid batteries must be immediately contained and remediated.
- (B) A retailer, wholesaler, or collection facility that accepts and stores residentially generated used lead-acid batteries in accordance with this Section and also accepts and stores used lead-acid batteries regulated under the Colorado Hazardous Waste Regulations 6 CCR 1007-3, may manage residentially generated used lead-acid batteries in accordance with:
- (1) Section 16.2.2(A) above;
 - (2) Hazardous waste requirements for Universal Wastes at 6 CCR 1007-3, Part 273; or
 - (3) Hazardous waste requirements for lead-acid batteries being reclaimed in accordance with 6 CCR 1007-3, Part 267, Subpart G.

16.2.3 Retailer Deposit System

Any retailer selling replacement lead-acid batteries may accept from customers used lead-acid batteries of the same general type and in a quantity at least equal to the number of new batteries purchased, if offered by customers. A lead-acid battery retailer that chooses to set up a deposit system may collect a deposit of at least ten dollars on the sale of an automotive-type replacement lead-acid battery not accompanied by the return of a used lead-acid battery. The retailer shall return the deposit if the person who paid the deposit returns a used lead-acid battery to the retailer within thirty (30) calendar days of the date of sale.

16.2.4 Retailer Disposal Options

A retailer accepting used lead-acid batteries from customers in the State shall dispose of said batteries by delivery to one of the following:

- (A) The agent of a lead-acid battery wholesaler or a secondary lead smelter;
- (B) A battery manufacturer for delivery to a secondary lead smelter;
- (C) A collection facility engaged in used lead-acid battery collection; or
- (D) A recycling facility engaged in used lead-acid battery recycling.

16.2.5 Lead-acid battery wholesalers

Any wholesaler selling replacement lead-acid batteries may accept from customers, at the point of transfer, used lead-acid batteries of the same general type and in a quantity at least equal to the number of new batteries purchased, if offered by customers.

16.2.6 Household Hazardous Waste Collection Event Exemption

Residentially generated used lead-acid batteries that are collected during any periodic household hazardous waste collection event (where such wastes are not accepted on a continuous basis) shall be exempt from the standards in 16.2.2, provided that the residentially generated used lead-acid batteries are managed to prevent release to the environment and are transferred from the site within thirty (30) calendar days following each collection event.

16.3 MANAGEMENT OF RESIDENTIALLY GENERATED USED OIL

16.3.1 Used Oil Disposal

- (A) Land disposal of residentially generated used oil is prohibited.
- (B) Notwithstanding Subsection (A) of this Section, a person may dispose of an item or substance that contains de minimis quantities of used oil in a solid waste disposal site and facility under Subsection (A) of this Section if:
 - (1) All oil has been removed from the item or substance to the extent reasonably possible; and
 - (2) No free-flowing oil remains in the item or substance.
- (C) A person shall dispose of used oil by delivery to one of the following entities:
 - (1) A retailer engaged in used oil collection or recycling;
 - (2) A wholesaler engaged in used oil collection or recycling;
 - (3) A collection facility engaged in used oil collection; or
 - (4) A recycling facility engaged in used oil recycling.

- (D) A retailer shall dispose of used oil by delivery to one of the following entities:
 - (1) The agent of a wholesaler engaged in used oil recycling;
 - (2) A collection facility engaged in used oil collection for recycling; or
 - (3) A recycling facility engaged in used oil recycling.

16.3.2 Used Oil Management Standards

A collection facility that accepts and stores residentially generated used oil must manage the oil as follows:

- (A) For transport to an appropriate recycling facility, the collection facility must comply with requirements set forth in the Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Part 279.30 for do-it-yourselfer (DIY) used oil collection centers. Owners or operators of all DIY used oil collection centers must comply with the generator standards in 6 CCR 1007-3, Part 279, Subpart C.
- (B) For the co-mingling of used oil residentially generated by DIY with commercially generated used oil, the collection facility must comply with requirements set forth in the Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Part 279.31 for used oil collection centers.

16.4 [RESERVED]

16.5 MANAGEMENT OF RESIDENTIALLY GENERATED WASTE ELECTRONIC DEVICES

16.5.1 Waste Electronic Device Disposal

- (A) Land disposal of residentially generated waste electronic devices is prohibited.
- (B) A person shall manage waste electronic devices by one of the following entities that offers to accept waste electronic devices, including but not limited to:
 - 1) A registered recycling facility, as described in Section 8;

- 2) A commercial retailer, wholesaler, consignment store, or any business engaged as a collection facility;
- 3) A city or county household hazardous waste program or collection facility;
- 4) A temporary residential collection event for electronics recycling; or
- 5) A producer or retailer mail-back program.

16.5.2 Exemptions

Notwithstanding Subsection (A) of this Section, a person may dispose of a waste electronic device at a solid waste disposal site and facility only following approval by majority vote of the county commissioners exempting residents from this Section 16.5 for no more than a two year period if the county:

- (A) Is unable to meet the minimum access requirements of 16.5.3; and
- (B) Performs the good faith effort requirements of 16.5.4.

16.5.3 Minimum Access Requirements

A board of county commissioners shall only vote to exempt residents from this Section 16.5, if the county does not meet the minimum access to electronics recycling which includes:

- (A) At least two electronic waste recycling collection events per year; or
- (B) An ongoing electronic waste recycling program serving residents of the county.

16.5.4 Good Faith Effort Requirements

- (A) A county shall make a good faith effort to establish electronics device recycling within the county prior to voting for an exemption to this Section 16.5.
- (B) A good faith effort shall be documented by the county and include at a minimum:
 - 1) Contacting the Department for assistance or reviewing the Department's webpage for the current list of electronic recycling options available;

- 2) Contacting at a minimum three registered recycling facilities who collect electronic waste, or recycling and waste associations who assist with collection events;
- 3) Coordinating with the county landfill or private landfill within the county to serve as an electronic waste collection facility or to perform periodic collection events; and
- 4) Coordinating with local municipalities within the county for electronic recycling collection events.

16.5.5 Used Electronic Device Management Standards

A retailer, wholesaler, or collection facility not subject to Section 8 that accepts and stores residentially generated waste electronic devices shall manage the used electronic devices in a manner that prevents the release of waste or waste constituents to the environment.

16.5.6 Disposal Site Signage

All solid waste disposal sites and facilities, transfer stations, and waste haulers shall post, in a conspicuous location at the facility, a sign stating that waste electronic devices will not be accepted for land disposal.

16.6 Waste Characterization Plans

Each solid waste site and disposal facility shall amend its waste characterization plan to include waste acceptance procedures designed to minimize the disposal of residentially generated waste electronic devices, used lead-acid batteries and used oil. Such procedures shall be implemented no later than July 1, 2013. Solid waste sites and disposal facilities shall include these waste screening procedures in the waste characterization and disposal plan required by Section 2.1.2(C). The prohibition on disposal of these waste types shall be incorporated into employee training required by Section 2.1.2(B)(3). Any solid waste disposal site and facility in substantial compliance with its waste characterization plan developed pursuant to section 30-20-110 (1) (g), and Section 2.1.2 of the Regulations, shall be deemed to be in compliance with this Section, so long as such waste characterization plan contains waste acceptance procedures to minimize the disposal of waste electronic devices, lead-acid batteries and used oil consistent with the requirements of this Section.

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SECTION 17

COMMERICAL EXPLORATION & PRODUCTION WASTE IMPOUNDMENTS

17.1 GENERAL PROVISIONS

17.1.1 **Scope and Applicability:** This Section 17 applies to all commercial solid waste disposal sites and facilities with waste impoundments that accept exploration & production (EP) wastes for treatment, storage or disposal. Included in the scope of this Section 17 are discrete impoundment units, containment systems, ancillary equipment and other associated operations at the facility. In addition, Sections 1 and 2 of these Solid Waste Regulations are directly applicable to all such facilities unless specifically otherwise noted herein. This Section 17 does not apply to exploration and production waste impoundments regulated by the Colorado Oil and Gas Conservation Commission. Compliance with this Section 17 shall not relieve the facility owner or operator from his/her obligation to comply with the facility's certificate of designation and any other applicable federal, state or local statute, regulation, requirement or ordinance.

17.1.2 **Effective Date:** This Section 17 was adopted by the Solid and Hazardous Waste Commission on November 18, 2008 and became effective on December 30, 2008.

17.1.3 Compliance Schedules

17.1.3(A) An application to amend a facility's certificate of designation to incorporate the requirements of these Solid Waste Regulations must be filed by the owner or operator of existing commercial EP waste impoundment facilities with the local governing authority within three (3) months of the effective date of this Section 17. If an existing facility does not have a certificate of designation, and one is required under 30-20-102 C.R.S., then the owner or operator of the facility must submit an application for certificate of designation to the local governing authority within three (3) months of the effective date of this Section 17.

17.1.3(B) Within twenty-four (24) months of the effective date of this Section 17, all facilities must comply with these Solid Waste Regulations.

17.1.3(C) Within eighteen (18) months of the effective date of this Section 17, facilities that cannot meet the compliance schedule specified in 17.1.3 (B) must make a demonstration to the Department showing why this compliance schedule cannot be met, and must request an alternate schedule for coming into compliance with this Section 17. Such extension shall be subject to Department approval, but the deadline for coming into

compliance may be extended no later than thirty-six (36) months after the effective date of this Section 17 per the requirements of HB 08-1414.

17.2 ENGINEERING DESIGN AND OPERATION PLAN

The owner or operator of each commercial EP waste impoundment shall submit an engineering design and operation plan to the Department and the Local Governing Authority for review and approval, prior to commencing impoundment construction, storage, treatment or disposal operations. The plan shall describe how the facility will comply with all applicable requirements in these Solid Waste Regulations.

17.2.1 All portions of the facility design and site investigation shall be reviewed and sealed by a Colorado registered professional engineer or reviewed and signed by a professional geologist, as appropriate.

17.2.2 The engineering design and operation plan shall include the following subject areas, at a minimum:

17.2.2(A) General Information

- (1) Owner and Operator mailing address, county and legal description of the solid waste disposal facility;
- (2) Site area, in acres;
- (3) Type of treatment, disposal, storage and containment features, monitoring and operational practices to be used at the facility; and
- (4) Discussion of facility's service area, including transportation corridors and surrounding access.

17.2.2(B) Site Investigation

17.2.2(B)(1) **Geologic Data:** The engineering design and operations plan shall include, at a minimum, the following geologic data:

- (a) Types and regional thickness of unconsolidated soils and materials;
- (b) Types and regional thickness of consolidated bedrock materials; and
- (c) Regional and local geologic information, including but not limited to bedrock strike and dip, fracture patterns, slope stability, fracturing, faulting, folding, rockfall, landslides,

subsidence or erosion potential, that may affect the design and operation of the facility for solid wastes disposal.

17.2.2(B)(2) **Hydrologic data.** The engineering design and operations plan shall include, at a minimum, the following hydrological data:

- (a) Lakes, rivers, streams, springs, or bogs, on-site or within two (2) miles of the site boundary;
- (b) Depth to and thickness of perched zones and uppermost aquifers;
- (c) Groundwater wells within one (1) mile of the site boundary, including well depth, depth to water, screened intervals, yields and the aquifers tapped;
- (d) Hydrologic properties of the perched zones and uppermost aquifer, including flow directions, flow rates, porosity, coefficient of storage, permeability, limits of saturation and potentiometric surface;
- (e) Site location in relation to the base floodplain of nearby drainages;
- (f) The separation between the wastes to be impounded and the uppermost water-bearing zone, perched or otherwise;
- (g) An evaluation of the potential for impacts to existing surface water and ground water quality from each of the proposed impoundment units and ancillary equipment, if more than one, or the facility if only one unit exists;
- (h) The existing quality of ground water beneath the proposed facility;
- (i) Any other associated factors related to the time of travel from the midpoint of each cell to the point of compliance;
- (j) Climatic factors;
- (k) The estimated volume, physical and chemical characteristics of the waste;
- (l) The distance ground water beneath the site would flow during the facility's operating life and post-closure care period; and

- (m) The distance to existing domestic wells or springs and proposed future development shown to use the uppermost aquifer or monitored unit down gradient of the site.

17.2.2(C) **Facility Design:** The engineering design and operations plan shall include specific design details for each solid waste impoundment and all associated structures and ancillary equipment used to store, treat or dispose of solid waste.

17.2.2(C)(1) **Engineering Data.** The engineering design and operations plan shall contain, at a minimum, the following engineering data:

- (a) The types and quantity of material(s) that will be required for use as liner material in the upper and lower components of the liner system;
- (b) Maps and plans, drawn to a common recognized engineering scale, that show the following:
 - (i) The location and depth of cut or fill for liners;
 - (ii) The location, dimensions and grades of all surface water control structures;
 - (iii) The location and dimensions of all surface water containment structures, including those designed to impound contaminated runoff, sludge, or liquids for treatment;
 - (iv) The spatial distribution of engineering, geologic and hydrologic data, and relationship to the proposed facility and each individual impoundment unit;
 - (v) The location of all proposed facility structures and access roads;
 - (vi) The location of all proposed monitoring points for surface water and ground water quality;
 - (vii) The final contours and grades of the reclaimed site after closure;
 - (viii) The location of fencing or other access control features to be placed on-site;
 - (ix) The location of each proposed phase of development; and

- (x) The design details of the impoundment liner including size and total volume at capacity.

17.2.2(C)(2) **Liner System Design Specifications:** The engineering design and operation plan shall provide the following specifications relative to each liner system component:

(a) **Compacted Clay Liner:**

- i) Compaction;
- ii) Density;
- iii) Moisture content; and
- iv) The design hydraulic conductivity.

(b) **Flexible Membrane Liner:**

- i) The selected flexible membrane liner product;
- ii) Thickness;
- iii) Manufacturer Specifications; and
- iv) Evidence demonstrating compatibility with all waste streams proposed to be managed in the waste impoundment.

17.2.2(C)(3) **Demonstration of Groundwater Protection:** Impoundment facilities shall demonstrate that the design proposed for the facility complies with all applicable sections of this Section 17, and complies with Sections 2.1.15 and 2.2 of these Solid Waste Regulations and Regulation 41 (5 CCR 1002-41). Such demonstration shall include the following information:

- (a) Liner hydraulic conductivity;
- (b) Thickness of each liner type;
- (c) Slope of the liner layer;
- (d) Hydraulic head on the liner;
- (e) The waste or waste streams to be impounded, including their constituent toxicity, mobility and persistence in the environment;

- (f) Distance from the midpoint of each cell to relevant point of compliance at the downgradient edge of each impoundment;
- (g) Distance to, and characteristics of, the uppermost aquifer or monitored unit;
- (h) Climatic factors;
- (i) The estimated volume and physical and chemical characteristics of the wastes to be impounded;
- (j) The chemical compatibility of the wastes to be impounded with the liner; and
- (k) The development and installation of a groundwater monitoring system.

17.2.2(C)(4) Monitoring System and/or Leak Detection System:

Construction details shall be provided for all proposed monitoring points for surface water and groundwater quality and the monitoring system used to make volume and freeboard determinations.

17.2.2(C)(5) Ancillary Storage: Facilities which include tanks or tank systems, or other ancillary storage and treatment equipment, must include plans, design criteria and specifications for each waste storage and waste treatment device in the facility's engineering design and operations plan.

17.2.2(D) Construction: The design and operation plan must include a quality assurance and quality control plan (QA/QC) for all engineered structures and appurtenances. The QA/QC Plan must be reviewed and approved by the Department and governing authority prior to commencing construction of any waste management features at the facility.

17.2.2 (E) Facility Operations: The engineering design and operations plan shall include specific operational details for each solid waste impoundment and all associated structures or ancillary equipment used to store, treat or dispose of solid waste. The plan shall also include the following operational data, at a minimum:

- (1) The names, qualifications and addresses of the persons operating the facility and having the authority to take corrective action in the event of noncompliance;
- (2) The business hours for the facility;

- (3) Access control measures, including the types and height of fencing to be placed onsite;
- (4) A listing of the waste stream types to be approved for routine receipt and anticipated volumes in barrels or gallons/per day of wastes to be received;
- (5) The expected life of the site or unit;
- (6) The number and job descriptions of personnel projected to be employed at the impoundment facility when operating;
- (7) Type of equipment projected to be used at the facility;
- (8) The size (surface area and volume) and types of impoundments or processing areas to be constructed;
- (9) Provisions to minimize nuisance conditions on-site and prevent nuisance conditions from occurring off-site;
- (10) Provisions for fire protection, including the amounts and sources of onsite water available to be used for fire protection; and
- (11) Facility inspections, both the frequency of inspections by the operator and associated written documentation of the condition of impoundment embankments and related piping or structures.

17.2.2(F) **Contingency Plan:** The Engineering Design and Operation Plan shall include a contingency plan. The plan shall describe what actions will be taken should one of the situations below occur. The plan must be implemented as described in Section 17.3.3(L), to address the following situations:

- (1) Plans to be implemented in the event of a release from the impoundment resulting in potential contamination of surface waters or groundwater;
- (2) Plans to be implemented if liquids are discovered in the leak detection system; and
- (3) Conditions of non-compliance with these Solid Waste Regulations or the facility's approved plans necessitating corrective action.

17.2.2(G) **Waste Characterization Plan:** The plan shall contain the following sections at a minimum:

- (1) A description of how the facility will comply with 2.1.2 of these Solid Waste Regulations;
- (2) Provision for annual profiling and analysis of waste streams and of impoundment contents consistent with Sections 17.3.3(C)(2) and 17.3.3(C)(3); and
- (3) Provision for random sampling of incoming wastes by the facility consistent with Section 17.3.3(C)(4).

17.2.2(H) **Personnel Training Plan:** The facility shall develop a personnel training plan based on job responsibilities and duties that includes the following provisions:

- (1) Job-specific annual training in the facility's design and operation plan, including all attachments to the plan and all documents referenced in the plan that are relevant to operational compliance, and
- (2) Job-specific annual training in the recognition of hazardous and prohibited wastes.

17.2.2(I) **Sitewide Monitoring Plan:** The facility shall develop a sitewide monitoring plan, inclusive of groundwater monitoring, stormwater monitoring, ancillary equipment (if present), leak detection monitoring and monitoring of liquid wastes.

17.3 DESIGN, CONSTRUCTION AND OPERATION REQUIREMENTS

A liner system is required by statute for all commercial solid waste disposal sites and facilities managing EP waste.

17.3.1 Design Requirements

17.3.1(A) Liner System

17.3.1(A)(1) **Liner Requirements:** The statutory performance requirement for EP waste disposal facilities is to prevent migration of EP waste to groundwater. Therefore, each waste impoundment covered by this section shall be lined with a composite liner as described in Section 17.3.1(A)(2) or a double liner system as described in Section 17.3.1(A) (3), and the facility design must include leak detection monitoring in accordance with Section 17.3.1(C) to prevent the migration of EP waste or EP waste constituents to groundwater. The owner or operator of the facility shall demonstrate, to the Department and the local governing

authority, that the design developed for the facility will comply with this Section 17 and Sections 2.1.15 and 2.2 of these Solid Waste Regulations, and with Regulation 41 (5 CCR 1002-41). Such demonstration shall be subject to Department approval.

17.3.1(A)(2) **Composite Liner System:** A composite liner shall consist of an upper and lower component.

(a) The upper component shall consist of a minimum 60-mil high-density polyethylene (HDPE). The upper component shall be installed in direct and uniform contact with the compacted soil component; and

(b) The lower component shall consist of at least a two-foot layer of compacted soil with a hydraulic conductivity less than or equal to 1×10^{-7} cm/sec.

17.3.1(A)(3) **Double liner system:** A double liner consists of two liner systems separated by a drainage or leak detection layer. Each of the liner systems may be comprised of a single or composite liner configuration. At a minimum, a) one of the liner systems must incorporate a 60-mil HDPE or equivalent liner material as one of its liner components, and b) the other liner system must be equivalent to a two-foot layer of compacted soil with a hydraulic conductivity less than or equal to 1×10^{-7} cm/sec. The drainage layer between the liner systems contains transmissive material such as sand, gravel or a synthetic drainage blanket, and conveys liquid to a sump from which it can be extracted. This type of liner incorporates leak detection capability directly into the design, and may warrant the Department's consideration of a modified Appendix B groundwater monitoring program.

17.3.1(A)(4) **Separation from Groundwater:** At a minimum, the facility shall ensure a separation of twenty (20) feet between the bottom of the liner system and the uppermost occurrence of groundwater.

17.3.1(A)(5) **Alternative liner designs:** Alternative liner designs that perform in an equivalent manner to the Section 17.3.1 (A) (2) or (A)(3) liner systems may be approved by the Department and the local governing authority based on a demonstration of alternate liner design's equivalent performance, the waste type and site specific technical information. At a minimum, the upper liner component shall be a 60-mil HDPE or equivalent synthetic liner. Proposals for alternative designs shall also demonstrate that the

facility can comply with Sections 2.1.15 and 2.2 of these Solid Waste Regulations, and with Regulation 41 (5 CCR 1002-41).

17.3.1(B) **Mandatory Set-Backs:** For EP waste disposal facilities whose application for certificate of designation is submitted to the local governing authority after the effective date of this Section 17, the facility must have a mandatory set-back of one-half mile from all residences, educational facilities, day-care centers, hospitals, nursing homes, jails, hotels, motels, other occupied structures, or outside activity areas such as parks and playing fields.

17.3.1(C) **Leak Detection Monitoring System:** All EP waste impoundments must include leak detection monitoring consistent with the liner design specific to that impoundment.

17.3.1(C)(1): Composite single liner systems must incorporate one of the following:

(i) Vadose Zone Monitoring (wet/dry wells);

(ii) Resistivity net;

(iii) Downgradient impoundment edge groundwater monitoring; or

(iv) Other equivalently protective system as approved by the Department.

17.3.1(C)(2) **Double liner system:** The leak detection is incorporated into the interstitial drainage layer. Sampling of leak detection liquids must be performed immediately upon discovery. Downgradient point-of-compliance groundwater monitoring shall be conducted, as necessary, based upon history of impoundment liquids detected in the leak detection system.

17.3.1(D) **Continuous Freeboard Monitoring:** All waste impoundment facilities or units shall be equipped with a means to, at all times, quickly and accurately determine the total volume of waste and amount of freeboard in each impoundment.

17.3.1(E) **Access Control:** Each waste impoundment covered by this section shall be equipped with fencing and netting to prevent the public and wildlife from accessing the waste disposal facility. Facilities shall control public access, prevent unauthorized access and provide for site security both during and after business hours, and prevent illegal dumping of wastes. Effective artificial barriers or natural barriers as approved by the Department may be used in lieu of fencing.

17.3.1(F) **Stormwater Control:** Each waste impoundment shall be designed, constructed and maintained to provide: (1) a run-on control and diversion structures to prevent flow into the unit from a 25-year, 24-hour storm, (2) a run-off control system to collect runoff from a 25-year, 24-hour storm and control run-off from a 100-year, 24-hour storm. Precipitation that cannot be diverted from the impoundment, and therefore comes in contact with impounded waste, shall be managed as solid waste. Each impoundment shall be designed, constructed and maintained to prevent damage to the containment structure from erosion.

17.3.1(G) **Embankment Durability:** Embankments shall be designed to eliminate erosion and to withstand deterioration caused by the impounded waste.

17.3.2 Construction Requirements

17.3.2(A) Waste impoundments shall be constructed according to Department-approved detailed design plans, specifications and criteria. The owner or operator of each facility shall develop and implement a Quality Assurance/Quality Control (QA/QC) program to demonstrate that each engineered containment structure at the facility has been constructed in accordance with the facility's approved Engineering Design and Operation Plan and the facility's approved QA/QC Plan.

17.3.2(B) Synthetic liners shall be installed according to the manufacturer's instructions, which shall be submitted as part of the facility's engineering design and operations plan.

17.3.2(C) The construction will be tested and evaluated using quality control and quality assurance measures and methods specified in the facility's approved Engineering Design and Operation Plan and QA/QC Plan. The resulting QA/QC information, including daily visual observations, moisture, density and hydraulic permeability test results, shall be submitted as part of a construction certification report to the Department and local governing authority for review and approval.

17.3.2(D) During construction and prior to the addition of liquid wastes, liner systems shall be protected from erosion, desiccation, drying, UV degradation or other damage.

17.3.2(E) At least ninety (90) calendar days prior to the commencement of waste acceptance into the impoundment facility, the owner or operator of the facility shall submit the construction certification report to the Department and the local governing authority. This report shall certify that the construction has been completed in accordance with the facility's

approved engineering design and operation plan and approved QA/QC Plan. The construction certification report shall be signed and sealed by a Colorado registered professional engineer and shall be subject to Department approval prior to the acceptance of waste. Nothing in these Solid Waste Regulations precludes separate review and approval by the local governing authority as well. Construction certification reports shall be developed, approved and implemented for all engineered structures and ancillary equipment used to manage solid waste at the facility.

17.3.3 Operating Requirements

17.3.3(A) **Compliance with Approved Plans:** Operation of waste impoundments shall be in accordance with all approved plans, and with the minimum standards found in Sections 1, 2 and 17 of these Solid Waste Regulations.

17.3.3(B) **Commingling of Wastes:** Incompatible wastes shall not be commingled.

17.3.3(C) **Waste Characterization:**

17.3.3(C)(1) The owner or operator of commercial EP waste disposal facilities shall develop and implement waste analysis procedures to ensure that only EP waste is disposed of at the facility. The disposal of waste streams different from those originally approved shall constitute a significant change in operation and require an approval by the Department and the local governing authority prior to acceptance at the facility. An amendment to the facility's certificate of designation may be required.

17.3.3(C)(2) The owner or operator of each commercial EP waste impoundment facility shall initially profile and then conduct annual testing on each waste stream entering the facility, including, at a minimum, waste from each well and/or each tank battery and each drilling location, to demonstrate conformance with the original analyses. Each facility must also ensure that EP waste generators using the facility notify the facility when there has been a change in their processes or waste composition.

17.3.3(C)(3) The owner or operator of each EP waste disposal facility shall analyze at least one sample of the contents of each impoundment annually for the suite of analytes included in Appendix II of the Solid Waste Regulations. Such analysis shall be performed using appropriate methods as specified in the site-wide monitoring plan to provide an accurate representation of constituents and

concentration levels found in the waste. If the impounded wastes are subject to stratification, a separate sample shall be taken from each representative level, including settled sludge and oil or other surface accumulation.

17.3.3(C)(4) Annual testing of unannounced grab samples shall be taken from random vehicles entering the facility and analyses conducted for the original or approved amended list of parameters. If any waste is found to differ from the original analysis, the Department and local governing body having jurisdiction shall be notified in writing within seven (7) calendar days, and a request to modify the design and operation plan submitted to the Department and local governing authority for review and approval prior to continuing acceptance the identified waste stream.

17.3.3(C)(5) EP waste disposal facilities shall not receive hazardous waste and will conduct waste profiling in accordance with Section 2 and their approved waste characterization plan (as amended to conform to this Section 17).

17.3.3(D) **Liner Protection:** The owner or operator of EP waste disposal facilities shall maintain the integrity of liners by prevention of damage through uncontrolled or improper discharge of wastes into the impoundment, vehicle traffic, dredging of settled sludge, skimming and maintenance of spray systems erosion, desiccation, drying, UV degradation or other damage or other actions.

17.3.3(E) **Removal of Surface Accumulation:** All evaporative impoundments shall be safeguarded and maintained free of oil or other surface accumulations. Any accumulation of oil or surface accumulations shall be removed within twenty-four (24) hours of discovery. Discovery and removal dates and times shall be documented.

17.3.3(F) **Leak Detection Monitoring:** Per statutory requirement, EP waste disposal facilities shall conduct monitoring not only to detect, but also to prevent, releases that impact groundwater. If the liner design incorporates a double liner system, this can be readily accomplished through monitoring of the drainage layer. However, if the liner design consists of a single composite liner, monitoring to provide leak detection capability must be implemented in accordance with Section 17.3.1(C) beneath or adjacent to the impoundment.

17.3.3(G) **Groundwater Monitoring:** The owner or operator of a commercial EP waste impoundment facility shall conduct groundwater monitoring in accordance with a Department-approved groundwater monitoring plan.

Monitoring parameters shall be established based on the hydrogeologic data related to the site, the type of waste stream(s) accepted at the facility and waste characterization results.

17.3.3(H) **Surface Water Monitoring:** Surface water monitoring, including monitoring of seeps, is required where seepage has been detected or other releases have been identified.

17.3.3(I) **Continuous Fluid Level Monitoring:** Continuous fluid level and freeboard level monitoring is required for each impoundment. Maximum liquid level shall be measured continuously so that each impoundment has a minimum of two (2) feet of freeboard, measured from the lowest elevation berm of a specific impoundment to the upper surface of the impounded waste. Fluid level measurement points for each impoundment shall be established, and continuously maintained.

17.3.3(J) **Mass Balance:** To ensure the accuracy of the method used for monitoring fluid level and to check for potential liner leaks, monthly monitoring of total volume for each impoundment shall occur.

17.3.3(K) **Attendant:** Commercial EP waste impoundment facilities shall maintain at least one trained attendant on site during scheduled business hours and when accepting waste.

17.3.3(L) **Contingencies:**

The owner or operator shall develop, implement and maintain an approved contingency plan (See Section 17.2.2(F), engineering design and operation plan) to be implemented in the following situations: 1) an unplanned release from the containment system, 2) leachate observed in the leak detection system and 3) conditions of noncompliance with approved plans or certificate of designation or the Solid Waste Regulations necessitating corrective action. The contingency plan must contain provisions for assessing the full nature and extent of release to delineate the impact to soil, groundwater or surface water, for remedying such impact, and for returning the facility to compliance. If a facility has an approved Spill Prevention Control and Countermeasures (SPCC) Plan, then the Department will accept a modified approved SPCC Plan that also incorporates the additional requirements as specified in these Solid Waste Regulations. If the facility does not have an approved SPCC Plan, then the Contingency Plan must include all of the provisions identified in this Section 17 of the Solid Waste Regulations.

17.3.3(L)(1) As part of the facility's implementation of the contingency plan, the owner or operator shall take the following actions, at a minimum:

- (a) Cease adding waste into the impoundment;
- (b) Close and empty the impoundment to repair leaks; and/or
- (c) Remove any liquid from the leak detection system on a daily basis, or more frequently as necessary; and
- (d) Measure and record the volume of waste removed.

17.3.3(L)(2) The owner or operator shall notify the Department and the local governing authority within twenty-four (24) hours of any identified release from a waste impoundment or ancillary equipment or any incident requiring implementation of the Contingency Plan. Within seven (7) calendar days of the incident, the owner or operator shall provide written notification outlining immediate actions taken.

17.3.3(L)(3) A detailed written assessment of the impact of leakage, repair completion and verification, and the need for additional monitoring and proposed corrective action shall be submitted by the owner/operator within forty five (45) calendar days to the Department and local governing authority. Repairs affecting an engineered feature at the facility must be certified by a Colorado registered P.E. in accordance with 17.3.2(E).

17.3.3(M) **Facility Inspections:** The owner or operator of the facility shall implement a weekly facility inspection program. The inspection provisions shall cover all waste treatment, disposal, containment and storage features at the facility, including tanks and ancillary equipment. At a minimum, these inspections shall examine ground movement, cracks, erosion, leaks, equipment connections, influent and effluent locations, rodent burrows, vegetation growing on a liner system, damage to ancillary equipment, spills, detection of liquids in sumps, fires or explosions, or other events or problems which could affect the operation of the facility or jeopardize the integrity of an impoundment. Leak detection and collection systems shall also be inspected weekly for the presence of any liquids. If liquids are detected, samples shall be taken and analyzed immediately, and a determination made, as to the source of the liquid in the leak collection system. Other aspects of the waste containment system, including tanks and ancillary equipment, shall be inspected on a weekly basis as well.

17.3.3(N) **Financial Assurance:** Financial assurance of an adequate amount to cover closure and post-closure care costs shall be established in accordance with Section 1.8 of these Solid Waste Regulations.

17.4 RECORDKEEPING AND REPORTING REQUIREMENTS

17.4.1 **Availability of Records:** Monthly summary records of waste receipts shall be maintained for a minimum of three (3) years during the operating life of the facility documenting the origin, volume in storage, shipment to other facilities, and rate of disposal of all wastes. All records, including but not limited to facility inspection logs, daily depth/volume readings, precipitation, waste and monitoring analyses, freeboard and load receipts shall be maintained on-site unless otherwise approved by the Department. Those records shall be available for inspection by representatives of the Department and the local governing authority during regular business hours.

17.4.2 **Evaporative Treatment:** The owner or operator of a facility employing forced evaporative treatment shall calculate and record on a quarterly basis the total volume of all wastes treated and evaporated in each impoundment.

17.4.3 **Incoming Waste Shipments:** Each shipment of solid waste being disposed of at a waste impoundment facility which is subject to the Solid Waste Regulations and the Act shall be registered, with the following information entered on a single receipt or manifest:

- (A) Date and time;
- (B) Receiving impoundment identification;
- (C) Quantity;
- (D) Type of waste;
- (E) Location produced;
- (F) Waste generator;
- (G) Hauler and truck number; and
- (H) Driver's name and signature.

17.4.4 **Record Retention:** Each waste impoundment facility shall maintain the following records:

- (A) Individual load receipts for at least three (3) years.
- (B) Monthly summaries shall be maintained for a minimum of three (3) years during the operating life and post closure care period of the facility. Monthly summaries for each impoundment shall contain the following: (1) total volume of each waste stream disposed, and (2) waste stream identification(s).

- 17.4.5 **Annual Report:** Each commercial EP waste impoundment facility shall submit an annual report by March 1st of each year to the Department and local governing authority. The annual report shall include:
- (A) The total volume received for each waste type during the previous calendar year;
 - (B) Waste removed from the facility during the previous calendar year;
 - (C) Any planned or unplanned releases from an impoundment unit at the facility during the previous calendar year; and
 - (D) Documentation regarding all hazardous waste screening of the impoundments and random load screening documentation.
- 17.4.6 **Routine Monitoring:** All monitoring data shall be documented in the facility's operating record.
- 17.4.7 **Measurement Points:** Each measurement point for each impoundment shall be established, recorded in the operating record and continuously maintained in accordance with Section 17.2.2(C)(4).
- 17.4.8 **Fluid level measurement points** for each impoundment shall be maintained in the facility operating record.
- 17.4.9 **Mass Balance:** Documentation of monthly total volume monitoring conducted to check for leakage shall become part of the facility's operating record.
- 17.4.10 **Waste Characterization:** Waste characterization results indicating excursions from the facility's approved plans, such as inadvertent receipt of unapproved wastes, shall trigger notification in writing to the Department and the local governing authority within seven (7) calendar days after receipt of such results by the owner or operator.
- 17.4.11 **Contingency:** Contingency notification and reporting shall be conducted as required in Section 17.3.3(L). Notification within twenty-four (24) hours to the Department and local governing authority and written notification within seven (7) calendar days of the incident outlining immediate (within 24 hours of any identified release) actions taken. The facility shall submit to the Department and the local governing authority a detailed written assessment of any situation requiring implementation of the facility's contingency plan within forty-five (45) calendar days of the occurrence.

17.4.12 Inspections

Records shall be maintained that fully document all inspections, damage, repairs and repair verifications to impoundments, the liners systems or ancillary equipment. Such documentation shall be inclusive of all requirements of Section 17.3.3(M). Written notification shall be provided to the Department and local governing authority within seven (7) calendar days after discovery of such liner damage or other event which affects the operation and environmental protectiveness of the facility.

17.5 CLOSURE

17.5.1: The owner or operator of an impoundment facility shall develop a closure plan, which meets the following minimum criteria:

17.5.1(A) The closure plan shall be prepared as part of the Engineering Design and Operations plan and shall describe the steps necessary to close the impoundment facility at any point during its active life. If at any time a facility ceases operation, including the discontinued receipt, treatment or processing of waste for more than thirty (30) calendar days, the owner or operator shall notify the Department and local governing authority and unless otherwise approved by the Department and the governing body, the owner or operator must begin implementation of its Closure Plan in accordance with the approved schedule required in 17.5.1(B)(1).

17.5.1(B) The closure plan, at a minimum, shall include the following information:

- (1) A schedule for implementing all activities associated with the closure process, with any change to this schedule requiring Department approval;
- (2) Provisions for removal of all equipment at the site;
- (3) Provisions for removing all liquid wastes from the impoundments;
- (4) Proposed plans and procedures for sampling and testing soil and groundwater at the site;
- (5) **Background Study:** Provisions for conducting a background constituent concentrations study prior to receipt of waste at the Facility or on a schedule approved by the Department. The Background Study must include, at a minimum, the following:
 - a. Sampling Plan;
 - b. Analysis Plan;

- c. Data Evaluation Plan;
- d. Recommendations;
- e. A description of anticipated post disposal land use; and
- f. A schedule for completing all activities necessary to satisfy implementation of the Background Study.

(6) **Closure Verification Study:** Provisions for sampling and analyses of residual materials following removal of all liquid wastes from the impoundments, such as sludge and soil, for potential hazardous characteristics. The soils and residual materials sampling and analyses results will be compared against appropriate protective remediation goals or levels established in the Background Study on a case-by-case basis for establishing acceptable residual levels as approved by the Department. The Closure Verification must include, at a minimum, the following:

- a. Sampling Plan;
- b. Analysis Plan;
- c. Data Evaluation Plan;
- d. Recommendations;
- e. A description of anticipated post disposal land use; and
- f. A schedule for completing all activities necessary to satisfy implementation of the Closure Verification Study.

(7) Provisions for final disposal of all soils, sludges, or other wastes that exceed the acceptable residual levels approved by the Department.

17.5.2 Owners or operators of all impoundment facilities shall submit a report to the Department within sixty (60) calendar days of completing final closure activities. The report shall summarize the volume of each waste stream disposed in each impoundment, and list the name, address and phone number of person(s) responsible for post closure control of the facility.

17.5.3 Discrete units of the impoundment facility may be closed independently of closure of the entire facility.

17.5.4 At least sixty (60) calendar days in advance of the proposed closure date, the owner or operator must notify the Department and the local governing authority and place signs of suitable size at the entrance to the site and facility.

17.5.5 The owner or operator of the facility must complete closure activities of the facility in accordance with the closure plan and within one hundred eighty (180) calendar days following the final receipt of waste. Extensions of the closure period may be granted by the Department if the owner or operator demonstrates that closure will take longer than one hundred eighty (180) calendar days and the owner/operator has taken and will continue to take all steps to prevent threats to human health and the environment.

17.5.6 Following closure of an impoundment facility, the owner or operator shall:

17.5.6(A) Record a notation on the deed to the facility property, or some other instrument that is normally examined during title search; and

17.5.6(B) Notify the Department and the local governing authority that a notation has been recorded on the deed and a copy has been placed in the operating record. The notation on the deed must in perpetuity notify any potential purchaser of the property that:

(1) The land has been used as an impoundment facility; and

(2) Its use may be restricted. The Department after consultation with the local governing authority may grant permission to remove the notation from the deed if all wastes and residual contamination are removed from the facility.

17.5.7 A closure certification report is required to be submitted within sixty (60) calendar days of completion of closure activities which documents all the requirements and conditions of the closure plan have been achieved. The Report must be signed and sealed by a Colorado registered professional engineer and is subject to review and approval by the Department.

17.6 POST-CLOSURE CARE AND MAINTENANCE

17.6.1 Following closure of the impoundment facility the owner or operator must conduct post-closure care, which shall consist of at least the following:

(A) Provisions to prevent nuisance conditions;

(B) Maintaining the integrity and effectiveness of the final cover, should waste be closed in place, including making repairs to the cover and replanting vegetation as necessary;

- (C) Monitoring ground water in accordance with the requirements of Section 2.2 and maintaining the groundwater monitoring system, if applicable;
- (D) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period; and
- (E) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the function of the monitoring systems unless reviewed and approved by the Department.

17.6.2 Following completion of the post-closure care period the owner or operator must submit a certification signed by an independent Colorado registered professional engineer for approval by the Department and the local governing body having jurisdiction, verifying that post-closure care has been completed in accordance with the post-closure plan and has been placed in the operating record.

17.6.3 Post-closure care must be conducted for a minimum of thirty (30) years. The length of the post-closure care period may be:

- (A) Decreased by the Department after consultation with the local governing authority if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment; or
- (B) Increased by the Department after consultation with the local governing authority if it is determined that the lengthened period is necessary to protect human health and the environment.

SECTION 18

WASTE GREASE TRANSPORTERS, FACILITIES, AND PERSONAL USERS OF WASTE GREASE

- 18.1 Scope and Applicability
- 18.2 General Provisions
- 18.3 Standards for Waste Grease Transporters
- 18.4 Standards for Waste Grease Facilities
- 18.5 Standards for Personal Use of Waste Grease Other than For Use as Biofuel
- 18.6 Standards for Personal Use of Waste Grease as Biofuel

SECTION 18.1- SCOPE and APPLICABILITY

The transport, storage, processing and disposal of waste grease must be done in accordance with this Section 18 of the Regulations and may also be subject to other requirements of these Regulations including, but not limited to, Sections 1, 7 and 8.

18.1.1 WASTE GREASE TRANSPORTERS

Sections 18.2 and 18.3 apply to any person transporting trap grease including commercial freight carriers under contract with a waste grease transporter.

18.1.2 WASTE GREASE FACILITIES

Sections 18.2 and 18.4 apply to all facilities, unless otherwise exempted, that collect, store, process, or dispose of trap grease in any manner.

18.1.3 PERSONAL USE OF WASTE GREASE OTHER THAN FOR USE AS BIOFUEL

Sections 18.2 and 18.5 apply to any person collecting, transporting, using, or storing waste grease for personal use other than for use as biofuel.

18.1.4 PERSONAL USE OF WASTE GREASE AS BIOFUEL

Sections 18.2 and 18.6 apply to any person collecting, transporting, using, or storing waste grease for personal use as biofuel.

18.1.5 AUTHORITY

These rules are adopted pursuant to Section 30-20-123 (9)(a), C.R.S.

18.1.6 EXEMPTIONS

This Section 18 does not apply to:

- (A) A domestic wastewater treatment works, as defined in Section 25-8-103, C.R.S., that processes waste grease as part of its operations that are regulated by the Department pursuant to Article 8 of Title 25, C.R.S.

- (B) Any person who is not engaged in the business of collecting, transporting, or disposing of waste grease or to any person who unknowingly collects, transports, or disposes of waste grease. If a solid waste hauler discovers waste grease in a quantity regulated by the Department, the solid waste hauler must notify the Department immediately. The Department will determine if the solid waste hauler has to register in order to collect, transport, or dispose of the waste grease.
- (C) A person who only travels through the state with waste grease as part of interstate commerce and does not collect, deposit, transfer, store or dispose of any waste grease within this state.
- (D) A person who transports products made from waste grease for sale or other distribution.
- (E) [RESERVED]
- (F) [RESERVED]
- (G) Response activities performed or approved by the governing body having jurisdiction. However, waste grease collected from a response activity must ultimately be transported to a registered waste grease facility or a domestic wastewater treatment plant.
- (H) The collection, processing or storage of waste grease in a grease trap, grease interceptor, waste grease bin/barrel or similar grease removal device at the point of waste grease generation.

SECTION 18.2 - GENERAL PROVISIONS

18.2.1 COMPLIANCE WITH OTHER LAWS

Waste Grease Facilities, Waste Grease Transporters, Personal Users of Waste Grease Other than For Use as Biofuel, and Personal Users of Waste Grease as Biofuel must comply with all local, state, and federal laws, regulations, ordinances, and other requirements.

18.2.2 OPERATIONS COVERED BY MULTIPLE PARTS OF THIS SECTION 18

Waste Grease Facilities, Waste Grease Transporters, Personal Users of Waste Grease Other than For Use as Biofuel, and Personal Users of Waste Grease as Biofuel may perform activities at their facilities that are regulated by multiple parts of this Section 18. If so, these entities must register accordingly and comply with the requirements of all applicable parts of these regulations.

18.2.3 WASTE GREASE SOURCES AND GENERATORS

A person who arranges for transportation or disposal of waste grease must only contract with, engage, employ, or use a person who is registered as a Waste Grease Transporter, is a Personal User of Waste Grease as Biofuel who uses waste grease for personal use as biofuel as defined in part 18.6 of this Section, or is registered as a Personal User of Waste Grease Other than For Use as Biofuel who uses waste grease for personal use other than for biofuel as defined in part 18.5 of this Section.

SECTION 18.3 - STANDARDS FOR WASTE GREASE TRANSPORTERS

18.3.1 GENERAL

This Section 18.3 applies to any person transporting waste grease including commercial freight carriers under contract with a waste grease transporter.

(A) A person may only transport waste grease to the following types of facilities, sites and users in Colorado:

1. A registered waste grease facility;

2. A domestic wastewater treatment works, as defined in Section 25-8-103 C.R.S., that processes waste grease as part of its operations that are regulated by the Department pursuant to Article 8 of Title 25, C.R.S.;
 3. To their own facility pursuant to Section 18.3.8 of these Regulations.
- (B) A person registered as a Waste Grease Transporter pursuant to Section 18.3.2 of these Regulations may collect waste grease from a generator/source of waste grease who is not registered as a Waste Grease Facility only if the Waste Grease Transporter creates a manifest for the load of waste grease pursuant to Section 18.3.4 of these Regulations, and ensures delivery of the waste grease only to a facility listed in Section 18.3.1(A) above.
- (C) All Waste Grease Transporters shall collect litter in and around any area used to store waste grease at their facility in order to avoid a fire hazard or a nuisance and control the growth of vegetation to minimize potential fuel sources.
- (D) Waste Grease Transporters shall ensure that all grease, greasy liquid, water and solids from each grease trap or grease interceptor is removed during each time of removal.

18.3.2 REGISTRATION FOR WASTE GREASE TRANSPORT

- (A) No person shall transport a load of more than 55 gallons of waste grease at one time unless he/she has registered with the Department by submitting an application for Waste Grease Certificate of Registration as a Colorado Waste Grease Transporter (Form WG-1) to the Hazardous Materials and Waste Management Division of the Department and received a Waste Grease Certificate of Registration from the Department.
- (B) An application for a Waste Grease Certificate of Registration as a Waste Grease Transporter shall be submitted on Form WG-1, available by contacting the Department or at the Department's website. The application shall be delivered to the Department and shall include, at a minimum, the following information:

- (1) The business name of the Waste Grease Transporter and any other names under which the Waste Grease Transporter may do business;
 - (2) The principal business address of the Waste Grease Transporter and any other address where the Waste Grease Transporter shall conduct commercial transportation of waste grease for storage or disposal activities in this state;
 - (3) A business telephone number(s);
 - (4) The name and address of the principal officer of a corporate Waste Grease Transporter or the owner(s) of a Waste Grease Transporter operating a proprietorship or partnership;
 - (5) The original signature and date of signature of the Waste Grease Transporter applicant;
 - (6) The number of vehicles the Waste Grease Transporter uses to transport waste grease in Colorado;
 - (7) A vehicle description sheet which lists each vehicle the Waste Grease Transporter will use to transport waste grease, and includes, as appropriate, the following information for each vehicle: the size/capacity of the tank used to hold waste grease, the license plate number, the state in which the vehicle is registered, the Vehicle Identification Number ("VIN") or other unique vehicle identifier, the make/model and year, and the registered owner; and
 - (8) Evidence that a surety bond or other debt instrument or method of financial assurance has been posted in accordance with Section 18.3.5 of these Regulations.
- (C) The Department shall issue an initial Waste Grease Certificate of Registration and corresponding vehicle decals to a waste grease transporter if the waste grease transporter has submitted an application to the Department containing all information required in Section 18.3.2(B) above. The Department shall issue subsequent Waste Grease Certificate of Registrations and corresponding vehicle decals in following years to a waste grease transporter if the waste grease transporter has submitted an application to the Department containing all information required in Section 18.3.2(B) above and has submitted the annual report required by Section 18.3.6 below.

- (D) The Waste Grease Certificate of Registration for a Waste Grease Transporter shall be valid from the date of issuance to July 15 of the following year.
- (E) A Waste Grease Transporter is not authorized to transport waste grease after the July 15 expiration date unless the Waste Grease Transporter has submitted a complete application to the Department to renew the Waste Grease Certificate of Registration as a Waste Grease Transporter pursuant to this section.
- (F) All Waste Grease Transporters who continue transporting waste grease shall submit an application for renewal no later than June 1 of each year.
- (G) A legible copy of the Waste Grease Certificate of Registration shall be maintained and made available for inspection at the Waste Grease Transporter's principal place of business and in each vehicle used by the Waste Grease Transporter for transporting waste grease in Colorado.
- (H) A Waste Grease Certificate of Registration is not transferable by the Waste Grease Transporter to whom it was issued to any other person or entity.
- (I) The Department may revoke a Waste Grease Transporter's Certificate of Registration for failure to comply with the Act and the Regulations.

18.3.3 WASTE GREASE TRANSPORTER DECALS

- (A) No person shall transport a load of more than 55 gallons of waste grease at one time in Colorado without having received a Waste Grease Transporter vehicle decal(s). An application for a Waste Grease Certificate of Registration submitted pursuant to Section 18.3.2 above shall also serve as the application for a Waste Grease Transporter's vehicle decal(s).
- (B) Waste Grease Transporters will receive decals for each vehicle from the Department along with their Waste Grease Certificate of Registration.
- (C) Each Waste Grease Transporter vehicle decal shall be valid until July 15 of the following year and will have a unique number.

- (D) A Waste Grease Transporter vehicle decal must be affixed to the lower left hand corner of the windshield of each vehicle the Waste Grease Transporter uses to transport waste grease, or in some other manner so the decal is visible on vehicles that do not have a windshield.
- (E) A Waste Grease Transporter vehicle decal is not transferable by the Waste Grease Transporter to whom it was issued to any other person or entity and shall not be used for any vehicle not listed by the Registered Waste Grease Transporter on its application for a Waste Grease Certificate of Registration as a Waste Grease Transporter.
- (F) Commercial freight carriers must obtain a temporary decal from the registered Waste Grease Transporter who contracts with them. A registered Waste Grease Transporter can apply for a set of five (5) temporary Waste Grease Transporter decals at the time of registration, or as needed, to be used only for commercial freight carriers. Such decals must include the original registration number, and the word "TEMP-1" up to "TEMP-5." The temporary decals must be displayed on the lower left hand side of the windshield at all times when the vehicle is under contract for waste grease transportation. Upon termination of contract, temporary decal(s) must be returned within twenty-four (24) hours to the registered Waste Grease Transporter. Commercial freight carriers must comply with Sections 18.3.1, 18.3.4, and 18.3.8.

18.3.4 MANIFEST REQUIREMENTS

- (A) No Waste Grease Transporter may accept waste grease without properly completing a manifest pursuant to Section 18.3.4 of these Regulations.
- (B) Paper or electronic copies of manifests for all shipments of waste grease accepted by a Waste Grease Transporter shall be maintained on-site at the Waste Grease Transporter's place of business and available for inspection for three (3) years from the date of delivery.
- (C) A person transporting a load of more than 55 gallons of waste grease at one time must use the Uniform Waste Grease Manifest form WG-2, available by contacting the Department or at the Department's website.

Each manifest will have a unique number that will be provided by the Waste Grease Transporter.

- (D) The Uniform Waste Grease Manifest must be filled out and contain the following information:
 - (1) The name, address, telephone number, and facility registration number, if applicable, of the generator(s) or source(s) of the waste grease in the load;
 - (2) The amount in gallons of waste grease in the load picked up by the waste grease transporter at each generator or source;
 - (3) The name, address, telephone number and Waste Grease Certificate of Registration number of the Waste Grease Transporter and the Waste Grease Transporter vehicle decal number of the vehicle used to transport the waste grease;
 - (4) The date(s) of transport;
 - (5) The name, address, telephone number and Waste Grease Certificate of Registration number and Waste Grease Facility decal number of the registered destination facility, if applicable, to which the waste grease will be delivered; and
 - (6) The signatures, under penalty of perjury, of the Waste Grease Transporter and the secondary Waste Grease Transporter (if any).
- (E) A person transporting a load of more than 55 gallons of waste grease at one time must do the following:
 - (1) Carry the Uniform Waste Grease Manifest of each load in the vehicle while transporting the waste grease described on the Manifest;
 - (2) Provide a completed copy of the Uniform Waste Grease Manifest for each load to the applicable waste grease generator/source of waste grease within thirty (30) days of delivery to the destination facility;
 - (3) Provide a completed copy of the Uniform Waste Grease Manifest for each load to the registered Waste Grease Facility within one business day of delivery; and

- (4) Make a copy of any Uniform Waste Grease Manifest available to the Department upon request.

18.3.5 FINANCIAL ASSURANCE

A person transporting a load of more than 55 gallons of waste grease at one time must acquire and maintain financial assurance in the amount of \$10,000 for the cleanup and proper disposal of waste grease in accordance with Section 1.8 of these Regulations.

18.3.6 ANNUAL REPORT

A person who transports a load of more than 55 gallons of waste grease at one time must submit an annual report to the Department on the Waste Grease Transporter Annual Report Form (Form WG-3). This form may be obtained by contacting the Department or is available at the Department's website.

- (A) The report shall account for the amount of waste grease transported by the person during the previous calendar year (beginning January 1 and ending December 31). Waste grease quantities shall be reported in gallons.
- (B) The annual report must be delivered to the Department by February 1 of each year and must include the following:
 - (1) The total number of waste grease pickups and the total amount of waste grease collected by the waste grease transporter from within Colorado for the applicable reporting period;
 - (2) The total amount of waste grease that is brought to Colorado locations by the waste grease transporter from out-of-state sources during the applicable reporting period;
 - (3) The total amount of waste grease that is taken from Colorado locations by the waste grease transporter to out-of-state destinations during the applicable reporting period;
 - (4) The total number of waste grease drop-offs and the final disposition of the total amount of waste grease collected during the applicable reporting period by listing each waste grease facility and the total quantities of waste grease that the waste grease transporter has delivered to each waste grease facility and/or domestic wastewater treatment works; and

- (5) Documentation that the financial assurance is current.

18.3.7 ANNUAL REGISTRATION FEE

A Waste Grease Transporter shall pay an annual registration fee pursuant to Section 1.7.5 of these Regulations.

18.3.8 WASTE GREASE TRANSPORTER STORAGE REQUIREMENTS

Notwithstanding the requirements of Section 18.2.2. of these Regulations and the definition of "Waste Grease Facility" in Section 1.2, a Waste Grease Transporter may store waste grease in the initial vehicle used for collecting the waste grease or in a vehicle used for off-site transport from the Waste Grease Transporter's facility, for up to 21 days without becoming a Waste Grease Facility.

18.4 - STANDARDS FOR WASTE GREASE FACILITIES

18.4.1 GENERAL

This Section 18.4 applies to all waste grease facilities that collect, store, process, or dispose of waste grease pursuant to Sections 30-20-113, C.R.S. or 30-20-123, C.R.S., except as exempted in 18.1.6 of these Regulations. In addition to the requirements imposed by this Section 18.4, Waste Grease Facilities that process or end-use grease are subject to the recycling requirements of Section 8 of these Regulations.

18.4.2 WASTE GREASE FACILITY REGISTRATON REQUIREMENTS

- (A) No person shall operate a Waste Grease Facility without having received Waste Grease Certificate of Registration from the Department.
- (B) An application for a Waste Grease Certificate of Registration as a Waste Grease Facility shall be submitted on Form WG-1, available by contacting the Department or at the Department's website. The application shall be delivered to the Department and shall include, at a minimum, the following information:
 - (1) The business name of the Waste Grease Facility and any other names under which the Waste Grease Facility may do business;
 - (2) The principal business address of the Waste Grease Facility;

- (3) A business telephone number(s);
 - (4) The name and address of the principal officer of a corporate Waste Grease Facility or the owner(s) of a Waste Grease Facility operating a proprietorship or partnership;
 - (5) The original signature and date of signature of the Waste Grease Facility applicant;
 - (6) Evidence that financial assurance has been posted in accordance with Section 18.4.7 of these Regulations.
- (C) The Department shall issue a Waste Grease Certificate of Registration and corresponding facility decal to a person if the person has submitted an application to the Department containing all information required in Section 18.4.2(B) above and has submitted the annual report required by Section 18.4.8 of these Regulations.
- (D) The Waste Grease Certificate of Registration for a Waste Grease Facility shall be valid from the date of issuance to July 15 of the following year.
- (E) A Waste Grease Facility is not authorized to accept, collect, store, process, or dispose of waste grease after the July 15 expiration date unless the Waste Grease Facility has submitted a complete application to the Department to renew the Waste Grease Certificate of Registration as a Waste Grease Facility pursuant to this section.
- (F) All Waste Grease Facilities who continue accepting, collecting, storing, processing, or disposing of waste grease shall submit an application for renewal no later than June 1 of each year.
- (G) A legible copy of the Waste Grease Certificate of Registration shall be maintained and made available for inspection at the Waste Grease Facility.
- (H) A Waste Grease Certificate of Registration is not transferable by the Waste Grease Facility to whom it was issued to any other person or entity.
- (I) The Department may revoke a Waste Grease Certificate of Registration for failure to comply with the Act and the Regulations.

18.4.3 WASTE GREASE FACILITY DECALS

- (A) An application for a Waste Grease Certificate of Registration submitted pursuant to Section 18.4.2 above shall also serve as the application for a Waste Grease Facility decal.
- (B) Waste Grease Facilities will receive a Waste Grease Facility decal from the Department along with their Waste Grease Certificate of Registration.
- (C) Waste Grease Facility decals shall be valid until July 15 of the following year and will have a unique number that will be assigned by the Department. Prior to the expiration date, a Waste Grease Facility must submit a new application for a Waste Grease Certificate of Registration pursuant to Section 18.4.2 above.
- (D) A Waste Grease Facility must post or affix their Waste Grease Facility decal to a prominent location at the address used to store/accumulate waste grease.
- (E) A Waste Grease Facility decal is not transferable by the Waste Grease Facility to whom it was issued to any other person or entity.

18.4.4 MANIFEST REQUIREMENTS

- (A) No Waste Grease Facility may accept a shipment of waste grease from a Waste Grease Transporter without an accompanying manifest properly completed pursuant to Section 18.3.4 of these Regulations.
- (B) Paper or electronic copies of manifests for all shipments of waste grease accepted by a registered Waste Grease Facility shall be maintained on-site at the facility and available for inspection for three (3) years from the date of delivery.
- (C) No Waste Grease Facility may offer a shipment of waste grease without an accompanying manifest properly completed by the Waste Grease Transporter pursuant to Section 18.3.4 of these Regulations.

- (D) Manifests for all shipments of waste grease offered by the Waste Grease Facility shall be maintained on-site at the facility and available for inspection for three (3) years from the date of pick-up.

18.4.5 STANDARDS FOR WASTE GREASE FACILITIES

- (A) All Waste Grease Facilities shall maintain all-weather access roads to those areas of the facility where waste grease is stored.
- (B) All Waste Grease Facilities shall collect litter in and around any area used to store waste grease in order to avoid a fire hazard or a nuisance and control the growth of vegetation to minimize potential fuel sources.
- (C) The operator shall maintain a working telephone at each Waste Grease Facility.
- (D) All Waste Grease Facilities shall control public access, prevent unauthorized access, provide for site security both during and after hours, and prevent illegal dumping or theft of waste grease.
- (E) Prominent signs in English and any other language predominant in the area surrounding the facility shall be posted in public view at the entrance to each Waste Grease Facility with the name of the facility, the hours the facility is open for public use, a listing of the wastes accepted at the facility, and a phone number for a 24-hour emergency contact.
- (F) **Contingency Plan:** All Waste Grease Facilities shall develop and maintain a contingency plan to be implemented when there is any planned or unplanned release of waste grease.
 - (1) The contingency plan must contain provisions for assessing the full nature and extent of release to delineate the impact to soil, groundwater or surface water, for remedying such impact, and for returning the waste grease facility to compliance. If a waste grease facility has an approved Spill Prevention Control and Countermeasures (SPCC) Plan, then the Department will accept a modified SPCC Plan that also incorporates the additional requirements as specified in these Solid Waste Regulations. If the facility does not have an approved SPCC Plan, then the

Contingency Plan must include all of the provisions identified in this Section 18 of the Solid Waste Regulations.

- (2) The owner or operator shall notify the Department and the local governing authority within twenty-four (24) hours of any identified release from a waste grease facility or ancillary equipment or any incident requiring implementation of the Contingency Plan. Within two (2) weeks of the incident, the owner or operator shall provide written notification to the Department outlining actions taken.
 - (3) Within forty-five (45) calendar days of any identified release from a waste grease facility or ancillary equipment or any incident requiring implementation of the Contingency Plan, the owner or operator shall submit a detailed, written assessment of the impact of the release, repair completion and verification, and the need for additional monitoring and proposed corrective action to the Department and local governing authority. Repairs affecting an engineered feature at the facility must be certified by a registered professional engineer (P.E.), in accordance with these Regulations.
- (G) Waste Grease Facilities shall arrange for the commercial transport of waste grease only with a waste grease transporter who is currently registered pursuant to section 18.3.2 of these Regulations
 - (H) Waste Grease Facilities that process waste grease must annually process 100% of the three-year rolling average annual amount, in gallons, of waste grease that the Waste Grease Facility accepted during the previous three years.
 - (I) Waste Grease Facilities that convert waste grease into an end product must annually convert 100% of the three-year rolling average annual amount, in gallons, of waste grease that the Waste Grease Facility accepted during the previous three years.
 - (J) Waste Grease Facilities that do not process waste grease or do not convert waste grease into an end product must either comply with Section 7 of these Regulations or obtain a Certificate of Designation, as appropriate.

18.4.6 CLOSURE OF WASTE GREASE FACILITIES

(A) All Waste Grease Facilities shall be closed and maintained in accordance with Sections 2.5, 2.6, and 18.4 of these Regulations.

(B) **Closure Plan Requirements for Waste Grease Facilities.**

A closure plan shall be prepared as part of an Engineering Design and Operations Plan and shall describe the steps necessary to close the Waste Grease Facility at any point during its active life and at the end of the facility's active life. The facility shall remove all solid waste and residual contamination to meet unrestricted use concentrations. The closure plan, at a minimum, shall include provisions for removal of all solid waste at the site, including:

- (1) Proposed plans and procedures for sampling and testing soil based on visual identification of staining or other indications of residual contamination;
- (2) Provisions for sampling and analyses of soil for potential hazardous characteristics and provisions for final disposal. Soils will need to meet unrestricted use concentrations or background levels whichever is greater; and
- (3) A schedule for completing all activities necessary to satisfy the closure criteria of this section.

(C) At least sixty (60) days in advance of the proposed closure date, the owner or operator must notify the Department and the local governing authority and place signs of suitable size at the entrance to the site and facility.

(D) The owner or operator of the facility must complete closure activities of the facility in accordance with the closure plan and within one hundred eighty (180) calendar days following the final receipt of waste grease. Extensions of the closure period may be granted by the Department if the owner or operator demonstrates that closure will take longer than one hundred eighty (180) calendar days and the owner/operator has taken and will

continue to take all steps necessary to prevent threats to human health and the environment.

- (E) Owners or operators of all Waste Grease Facilities shall submit a Closure Certification Report to the Department within sixty calendar days of completion of closure activities. The Closure Certification Report shall document that all the requirements and conditions of the closure plan have been achieved, including any analytical results, needed to support the unrestricted use condition of the facility. The report must be signed and sealed by Colorado registered professional engineer and is subject to review and approval by the Department.

18.4.7 FINANCIAL ASSURANCE

All Waste Grease Facilities must acquire and maintain financial assurance for any required reclamation and for closure of the Facility in accordance with Section 1.8 of these Regulations.

18.4.8 ANNUAL REPORT

All Waste Grease Facilities must submit an annual report to the Department on the Waste Grease Facility Annual Report Form (Form WG-4). This form may be obtained by contacting the Department or is available at the Department's website.

- (A) The report shall account for the amount of waste grease collected, stored, processed, and/or disposed of by the facility during the previous calendar year (beginning January 1 and ending December 31). Waste grease quantities shall be reported exclusively in gallons.
- (B) The annual report must be delivered to the Department, by February 1 of each year and must include the following:
 - (1) The number of loads and amount of waste grease the facility collected, stored, processed, and/or disposed of for the applicable reporting period;
 - (2) The number of loads and amount of waste grease the facility shipped off-site for the applicable reporting period.
 - (3) Documentation that the financial assurance is paid and current.

18.4.9 ANNUAL REGISTRATION FEE

A Waste Grease Facility shall pay an annual registration fee pursuant to Section 1.7.5 of these Regulations.

18.5 - STANDARDS FOR PERSONAL USE OF WASTE GREASE OTHER THAN FOR USE AS BIOFUEL

18.5.1 GENERAL

This Section 18.5 applies to a person collecting or transporting waste grease for personal use other than for use as biofuel pursuant to Sections 30-20-113, C.R.S. or 30-20-123, C.R.S., except as exempted in Section 18.1.6 of these Regulations.

18.5.2 PERSONAL USE OF WASTE GREASE OTHER THAN FOR USE AS BIOFUEL REGISTRATON REQUIREMENTS

- (A) No person shall collect or transport waste grease for personal use, other than for use as biofuel, without having received Waste Grease Certificate of Registration from the Department.
- (B) An application for a Waste Grease Certificate of Registration as a Personal User of Waste Grease Other than For Use as Biofuel shall be submitted on Form WG-1, available by contacting the Department or at the Department's website. The application shall be delivered to the Department and shall include, at a minimum, the following information:
 - (1) The name of the Personal User of Waste Grease Other than For Use as Biofuel;
 - (2) The principal address of the Personal User of Waste Grease Other than For Use as Biofuel;
 - (3) A principal telephone number(s);
 - (4) The original signature and date of signature of the Personal User of Waste Grease Other than For Use as Biofuel;
 - (5) A vehicle description sheet which lists each vehicle the Personal User of Waste Grease Other than For Use as Biofuel will use to transport waste grease, and includes the following information for each vehicle: the license plate number, the state in which the

vehicle is registered, the Vehicle Identification Number (“VIN”), the make/model and year, and the registered owner; and

- (6) Evidence that an annual fee for each Personal User of Waste Grease Other than For Use as Biofuel has been posted in accordance with Section 18.5.4 of these Regulations.
- (C) The Department shall issue a Waste Grease Certificate of Registration to a person if the person has submitted an application to the Department containing all information required in Section 18.5.2 (B) above.
- (D) The Waste Grease Certificate of Registration for a Personal User of Waste Grease Other than For Use as Biofuel shall be valid from the date of issuance to July 15 of the following year.
- (E) A Personal User of Waste Grease Other than For Use as Biofuel is not authorized to accept, collect, store, process, or dispose of waste grease after the July 15 expiration date unless the Personal User of Waste Grease Other than Use as Biofuel has submitted a complete application to renew the Waste Grease Certificate of Registration as a Personal User of Waste Grease Other than Use as Biofuel from the Department.
- (F) A Personal User of Waste Grease Other than For Use as Biofuel who continues accepting, collecting, storing, processing, or disposing of waste grease shall submit an application for renewal no later than June 1 of each year.
- (G) A legible copy of the Waste Grease Certificate of Registration shall be maintained by the Personal User of Waste Grease Other than For Use as Biofuel and made available for inspection.
- (H) A Waste Grease Certificate of Registration is not transferable by the Personal User of Waste Grease Other than For Use as Biofuel to whom it was issued to any other person or entity.
- (I) The Department may revoke a Personal User of Waste Grease Other than For Use as Biofuel’s Certificate of Registration for failure to comply with the Act and the Regulations.

18.5.3 STANDARDS FOR PERSONAL USE OF WASTE GREASE OTHER THAN FOR USE AS BIOFUEL

All Personal Users of Waste Grease Other than For Use as Biofuel shall not barter, trade, or sell any portion of the waste grease to any person or take any waste grease from any container that is owned by a registrant unless written permission has been granted by the registrant.

- (A) All Personal Users of Waste Grease Other than For Use as Biofuel shall not transport more than 55 gallons of waste grease at a time.
- (B) All Personal Users of Waste Grease Other than For Use as Biofuel shall not store more than 165 gallons of waste grease at a time, which includes the quantity of waste grease being transported.

18.5.4 ANNUAL FEE

A Personal User of Waste Grease Other than For Use as Biofuel shall pay an annual registration fee pursuant to Section 1.7.5 of these Regulations.

18.6 STANDARDS FOR PERSONAL USE OF WASTE GREASE AS BIOFUEL

18.6.1 GENERAL

This Section 18.6 applies to a person collecting or transporting waste grease for personal use of the waste grease as biofuel pursuant to Sections 30-20-113, C.R.S. or 30-20-123, C.R.S., except as exempted in Section 18.1.6 of these Regulations.

18.6.2 STANDARDS FOR PERSONAL USE OF WASTE GREASE AS BIOFUEL

A personal user of waste grease as biofuel shall not barter, trade, or sell any portion of the waste grease to any other person or take any waste grease from any container that is owned by a registrant unless written permission has been granted by the registrant.

[RESERVED]

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Appendix A
FINANCIAL ASSURANCE INSTRUMENT LANGUAGE

WORDING OF THE INSTRUMENTS

I. (A) Trust Agreement

A trust agreement for a trust fund, in this section, must be worded as follows, except that instruction in brackets are to be replaced with the relevant information and the brackets deleted:

Trust Agreement

Trust Agreement, the "Agreement", entered into as of [date] by and between [name of the owner or operator], a [name of state][insert "corporation", "partnership", "association", or "proprietorship"], the "Grantor", and [name of corporate trustee], [insert "incorporated in the State of Colorado" or "a national bank"], the "Trustee."

Whereas, the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, a regulatory agency of the State of Colorado, has established certain regulations applicable to the Grantor, requiring that an owner or operator of a solid waste facility shall provide assurance that funds will be available when needed for closure and/or post-closure care of the facility,

Whereas, the Grantor has elected to establish a trust to provide all or a part of such financial assurance for the facilities identified herein,

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

Now, therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions as used in this Agreement:

(A) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(B) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

Section 2. Identification of Facilities and Cost Estimates This Agreement pertains to the facilities and cost estimates identified on attached Schedule A [on Schedule A, for each facility list the EPA identification number, name, address, and the current closure and/or post-closure cost estimates, and/or corrective action, or portions thereof, for which financial assurance is demonstrated by this Agreement].

Section 3. Establishment of Fund The grantor and the trustee hereby establish a trust fund, the "Fund", for the benefit of the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division. The grantor and the trustee intend that no third party have access to the fund except as herein provided. The fund is established initially as consisting of the property which is acceptable to the trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the trustee is referred to as the fund, together with all earnings and profits thereon, less any payments or distributions made by the trustee pursuant to this Agreement.

The fund shall be held by the trustee, IN TRUST, as hereinafter provided. The trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the grantor, any payments necessary to discharge any liabilities of the grantor established by the Department.

Section 4. Payment for Closure and Post-Closure Care

The trustee shall make payments from the fund as the Department shall direct, in writing, to provide for the payment of the costs of closure, and/or corrective action, and/or post-closure care of the facilities covered by this Agreement. The trustee shall reimburse the grantor or other persons as specified by the Department from the fund for closure and post-closure expenditures in such amount as the Department shall direct in writing. In addition, the trustee shall refund to the grantor such amounts as the Department specifies in writing. Upon refund, such funds shall no longer constitute part of the fund as defined herein.

Section 5. Payment Comprising the Fund Payments made to the trustee for the fund shall consist of cash or securities acceptable to the trustee.

Section 6. Trustee Management The trustee shall invest and reinvest the principal and income of the fund and keep the fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the grantor may communicate in writing to the trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the fund, the trustee shall discharge his duties with respect to the trust fund solely in the interest of the

beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(A) Securities or other obligations of the grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80A-2.(A), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(B) The trustee is authorized to invest the fund in time or demand deposits of the trustee, to the extent insured by an agency of the Federal or State government; and

(C) The trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment The trustee is expressly authorized in its discretion:

(A) To transfer from time to time any or all of the assets of the fund to any common, commingled, or collective trust fund created by the trustee in which the fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(B) To purchase shares in any investment company registered under the investment company act of 1940, 15 U.S.C. 80A-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the trustee. The trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee Without in any way limiting the powers and discretions conferred upon the trustee by the other provision of this Agreement or by law, the trustee is expressly authorized and empowered:

(A) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(B) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(C) To register any securities held in the fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the trustee shall at all times show that all such securities are part of the fund;

(D) To deposit any cash in the fund in interest-bearing accounts maintained or savings certificates issued by the trustee, in its separate corporate capacity, or in any other banking institution affiliated with the trustee, to the extent insured by an agency of the Federal or State government; and

(E) To compromise or otherwise adjust all claims in favor of or against the fund.

Section 9. Taxes and Expenses All taxes of any kind that may be assessed or levied against or in respect of the fund and all brokerage commissions incurred by the fund shall be paid from the fund. All other expenses incurred by the trustee in connection with the administration of this trust, including fees for legal services rendered to the trustee, the compensation of the trustee to the extent not paid directly by the grantor, and all other proper charges and disbursements of the trustee shall be paid from the fund.

Section 10. Annual Valuation The trustee shall annually, at least 30 days prior to the anniversary date of establishment of the fund, furnish to the grantor and to the Colorado Department of Public Health and Environment a statement confirming the value of the trust. Any securities in the fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the fund. The failure of the grantor to object in writing to the trustee within 90 days after the statement has been furnished to the grantor and the Department shall constitute a conclusively binding assent by the grantor, barring the grantor from asserting any claim or liability against the trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel The trustee may from time to time consult with counsel, who may be counsel to the grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation The trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the grantor.

Section 13. Successor Trustee The trustee may resign or the grantor may replace the trustee, but such resignation or replacement shall not be effective until the grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the trustee hereunder. Upon the successor trustee's acceptance of the appointment, the trustee shall assign, transfer and pay over to the successor trustee the funds and properties then constituting the fund. If for any reason the grantor cannot or does not act in the event of the resignation of the trustee, the trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes the administration of the trust in a writing sent to the grantor, the Department, and the present trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee All orders, requests, and instructions by the grantor to the trustee shall be in writing, signed by such persons as are designated in the attached Exhibit A or such other designees as the grantor may designate by amendment to Exhibit A. The trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the Department to the trustee shall be in writing, signed by the director or his designees, and the trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the grantor or Department hereunder has occurred. The trustee shall have no duty to act in the absence of such orders, requests, and instructions from the grantor and/or the Department, except as provided for herein.

Section 15. Notice of Nonpayment The trustee shall notify the grantor and the Department, by certified mail within 10 days following the expiration of the 30-days period after the anniversary of the establishment of the trust, if no payment is received from the grantor during that period. After the pay-in period is completed, the trustee shall not be required to send a notice of nonpayment.

Section 16. Amendment of Agreement This Agreement may be amended by an instrument in writing executed by the grantor, the trustee, and the Department, or by the trustee and the Department if the grantor ceases to exist.

Section 17. Irrevocability and Termination Subject to the right of the parties to amend this Agreement as provided in Section 16, this trust shall be irrevocable and shall continue until terminated at the written agreement of the grantor, the trustee and the Department, or by the trustee and the Department, if the grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the grantor.

Section 18. Immunity and Indemnification The trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the grantor or the Department issued in accordance with this Agreement. The trustee shall be indemnified and saved harmless by the grantor or from the trust fund, or both, from and against any personal liability to which the trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the grantor fails to provide such defense.

Section 19. Choice of Law This Agreement shall be administered, construed, and enforced according to the laws of the State of Colorado.

Section 20. Interpretation As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In witness whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals to be hereunto affixed and attested as of the date first above written: The parties below certify that the wording of this Agreement is identical to the wording specified in these regulations were constituted on the date first above written.

[Signature of grantor]

[Title]
[Seal]

Attest: [Signature of attestor]
[Title]

[Signature of trustee]
[Name of trustee]
[Title]
[Seal]

Attest: [Signature of attestor]
[Title]

(B) The following is an example of the certification of acknowledgment which must accompany the trust agreement for a trust fund as specified in of these regulations.

State of _____
County of _____

On this [date], before me personally came [owner or operator] to me known, who, being by me duly sworn, did depose and say that she/he resides at [address], that she/he is [title] of [corporation], the corporation described in and which executed the above instrument; that she/he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the board of directors of said corporation, and that she/he signed her/his name thereto by like order.

[Signature of notary public]

II. Standby Trust Agreement

(A) A trust agreement for a standby trust fund, in this section, must be worded as follows, except that instruction in brackets are to be replaced with the relevant information and the brackets deleted:

Standby Trust Agreement

Standby Trust Agreement, the "Agreement", entered into as of [date] by and between [name of the owner or operator], a [name of state] [insert "corporation", "partnership", "association", or "proprietorship"], the "Grantor", and [name of corporate Trustee], [insert "incorporated in the State of Colorado" or "a national bank"], the "Trustee."

Whereas, the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, a regulatory agency of the State of Colorado, has established certain regulations applicable to the Grantor, requiring that an owner or operator of a solid waste facility shall provide assurance that funds will be available when needed for closure and/or post-closure care of the facility,

Whereas, the Grantor has elected to establish a standby trust to provide all or a part of such financial assurance for the facilities identified herein,

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

Now, therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions as used in this Agreement:

(A) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(B) The term "Trustee" means the trustee who enters into this Agreement and any successor Trustee.

Section 2. Identification of Facilities and Cost Estimates This Agreement pertains to the facilities and cost estimates identified on attached Schedule A [on Schedule A, for each facility list the EPA identification number, name, address, and the

current closure and/or post-closure cost estimates, or portions thereof, for which financial assurance is demonstrated by this Agreement].

Section 3. Establishment of Fund The grantor and the trustee hereby establish a trust fund, the "Fund", for the benefit of the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division. The grantor and the trustee intend that no third party have access to the fund except as herein provided. The fund is established initially as consisting of the property which is acceptable to the trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the trustee is referred to as the fund, together with all earnings and profits thereon, less any payments or distributions made by the trustee pursuant to this Agreement. The fund shall be held by the trustee, IN TRUST, as hereinafter provided. The trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the grantor, any payments necessary to discharge any liabilities of the grantor established by the Department.

Section 4. Payment for Closure and Post-Closure Care

The trustee shall make payments from the fund as the Department shall direct, in writing, to provide for the payment of the costs of closure and/or post-closure care of the facilities covered by this Agreement. The trustee shall reimburse the grantor or other persons as specified by the Department from the fund for closure and post-closure expenditures in such amount as the Department shall direct in writing. In addition, the trustee shall refund to the grantor such amounts as the Department specifies in writing. Upon refund, such funds shall no longer constitute part of the fund as defined herein.

Section 5. Payment Comprising the Fund payments made to the trustee for the fund shall consist of cash or securities acceptable to the trustee.

Section 6. Trustee Management The trustee shall invest and reinvest the principal and income of the fund and keep the fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the grantor may communicate in writing to the trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the fund, the trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(A) Securities or other obligations of the grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80A-2.(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(B) The trustee is authorized to invest the fund in time or demand deposits of the trustee, to the extent insured by an agency of the Federal or State government; and

(C) The trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment The trustee is expressly authorized in its discretion:

(A) To transfer from time to time any or all of the assets of the fund to any common, commingled, or collective trust fund created by the trustee in which the fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(B) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80A-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the trustee. The trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee Without in any way limiting the powers and discretions conferred upon the trustee by the other provision of this Agreement or by law, the trustee is expressly authorized and empowered:

(A) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(B) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(C) To register any securities held in the fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the trustee shall at all times show that all such securities are part of the fund;

(D) To deposit any cash in the fund in interest-bearing accounts maintained or savings certificates issued by the trustee, in its separate corporate capacity, or in any other banking institution affiliated with the trustee, to the extent insured by an agency of the Federal or State government; and

(E) To compromise or otherwise adjust all claims in favor of or against the fund.

Section 9. Taxes and Expenses All taxes of any kind that may be assessed or levied against or in respect of the fund and all brokerage commissions incurred by the fund shall be paid from the fund. All other expenses incurred by the trustee in connection with the administration of this trust, including fees for legal services rendered to the trustee, the compensation of the trustee to the extent not paid directly by the grantor, and all other proper charges and disbursements of the trustee shall be paid from the fund.

Section 10. Advice of Counsel The trustee may from time to time consult with counsel, who may be counsel to the grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The trustee shall be fully protected, to the extent permitted by law, in acting upon the advise of counsel.

Section 11. Trustee Compensation The trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the grantor.

Section 12. Successor Trustee The trustee may resign or the grantor may replace the trustee, but such resignation or replacement shall not be effective until the grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as

those conferred upon the trustee hereunder. Upon the successor trustee's acceptance of the appointment, the trustee shall assign, transfer and pay over to the successor trustee the funds and properties then constituting the fund. If for any reason the grantor cannot or does not act in the event of the resignation of the trustee, the trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes the administration of the trust in a writing sent to the grantor, the Department, and the present trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 13. Instructions to the Trustee All orders, requests, and instructions by the grantor to the trustee shall be in writing, signed by such persons as are designated in the attached exhibit A or such other designees as the grantor may designate by amendment to Exhibit A. The trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the Department to the trustee shall be in writing, signed by the director or his designees, and the trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the grantor or department hereunder has occurred. The trustee shall have no duty to act in the absence of such orders, requests, and instructions from the grantor and/or the Department, except as provided for herein.

Section 14. Amendment of Agreement This Agreement may be amended by an instrument in writing executed by the grantor, the trustee, and the Department, or by the trustee and the Department if the grantor ceases to exist.

Section 15. Irrevocability and Termination Subject to the right of the parties to amend this Agreement as provided in Section 14, this trust shall be irrevocable and shall continue until terminated at the written agreement of the grantor, the trustee and the Department, or by the trustee and the Department, if the grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the grantor.

Section 16. Immunity and Indemnification The trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the grantor or

the Department issued in accordance with this Agreement. The trustee shall be indemnified and saved harmless by the grantor or from the trust fund, or both, from and against any personal liability to which the trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the grantor fails to provide such defense.

Section 17. Choice of Law This Agreement shall be administered, construed, and enforced according to the laws of the State of Colorado.

Section 18. Interpretation As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In witness whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals to be hereunto affixed and attested as of the date first above written: The parties below certify that the wording of this Agreement is identical to the wording specified in these regulations were constituted on the date first above written.

[Signature of grantor]
[Title]
[Seal]

Attest: [Signature of attestor]
[Title]

[Signature of trustee]
[Name of trustee]
[Title]
[Seal]

Attest: [Signature of attestor]
[Title]

(B) The following is an example of the certification of acknowledgment which must accompany the trust agreement for a trust fund as specified in of these regulations.

State of _____
County of _____

On this [date], before me personally came [owner or operator] to me known, who, being by me duly sworn, did depose and say that she/he resides at [address], that she/he is [title] of [corporation], the corporation described in and which executed the above instrument; that she/he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the board of directors of said corporation, and that she/he signed her/his name thereto by like order.

[Signature of notary public]

III. Irrevocable Standby Letter of Credit.

A letter of credit, specified in these regulations, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Irrevocable Standby Letter of Credit

Director
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Sir or Madam:

We hereby establish our irrevocable standby letter of credit no. _____ in your favor, at the request and for the account of [owner's or operator's name and address] up to the aggregate amount of [in words] U.S. Dollars \$_____, available upon presentation of:

(1) Your sight draft bearing reference to this letter of credit no. _____, and

(2) Your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of the Colorado Solid Wastes Disposal Sites and Facilities Act as amended."

This letter of credit is effective as of [date] and shall expire on [date at least 1 year later], but such expiration date shall be automatically extended for a period of [at least 1 year] on [date] and on each successive expiration date, unless, at least 120 days before the current expiration date, we notify both you and [owner's or operator's name] by certified mail that we have decided not to extend this letter of credit beyond the current expiration date. In the event you are so notified, any unused portion of the credit shall be available upon presentation of your sight draft, for 120 days after the date of receipt by both you and [owner's or operator's name], as shown on the signed return receipts.

Whenever this letter of credit is drawn on under and in compliance with the terms of this credit, we shall duly honor such draft upon presentation to us, and we shall deposit the specified amount of the draft directly into the standby trust fund of [owner's or operator's name], in accordance with your instructions, unless an alternate mechanism has been established by the State of Colorado to directly receive monies.

We certify that the wording of this letter of credit is identical to the wording specified as such regulations were constituted on the date shown immediately below.

[Signature(s) and title(s) of official(s) of issuing institution]
[date]

This credit is subject to [insert "the most recent edition of the Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce," or "the Uniform Commercial Code"].

IV. Surety Bond

A surety bond guaranteeing payment into a trust fund, as specified in these regulations, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

Financial Guarantee Bond

Date bond executed: _____

Effective date: _____

Principal:[legal name and business address of owner or operator]_____

Type of organization: [insert "individual", "joint venture", "partnership", or "corporation"]_____

State of incorporation: _____

Surety(ies):[name(s) and business address(es)]_____

EPA Identification Number, name, address, and closure and/or post-closure amount(s) for each facility guaranteed by this bond: [Indicate closure and/or post-closure and/or corrective action amount separately]_____

Total penal sum of bond: \$_____

Surety's bond number: _____

Know all persons by these presents, that we, the principal and surety(ies) hereto are firmly bound to the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the surety(ies) are corporations acting as co-sureties, we, the sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or action against any or all of us, and for all other purposes each surety binds itself, jointly and severally with the principal, for the payment of such sum only as is set forth

opposite the name of such surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

Whereas said principal is required, under the Colorado regulations pertaining to Solid Waste Disposal Sites and Facilities, to have a permit or interim status in order to own or operate each solid waste management facility identified above, and

Whereas said principal is required to provide financial assurance for closure, or closure and post-closure care, as a condition of the permit or interim status, and

Whereas said principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance, unless an alternate mechanism has been established by the State of Colorado to directly receive monies.

Now, therefore, the conditions of the obligation are such that if the principal shall faithfully, before the beginning of final closure of each facility identified above, fund the standby trust fund in the amount(s) identified above for the facility,

Or, if the principal shall fund the standby trust fund in such amount(s) within 15 days after an order to begin closure is issued by the Department or a U.S. District court or other court of competent jurisdiction,

Or, if the principal shall provide alternate financial assurance, as specified in these regulations and obtain the Department's written approval of such assurance, within 90 days after the date notice of cancellation is received by both the principal and the Department from the surety(ies), then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The surety(ies) shall become liable on this bond obligation only when the principal has failed to fulfill the conditions described above. Upon notification by the Department that the principal has failed to perform as guaranteed by this bond, the surety(ies) shall place funds in the amount guaranteed for the facility(ies) into the standby trust fund as directed by the Department.

The liability of the surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the surety(ies) hereunder exceed the amount of said penal sum.

The surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the principal and to the Department, provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by both the principal and the Department, as evidenced by the return receipts.

The principal may terminate this bond by sending written notice to the surety(ies), provided, however, that no such notice shall become effective until the surety(ies) receive(s) written authorization for termination of the bond by the Department.

[The following paragraph is an optional rider that may be included but is not required:]

The principal and surety(ies) hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new closure and/or post-closure amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the Department.

In witness whereof, the principal and surety(ies) have executed this financial guarantee bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the principal and surety(ies) and that the wording of this surety bond is identical to the wording specified in the applicable regulations were constituted on the date this bond was executed.

Principal

[Signature(s)]

[Name(s)]

[Title(s)]

Corporate seal]

Corporate Surety(ies)

[Name and address]

State of incorporation:

Liability limit: \$

[Signature(s)]

[Name(s) and title(s)]

[Corporate seal]

[For every co-surety, provide signature(s), Corporate seal, and other information in the same manner as for surety above.]

Bond premium: \$

V. Performance Bond

A surety bond guaranteeing performance of closure and/or post-closure care, or corrective action as specified, must be worded as follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Performance Bond

Date bond executed: _____

Effective date: _____

Principal:[legal name and business address of owner or operator]_____

Type of organization: [insert "individual", "joint venture", "Partnership", or "corporation"]_____

State of incorporation: _____

Surety(ies):[Name(s) and business address(es)]_____

EPA Identification Number, name, address, and closure and/or post-closure amount(s) for each facility guaranteed by this bond (indicate closure and post-closure amounts separately): _____

Total penal sum of bond: \$_____

Surety's bond number: _____

Know all persons by these presents, that we, the principal and surety(ies) hereto are firmly bound to the Colorado Department of Public Health and Environment (hereinafter referred to as the Department), in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators successors, and assigns jointly and severally; provide that, where the surety(ies)

are corporations acting as co-sureties, we, the sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each surety binds itself, jointly and severally with the principal, for the payment of such sum only as is set forth opposite the name of such surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

Whereas said principal is required, under the Colorado Solid Wastes Disposal Sites and Facilities Act as amended, to have a permit in order to own or operate each solid waste management facility identified above, and

Whereas said principal is required to provide financial assurance for closure, or closure and post-closure care, as a condition of the permit, and Whereas said principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance, unless an alternate mechanism has been established by the State of Colorado to directly receive monies;

Now, therefore, the conditions of this obligation are such that if the principal shall faithfully perform closure, whenever required to do so, of each facility for which this bond guarantees closure, in accordance with the closure plan and other requirements of the permit as such plan and permit may be amended, pursuant to all applicable laws, statutes, rules, and regulations, as such laws, statutes, rules, and regulations may be amended.

And, if the principal shall faithfully perform post-closure care of each facility for which this bond guarantees post-closure care, in accordance with the post-closure plan and other requirements of the permit, as such plan and permit may be amended, pursuant to all applicable laws, statutes, rules, and regulations, as such laws, statutes, rules, and regulations may be amended.

Or, if the principal shall provide alternate financial assurance as specified in these regulations, and obtain the Department's written approval of such assurance, within 90 days after the date notice of cancellation is received by both the principal and the Department from the surety(ies), then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The surety(ies) shall be come liable on this bond obligation only when the principal has failed to fulfill the conditions described above.

Upon notification by the Department that the principal has been found in violation of the closure requirements of these regulations, for a facility for which

this bond guarantees performances of closure, the surety(ies) shall either perform closure in accordance with the closure plan and other permit requirements or place the closure amount guaranteed for the facility into the standby trust fund as directed by the Department.

Upon notification by the Department that the principal has failed to provide alternate financial assurance as specified in these regulations, and obtain written approval of such assurance from the Department during the 90 days following receipt by both the principal and the Department of a notice of cancellation of the bond, the surety(ies) shall place funds in the amount guaranteed for the facility(ies) into the standby trust fund as directed by the Department.

The surety(ies) hereby waive(s) notification of amendments to closure plans, permits, applicable laws, statutes, rules, and regulations and agrees that no such amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the surety(ies) hereunder exceed the amount of said penal sum.

The surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the owner or operator and to the Department provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by both the principal and the Department, as evidenced by the return receipts.

The principal may terminate this bond by sending written notice to the surety(ies), provided, however, that no such notice shall become effective until the surety(ies) receive(s) written authorization for termination of the bond by the Department.

[The following paragraph is an optional rider that may be included but is not required.]

Principal and surety(ies) hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new closure and/or post-closure amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the Department.

In witness whereof, the principal and surety(ies) have executed this performance bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the principal and surety(ies) and that the wording of this surety bond is identical to the wording specified in the applicable regulations.

Principal

[Signature(s)]

[Name(s)]

[Title(s)]

[Corporate seal]

Corporate Surety(ies)

[Name and address]

State of incorporation:

Liability limit: \$

[Signature(s)]

[Name(s) and title(s)]

[Corporate seal]

[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for surety above.]

Bond premium: \$

VI. Insurance

- (1) The standard insurance industry certificate of insurance form (ACORD form), as prescribed by the Colorado Insurance Commission, shall be used to evidence closure and/or post-closure care and/or corrective action coverage. The following information is to be included in the certificate of insurance:
 - (A) Name, address, and telephone number of agency; and the underwriter
 - (B) Name and EPA I.D. Number if applicable of facility being covered (if list is too long additional pages may be attached).
 - (C) Indication of type of coverage (closure, post-closure and/or corrective action).

(D) Amount of coverage (closure, post-closure and/or corrective action).

(E) A statement of certification, in the comment section, worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

"This certificate certifies that the policy to which this certificate applies, provides [insert and/or closure and/or post-closure care or corrective action coverage] in connection with the insured's obligation to demonstrate financial responsibility under Section 1.8.9 of the regulations pertaining to Solid Waste Disposal Sites and Facilities 6 CCR 1007-2, as amended.

(F) Authorized company representatives' signature

- (2) Cancellation of this policy, whether by the insurer or the insured, will be effective only upon written notice and only after the expiration of sixty (60) days after a written notice of cancellation is received by the Department.

VII. Certificate of Deposit

- (1) The following information is to be included on the Certificate of Deposit:

(A) Name, address, and telephone number of issuing bank.

(B) Name and EPA I.D. Number if applicable of facility being covered (if list is too long additional pages may be attached).

(C) Payable To: Director, Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division.

(D) Indication of type of coverage (closure, post-closure and/or corrective action).

(E) Amount of coverage (closure, post-closure and/or corrective action).

(F) Authorized Bank's signature

(G) Automatic renewal of the Certificate of Deposit with interest added to the principal unless otherwise instructed in writing by the Department.

(2) (A) Cancellation of this Certificate of Deposit, whether by the insurer or the insured, will be effective only upon written notice and only after expiration of sixty (60) days after a written notice of cancellation is received by the Department.

(B) A thirty (30) day written notice of maturity of the Certificate of Deposit will be sent to the Department and facility.

[RESERVED]

Pages 330-334 are Reserved

Appendix B

Ground Water Monitoring

Appendix B uses 40 CFR Part 258 (Solid Waste Disposal Facility Criteria, October 9, 1991) as a reference document. Part 258 reference numbers, contained herein, are intentionally used for cross reference to the federal document.

B1 Applicability [40 CFR 258.50]

Ground water monitoring requirements in the Appendix B may be waived by the Department after consultation with the local governing body having jurisdiction if the owner or operator demonstrates that there is no migration potential for hazardous substances, pollutants and contaminants from that solid waste disposal site and facility to ground water during the life of the facility and the post-closure care period. If ground water monitoring requirements are waived, the operator must continue to demonstrate that no potential exists for migration of hazardous substances, pollutants and contaminants from the facility. Such demonstration shall be evaluated by the operator and submitted to the Department and the local governing body having jurisdiction every five years. This demonstration must be certified by a qualified ground water scientist and approved by the Department, and be based upon:

- (1) Site-specific field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport, and
- (2) Contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and environment, and
- (3) Distance to drinking water intakes.

B2 Ground water monitoring systems [40 CFR 258.51]

(A) A ground water monitoring system must consist of a sufficient number of monitoring wells installed at appropriate locations and depths which will yield ground water samples that:

- (1) Represent the quality of background ground water that has not been affected by leakage from a unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the waste management unit where:

(a) Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient; or

(b) Sampling at other wells will provide an indication of background ground water quality that is as representative or more representative than that provided by the hydraulically upgradient wells; and

(2) Represent the quality of ground-water at the relevant point of compliance specified in Section 2.1.15. The downgradient monitoring system must be installed at the relevant point of compliance specified by the Department under 40 CFR 258.40(D) that is capable of detecting ground water contamination. When physical obstacles preclude installation of ground water monitoring wells at the relevant point of compliance at existing units, the down-gradient monitoring system may be installed at the closest practicable distance hydraulically down-gradient from the relevant point of compliance specified by the Department under 40 CFR 258.40(D) that is capable of detecting ground water contamination.

(B) Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground water samples. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the ground water. Ground water monitoring wells and points are designed and installed in accordance with applicable rules and regulations pursuant to the "Water Well and Pump Installation Contractor's Act", Title 37, Article 91, Part 1, CRS, as amended

(1) The owner or operator must document the design, installation, development, and decommission of any monitoring wells, piezometers and other measurements, sampling, and analytical devices. Documentation shall be placed in the operating record and shall be submitted to the Department and the local governing body having jurisdiction.

(2) The monitoring wells, piezometers, and other measurement, sampling, and analytical devices must be operated and maintained so that they perform to design specifications throughout the life of the monitoring program.

(C) The number, spacing, and depths of monitoring systems shall be:

(1) Determined based upon site-specific technical information that must include thorough characterization of the:

(a) Saturated thickness, ground water flow rate, ground water flow direction including seasonal and temporal fluctuations in ground-water flow; and

(b) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer; including, but not limited to: thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.

(2) Certified by a qualified ground water scientist and approved by the Department and the local governing body having jurisdiction. Within 14 days, the owner or operator must place documentation in the operating record and be submitted to the Department and the local governing body having jurisdiction.

(D) Alternative monitoring systems

Alternative monitoring systems may be approved by the Department based on site specific technical information. Alternative monitoring includes the following: vadose zone monitoring, wet/dry monitoring or other alternative monitoring systems that are sufficient to detect changes in the subsurface condition and/or contaminants from the facility at the relevant point of compliance.

B3 Ground water sampling and analysis requirements [40 CFR 258.53]

(A) The ground water monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of ground water quality at the background and downgradient wells installed in compliance with 40 CFR 258.51(A). The owner or operator must notify the Department and the local governing body having jurisdiction that the sampling and analysis program documentation has been placed in the operating record and the program must include procedures and techniques for:

- (1) Sample collection;
- (2) Sample preservation and shipment;
- (3) Analytical procedures;
- (4) Chain of custody control; and
- (5) Quality assurance and quality control.

(B) The ground water monitoring program must include sampling and analytical methods that are appropriate for ground water sampling and that accurately measure hazardous constituents and other monitoring parameters in ground water samples. Analytical methods shall be according to Colorado Department of Public

Health and Environment guidelines, or an EPA approved method, for constituents listed in Appendix I and Appendix II.

(C) The sampling procedures and frequency must be protective of human health and the environment.

(D) Ground water elevations must be measured in each well immediately prior to purging, each time ground water is sampled. Changes in the rate and directions of ground water flow should be evaluated at a frequency appropriate to site-specific hydrogeologic conditions. Ground water elevations in wells which monitor the same waste management area must be measured within a period of time short enough to avoid temporal variations in ground water flow which could preclude accurate determination of ground water flow rate and direction.

(E) The owner or operator must establish background ground water quality in a hydraulically upgradient or background well(s) for each of the monitoring parameters or constituents required in the particular ground water monitoring program that applies to the solid waste disposal site and facility, as determined under 40 CFR 258.54(A) or 40 CFR 258.55(A). Background ground water quality may be established at wells that are not located hydraulically upgradient from the solid waste disposal site and facility if it meets the requirements of 40 CFR 258.51(A)(1).

(F) The number of samples collected to establish ground water quality data must be consistent with the appropriate statistical procedures determined pursuant to paragraph (G) of this section. The sampling procedures shall be those specified under 40 CFR 258.54(B) for detection monitoring, 40 CFR 258.55 (B) and (D) for assessment monitoring, and 40 CFR 258.56(B) for corrective action.

(G) Following collection of background constituent concentration data, the owner or operator must specify in the operating record one or more of the following statistical methods to be used in evaluating ground water monitoring data for each hazardous constituent. The statistical test chosen shall be conducted separately for each hazardous constituent in each well. Any changes in statistical methodology from the specified method(s) shall be reviewed and approved by the Department within two weeks of the request and entered into the operating record.

After background data has been collected, a statistical analysis will be specified.

(1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

(2) An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

(3) A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.

(4) A control chart approach that gives control limits for each constituent.

(5) A trend analysis approach to evaluate the significance of an apparent change in water quality over time at a given well.

(6) Another statistical test method that meets the performance standards of 40 CFR 258.53(H). The owner or operator must place a justification for this alternative in the operating record and notify the Department of the use of this alternative test. The justification must demonstrate that the alternative method meets the performance standards of 40 CFR 258.53(H).

(H) Any statistical method chosen under 40 CFR 258.53(G) shall comply with the following performance standards, as appropriate:

(1) The statistical method used to evaluate ground water monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator to be inappropriate for a normal theory test, then the data should be transformed, or a distribution-free theory test should be used. If the distributions for the constituents differ, more than one statistical method may be needed.

(2) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground-water protection standard, the test shall be done at a Type I error level no less than 0.01 For each testing period. If a multiple comparisons procedure is used, the type I experiment wise error rate for each testing period shall be no less than 0.05; However, the type I error of no less than 0.01 for individual well comparisons must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts.

(3) If a control chart approach is used to evaluate ground water monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment. The parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(4) If a tolerance interval or a prediction interval is used to evaluate ground water monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, shall be protective of human health and the environment. These parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(5) The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (PQL) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

(6) If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(I) The owner or operator must determine whether or not there is a statistically significant increase over background values for each parameter or constituent required in the particular ground water monitoring program that applies to the solid waste disposal site and facility, as determined under 40 CFR 258.54(A) or 40 CFR 258.55(A).

(1) In determining whether a statistically significant increase has occurred, the owner or operator must compare the ground-water quality of each parameter or constituent at each monitoring well designated pursuant to 40 CFR 258.51(A)(2) to the background value of that constituent, according to the statistical procedures and performance standards specified under paragraphs (G) and (H) of this section.

(2) Within 30 days after completing sampling and analysis, the owner or operator must determine whether there has been a statistically significant increase over background at each monitoring well and notify the Department.

B4 Detection monitoring program [40 CFR 258.54]

(A) Detection monitoring is required at solid waste disposal sites and facilities at all ground water monitoring wells defined under 40 CFR 258.51(A)(1) and (A)(2) of this part. At a minimum, a detection monitoring program must include the monitoring for the constituents listed in Appendix IA of this part. A detection monitoring program for solid waste disposal site and facility must also include the monitoring for constituents listed in Appendix IB.

(1) The Department after consultation with the local governing body having jurisdiction may delete any of the Appendix I monitoring parameters for a solid waste disposal site and facility on a site specific basis, if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the facility.

(2) The Department after consultation with the local governing body having jurisdiction may add to the Appendix IA or IB monitoring parameters for a solid waste disposal site and facility on a site specific basis. The additional analytes will be selected using the following minimum criteria:

(a) An "acceptable" analytical method exists. An acceptable method should be validated to demonstrate it is capable of generating reliable data on a routine basis. Additionally, it should be standardized and thus readily available from commercial laboratories.

(b) A calibration standard is commercially available and readily obtainable.

(c) The analyte is chemically stable in the sample matrix with appropriate but not unreasonable collection and preservation techniques.

(d) If there exists a reasonable expectation that the additional analyte will be present due to site specific conditions, or the additional analyte will be a reliable indicator of ground water chemistry and possible precursor to other more hazardous constituents that may be released later from the solid waste disposal site and facility.

(3) In determining the addition or deletion of Appendix IA or IB constituents, the Department shall consider the following factors:

(a) The types, quantities, And concentrations of constituents in wastes managed at the solid waste disposal sites and facilities, and

(b) The mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the mswlf unit.

(B) To establish background concentrations, a minimum of eight quarterly samples from each well must be collected and analyzed for the Appendix IA & IB constituents, or the list approved in accordance with paragraph (A) of this section. The Department may specify an appropriate monitoring frequency for repeated sampling and analysis for Appendix IA & IB constituents, or the list approved in accordance with paragraph (a) of this section, during the active life and the post-closure care period. The monitoring frequency during the active life (including closure) shall be no less than semi-annual, unless approved by the Department. The alternative frequency shall be based on consideration of the following factors:

- (1) Lithology of the saturated and unsaturated zone;
- (2) Hydraulic conductivity of the ground water and unsaturated zone;
- (3) Ground water flow rates;
- (4) Minimum distance between upgradient edge of the solid waste disposal site and facility unit and downgradient monitoring well screen (minimum distance of travel); and
- (5) Resource value of the ground water.
- (6) For landfills this schedule shall be no less stringent than 40 CFR 258.54(B).

(C) If the owner or operator determines, pursuant to 40 CFR 258.53(G) of this part, that there is a statistically significant increase over background for one or more of the constituents listed in Appendix I a or IB or the list approved in accordance with paragraph (A) of this section, at any monitoring well at the boundary specified under 40 CFR 258.51(A)(2), the owner or operator:

- (1) Must place documentation in the facility operating record indicating which constituents have shown statistically significant changes from background levels and forward the documentation to the Department and the local governing body having jurisdiction within 14 days; and
- (2) Must establish an assessment monitoring program meeting the requirements of 40 CFR 258.55 of this part within 90 days except as provided for in paragraph (3) below.

(3) May demonstrate that a source other than a SWDSF caused the contamination or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality. A report documenting this demonstration must be certified by a qualified ground water scientist and approved by the Department and the local governing body having jurisdiction and be placed in the operating record. If a successful demonstration is made and documented, the owner or operator may continue detection monitoring as specified in this section. If, after 90 days, a successful demonstration is not made, the owner or operator must initiate an assessment monitoring program as required in 40 CFR 258.55.

B5 Assessment monitoring program [40 CFR 258.55]

(A) Assessment monitoring is required whenever a statistically significant increase over background has been detected for one or more of the constituents listed in the Appendix IA or IB or in the list approved in accordance with 40 CFR 258.54(A)(1) & (a)(2).

(B) Within 90 days of triggering an assessment monitoring program, and annually thereafter, the owner or operator of a sanitary landfill must sample and analyze the ground water for all constituents identified in Appendix II of this part. A minimum of one sample from each potentially affected well must be collected and analyzed during each sampling event. For any constituent detected in these wells as a result of the complete Appendix II analysis, a minimum of four independent samples, or an alternate sampling schedule approved by the Department, from each well (background and downgradient) must be collected and analyzed to establish background for the constituents. The Department may specify an appropriate subset of wells to be sampled and analyzed for Appendix II constituents during assessment monitoring. The Department may delete any of the Appendix II monitoring parameters for a MSWLF unit if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit.

(C) Solid waste disposal sites and facilities, other than sanitary landfill, must also conduct an assessment monitoring program. The parameters of the assessment monitoring program shall be determined by the owner or operator and the Department based on consideration of:

(1) The types, quantities and concentrations of constituents in wastes managed at the solid waste disposal site and facility, and

(2) The mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the solid waste disposal site and facility.

(D) The Department may specify an appropriate alternate frequency for repeated sampling and analysis for the full set of Appendix II constituents or the list approved in accordance with 40 CFR 258.55(C), during the active life (including closure) and post-closure care of the unit considering the following factors:

- (1) Lithology of the aquifer, monitored and unsaturated zone;
- (2) Hydraulic conductivity of the aquifer, monitored and unsaturated zone;
- (3) Ground water flow rates;
- (4) Minimum distance between upgradient edge of the MSWLF unit and downgradient monitoring well screen (minimum distance of travel);
- (5) Resource value of the aquifer and monitored unit; and
- (6) Nature (fate and transport) of any constituents detected in response to this section.

(E) After obtaining the results from the initial or subsequent sampling events required in 40 CFR 258.55(B), (C) and (D), the owner or operator must:

- (1) Within 14 days, place documentation in the operating record identifying the detected Appendix II constituents or the list approved in accordance with 40 CFR 258.55(C), and submit the documentation to the Department and the local governing body having jurisdiction;
- (2) Within 90 days, and on a semiannual basis thereafter:
 - (a) Resample all wells specified by 40 CFR 258.51(A);
 - (b) Conduct analyses for all constituents in Appendix IA & IB or in the alternative list approved in accordance with 40 CFR 258.54(A)(2), and for those constituents in Appendix II or the list approved in accordance with 40 CFR 258.55(C) that are detected in response to 40 CFR 258.55(B), (c) and (d); and

(c) Record their concentrations in the facility operating record and submit them to the Department and the local governing body having jurisdiction.

(3) At least one sample from each well must be collected and analyzed during these sampling events. The Department may specify an alternative monitoring frequency during the active life (including closure) and the post-closure period for the constituents referred above to in this paragraph. The alternative frequency for Appendix IA & IB constituents, or the list approved in accordance with 40 CFR 258.54(A)(2), during the active life (including closure) shall be no less than annual. The alternative frequency shall be based on consideration of the factors specified in 40 CFR 258.55(D);

(F) If the concentrations of all Appendix II constituents are shown to be at or below background values, using the statistical procedures in 40 CFR 258.53(G), for two consecutive sampling events, the owner or operator must document and submit this finding to the Department and the local governing body having jurisdiction, and may, upon approval from the Department and the local governing body having jurisdiction discontinue assessment monitoring.

(G) If one or more Appendix II constituents or the list approved in accordance with 40 CFR 258.55(C) are detected at statistically significant levels above the background concentrations, the owner or operator shall, within 14 days of this finding, place a document in the operating record identifying the Appendix II constituents or the list approved in accordance with 40 CFR 258.55(C) that have exceeded the background concentrations and submit the documentation to the Department and all appropriate local government officials. The owner or operator shall also:

(1)(a) Characterize the nature and extent of the release by installing additional monitoring wells as necessary;

(b) Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with 40 CFR 258.55(D)(2);

(c) Notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site if indicated by sampling of wells in accordance with 40 CFR 258.55(G)(1); and

(d) Initiate an assessment of corrective measures as required by 40 CFR 255.56 Of this part within 90 days; or

(2) Demonstrate that a source other than a mswlf unit caused the contamination, or that the statically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality. A report documenting this demonstration must be certified by a qualified ground water scientist or approved by the Department and placed in the operating record. If a successful demonstration is made the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to 40 CFR 258.55, and may return to detection monitoring if the Appendix II constituents or the list approved in accordance with 40 CFR 258.55(C) are at or below background as specified in 40 CFR 258.55(E). Until a successful demonstration is made, the owner or operator must comply with 40 CFR 258.55(G) including initiating an assessment of corrective measures in accordance with 40 CFR 258.56.

B6 Assessment of corrective measures [40 CFR 258.56]

(A) Within 90 days of finding that any of the constituents referenced in 40 CFR 258.55 have been detected at a statistically significant level exceeding the background concentrations, the owner or operator must initiate an assessment of corrective measures. Such an assessment must be completed within a reasonable period of time as determined by the Department and governing body having jurisdiction.

(B) The owner or operator must continue to monitor in accordance with the assessment monitoring program as specified in 40 CFR 258.55.

(C) The assessment shall include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under 40 CFR 258.57, addressing at least the following:

(1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;

(2) The time required to begin and complete the remedy;

(3) The costs of remedy implementation; and

(4) The institutional requirements such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

(D) The owner or operator shall provide to the Department the results of the corrective measures assessment, prior to the remedy selection. The Department and the local governing body having jurisdiction shall provide a 30 day public notification and public comment period to interested and affected parties prior to the remedy selection.

(E) In the interest of minimizing environmental contamination and promoting effective remediation, owners or operators shall evaluate pursuant to Appendix B, Section B6, Subsection (F) the need for undertaking interim measures prior to the selection of the final remedy.

(1) The owner or operator shall evaluate the need for interim measures within 30 days of the date of determining that there has been a statistically significant increase over background and shall submit the evaluation to the department and the local governing body having jurisdiction.

(2) Within 30 days after the determination is made that interim measures are needed, the owner or operator shall submit documentation to the department and the local governing body having jurisdiction of their intention to implement the interim measure and an implementation schedule.

(3) Within 14 days of receipt of documentation, the department shall notify the owner or operator of any conditions to be imposed and any recommended modifications to be employed during the implementation of the interim measure.

(5) The interim measures, as approved by the department, shall be initiated as soon as possible but no later than 30 days after the receipt of the department's approval.

(6) The owner or operator shall provide periodic progress reports on the implementation of interim measures to the department and the local governing body having jurisdiction and incorporate the interim measures in the results of the corrective measures assessment as required in 40 CFR 258.56(d).

(F) Interim measures should, to the greatest extent practicable, be consistent with the objectives of and contribute to the performance of any remedy that may be required pursuant to 40 CFR 258.57. The following factors must be considered by an owner or operator in determining whether interim measures are necessary:

(1) Time required to develop and implement a final remedy;

- (2) Actual or potential exposure of nearby populations or environmental receptors to hazardous constituents;
- (3) Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- (4) Further degradation of the ground water that may occur if remedial action is not initiated expeditiously;
- (5) Weather conditions that may cause hazardous constituents to migrate or be released;
- (6) Risks of fire or explosion, or potential for exposure to hazardous constituents as a result of an accident or failure of a container or handling system; and
- (7) Other situations that may pose threats to human health and the environment.

B7 Selection of remedy [40 CFR 258.57]

(A) Based on the results of the corrective measures assessment conducted under 40 CFR 258.56, remedies must:

- (1) Be protective of human health and the environment;
- (2) Attain the ground water protection standard as specified pursuant to 40 CFR 258.55 (G) and (H);
- (3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of constituents referenced in 40 CFR 258.55 into the environment that may pose a threat to human health or the environment; and
- (4) Comply with standards for management of wastes as specified in 40 CFR 258.58(D).

(B) In selecting a remedy that meets the requirements of 40 CFR 258.57(A), the owner or operator shall consider the following evaluation factors:

- (1) Extent and nature of contamination;

(2) Resource value of the ground water including:

- (a) Current and potential uses;
- (b) Proximity and withdrawal rate of users;
- (c) Ground water quantity and quality;
- (d) The hydrogeologic characteristic(s) of the saturated zones beneath the facility and surrounding land; and
- (e) The cost and availability of alternative water supplies.

(3) The long-term and short-term effectiveness and protectiveness of the potential remedy(s) based on consideration of the following:

- (a) The type and degree of long-term management required, including monitoring, operation, and maintenance;
- (b) Short-term risks that might be posed to the human health and the environment during implementation of such a remedy, including potential threats associated with excavation, transportation, and redisposal or containment;
- (c) Time until the remedy becomes effective;
- (d) Potential for exposure of humans and environmental receptors to remaining wastes;
- (e) Long-term reliability of the engineering and institutional controls; and
- (f) Potential need for refinement of the remedy.

(4) The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:

- (I) The extent to which containment practices will reduce further releases;
- (II) The extent to which treatment technologies may be used; and
- (III) The practical capabilities of remedial technologies in achieving compliance with ground water protection standards established under 40 CFR 258.57(G) and (H), and other objectives of the remedy.

(5) The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors:

(I) Degree of difficulty associated with constructing the technology;

(II) Expected operational reliability of the technologies;

(III) Need to coordinate with and obtain necessary approvals and permits from other agencies;

(IV) Availability of necessary equipment and specialists;

(V) Available capacity and location of needed treatment, storage, and disposal services;

(VI) Desirability of utilizing technologies that are not currently available, but which may offer significant advantages over already available technologies in terms of effectiveness, reliability, safety, or ability to achieve remedial objectives; and

(VII) Ground water removal and treatment costs.

(6) Practicable capability of the owner or operator, including a consideration of the technical and economic capability.

(7) The degree to which community concerns are addressed by a potential remedy(s).

(8) Other relevant factors.

(C) If the owner or operator is unable to meet the requirements of 40 CFR 258.57(A) the Department after consultation with the local governing body having jurisdiction may determine that remediation of a release of constituents referenced in 40 CFR 258.55 is not necessary if the owner or operator demonstrates to the satisfaction of the Department that:

(1) The ground water is additionally contaminated by substances that have originated from a source other than the solid waste disposal site and facility and those substances are present in concentrations such that cleanup of the release from the SWDSF would provide no significant reduction in risk to the human health and the environment; or

(2) The constituent(s) is present in ground water that is not hydraulically connected to the uppermost aquifer or surface water.

(3) Remediation results in unacceptable cross-media impacts.

(4) Obtain certification of a qualified ground water scientist or approval by the Department that compliance with requirements under 40 CFR 258.57(A) cannot be practically achieved with any currently available methods.

(5) A cost-benefit analysis indicates that remediation of the release is unacceptable.

(D) A determination by the Department pursuant to 40 CFR 258.57(C) shall not affect the authority of the Department to require the owner or operator to undertake source control measures or other measures that may be necessary to eliminate or minimize further releases to the ground water; to prevent exposure to the ground water; or control exposure of human health and environment to residual contamination.

(E) The owner or operator shall specify as part of the selected remedy, a schedule(s) for initiating and completing remedial activities or source control. Such a schedule must require the initiation of remedial activities or source control within a reasonable period of time taking into consideration the factors set forth in paragraphs 40 CFR 258.57(B) or 40 CFR 258.57(D).

(F) The owner or operator must submit a report to the Department and the local governing body having jurisdiction and place it in the operating record, within 14 days of selecting a remedy(s) or source control measure(s). The report shall describe the selected remedy(s) or source control measure(s) and how it meets the requirements of section 40 CFR 258.57. Within 60 days of the reports receipt, the Department after consultation with the local governing body having jurisdiction shall provide a determination, in conformance with Section 40 CFR 258.57 of the adequacy of the remedy(s) or source control measure(s).

(G) The owner or operator shall develop ground water protection standards which are required to implement a corrective measure pursuant to 40 CFR 258.57. The ground water protection standards shall not be implemented without approval by the Department. The ground water protection standard for each constituent, referenced in 40 CFR 258.55, that has been detected at a statistically significant level exceeding background shall be based on the following:

(1) Background concentration for the constituent in wells established in accordance with 40 CFR 258.51(A);

(2) Maximum contaminant level (MCL) promulgated under Section 1412 of the safe drinking water act (codified) under 40 CFR Part 141;

(3) Health based levels that satisfy the following criteria:

(a) The level is derived in a manner consistent with guidelines for assessing the health risks of environmental pollutants (51 FR 33992, 34006, 34014, 34028);

(b) The level is based on scientifically valid studies conducted in accordance with the toxic substances control act good laboratory practice standards (40 CFR Part 792) or equivalent;

(c) For carcinogens, the level represents a concentration associated with an excess lifetime cancer risk level (due to continuous lifetime exposure) with the 1×10^{-4} To 1×10^{-6} range; and

(d) For systemic toxicants, the level represents a concentration to which the human population (including sensitive subgroups) could be exposed on a daily basis that is likely to be without appreciable risk of deleterious effects during a lifetime. For purposes of this subpart, systemic toxicants include toxic chemicals that cause effects other than cancer or mutation.

(H) The owner or operator, and the Department in consultation with the local governing body having jurisdiction may consider establishing alternate ground water protection standards to 40 CFR 258.57(G), based on consideration of the following:

(1) Multiple contaminants in the ground water;

(2) Exposure threats to sensitive environmental receptors;

(3) Other site-specific exposure or potential exposure to ground water; and

(4) Best demonstrated available technology.

B8 Implementation of corrective measures [40 CFR 258.58]

(A) Based on the schedule established under 40 CFR 258.57(D) for initiation and completion of remedial activities the owner or operator must:

(1) Establish and implement a corrective action ground water monitoring program that, at a minimum:

(a) Meets the requirements of an assessment monitoring program under 258.55;

(b) Indicates the effectiveness of the corrective action remedy; and

(c) Demonstrates compliance with ground water protection standard pursuant to 40 CFR 258.58(E).

(2) Implement the corrective action remedy selected under 40 CFR 258.57;

(B) An owner or operator or the Department in consultation with the local governing body having jurisdiction may determine, based on information developed after implementation of the remedy, source control or other information, that compliance with requirements of 40 CFR 258.57 are not being achieved. In such cases, the owner or operator must implement other methods or techniques in compliance with the requirements of section 40 CFR 258.58(C).

(C) All wastes that are generated during the implementation of the remedy(s) or source control measure(s) required under 40 CFR 258.57, or an interim measure required under 40 CFR 258.58(A)(3), shall be managed in a manner:

(1) That is protective of human health and the environment; and

(2) That complies with applicable Resource Conservation and Recovery Act requirements.

(D) Remedies selected pursuant to 40 CFR 258.57 shall be considered complete when:

(1) The owner or operator complies with the ground water protection standards established under 40 CFR 258.55 (G) and (H) at all points within the plume of contamination that lie beyond the ground water monitoring well system established under 40 CFR 258.51(A).

(2) Compliance with the ground water protection standards established under 40 CFR 258.55 (G) and (H) has been achieved by demonstrating that concentrations of constituents referenced in 40 CFR 258.55 have not exceeded the ground water protection standard(s) for a period of three consecutive years using the statistical procedures and performance standards in 40 CFR 258.53(G) and (H). The Department may specify an alternative length of time during which the owner or operator must demonstrate that concentrations of constituents referenced in 40 CFR 258.55 have not exceeded the ground water protection standard(s) based on the following factors:

(a) Extent and concentration of the constituent(s) released;

(b) Chemical and physical characteristics of the hazardous constituents in the ground water and geologic media;

(c) Accuracy of monitoring or modeling techniques, including any seasonal, meteorological, or other environmental variabilities that may affect the accuracy; and

(d) Chemical and physical characteristics of the ground water and geologic media.

(3) All actions required to complete the remedy have been satisfied.

(E) Upon completion of the remedy, the owner or operator and qualified ground water scientist must certify that completion of the remedy is in compliance with 40 CFR 258.58(D). A report shall be submitted to the Department and the local governing body having jurisdiction and placed in the operating record, within 14 days of certification. Within 60 days receipt of the report, the Department after consultation with the local governing body having jurisdiction shall provide a determination that the corrective action has met the requirements of 40 CFR 258.58(D).

(F) Upon completion of the certification process pursuant to 40 CFR 258.58(E), the owner or operator shall be released from the financial assurance requirement for corrective action under Section 1.6.

[RESERVED]

Pages 355-359 are Reserved

APPENDIX I FOR DETECTION MONITORING
APPENDIX IA

GENERAL GROUND WATER QUALITY INDICATOR PARAMETERS

CATIONS

MAGNESIUM
SODIUM
POTASSIUM
CALCIUM

ANIONS

CARBONATE
BICARBONATE
CHLORIDE
SULFATE
NITRITE
NITRATE

FIELD PARAMETERS

PH
SPECIFIC CONDUCTIVITY
TEMPERATURE
TOTAL ORGANIC CARBON

APPENDIX IB

<u>COMMON NAME</u>	<u>CAS NUMBER</u>
INORGANIC CONSTITUENTS	
(1) ANTIMONY (TOTAL)	
(2) ARSENIC (TOTAL)	
(3) BARIUM (TOTAL)	
(4) BERYLLIUM (TOTAL)	
(5) CADMIUM (TOTAL)	
(6) CHROMIUM (TOTAL)	
(7) COBALT (TOTAL)	
(8) COPPER (TOTAL)	
(9) LEAD (TOTAL)	
(10) NICKEL (TOTAL)	
(11) SELENIUM (TOTAL)	
(12) SILVER (TOTAL)	
(13) THALLIUM (TOTAL)	

(14) VANADIUM (TOTAL)	
(15) ZINC (TOTAL)	
ORGANIC CONSTITUENTS:	
(16) ACETONE	67-64-1
(17) ACRYLONITRILE	107-13-1
(18) BENZENE	71-43-2
(19) BROMOCHLOROMETHANE	74-97-5
(20) BROMODICHLOROMETHANE	75-27-4
(21) BROMOFORM; TRIBROMOMETHANE	75-25-2
(22) CARBON DISULFIDE	75-15-0
(23) CARBON TETRACHLORIDE	56-23-5
(24) CHLORO BENZENE	108-90-7
(25) CHLOROETHANE; ETHYL CHLORIDE	75-00-3
(26) CHLOROFORM; TRICHLOROMETHANE	67-66-3
(27) DIBROMOCHLOROMETHANE; CHLORODIBROMOMETHANE	124-48-1
(28) 1,2-DIBROMO-3-CHLOROPROPANE; DBCP	96-12-8
(29) 1,2-DIBROMOETHANE; ETHYLENE DIBROMIDE; EDB	106-93-4
(30) O-DICHLORO BENZENE; 1,2-DICHLORO BENZENE	95-50-1
(31) P-DICHLORO BENZENE; 1,4-DICHLORO BENZENE	106-46-7
(32) TRANS-1,4-DICHLORO-2-BUTENE	110-57-6
(33) 1,1-DICHLOROETHANE; ETHYLIDENE CHLORIDE	75-34-3
(34) 1,2-DICHLOROETHANE; ETHYLENE DICHLORIDE	107-06-2
(35) 1,1-DICHLOROETHYLENE; 1,1-DICHLOROETHENE; VINYLIDEN CHLORIDE	75-35-4
(36) CIS-1,2-DICHLOROETHYLENE; CIS-1,2-DICHLOROETHENE	156-59-2
(37) TRANS-1,2-DICHLOROETHYLENE; TRANS-1,2-DICHLOROETHENE	156-60-5
(38) 1,2-DICHLOROPROPANE; PROPYLENE DICHLORIDE	78-87-5
(39) CIS-1,3-DICHLOROPROPENE	10061-01-5
(40) TRANS-1,3-DICHLOROPROPENE	10061-02-6
(41) ETHYLBENZENE	100-41-4
(42) 2-HEXANONE; METHYL BUTYL KETONE	591-78-6
(43) METHYL BROMIDE; BROMOMETHANE	74-83-9
(44) METHYL CHLORIDE; CHLOROMETHANE	74-87-3
(45) METHYLENE BROMIDE; DIBROMOMETHANE	74-95-3
(46) METHYLENE CHLORIDE; DICHLOROMETHANE	75-09-2
(47) METHYL ETHYL KETONE; MEK; 2-BUTANONE	78-93-3
(48) METHYL IODIDE; IODOMETHANE	74-88-4

(49) 4-METHYL-2-PENTANONE; METHYL ISOBUTYL KETONE	108-10-1
(50) STYRENE	100-42-5
(51) 1,1,1,2-TETRACHLOROETHANE	630-20-6
(52) 1,1,2,2-TETRACHLOROETHANE	79-34-5
(53) TETRACHLOROETHYLENE; TETRACHLOROETHENE PERCHLOROETHYLENE	127-18-4
(54) TOLUENE	108-88-3
(55) 1,1,1-TRICHLOROETHANE; METHYLCHLOROFORM	71-55-6
(56) 1,1,2-TRICHLOROETHANE	79-00-5
(57) TRICHLOROETHYLENE; TRICHLOROETHENE	79-01-6
(58) TRICHLOROFLUOROMETHANE; CFC-11	75-69-4
(59) 1,2,3-TRICHLOROPROPANE	96-18-4
(60) VINYL ACETATE	108-05-4
(61) VINYL CHLORIDE	75-01-4
(62) XYLENES	1330-20-7

This list contains 47 volatile organics for which possible analytical procedures provided in EPA report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised December 1987, includes method 8260; and 15 metals for which SW-846 provides either method 6010 or a method from the 7000 series of methods.

Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

Cas number = Chemical Abstracts Service registry number.

APPENDIX II FOR ASSESSMENT MONITORING

COMMON NAME(2)	CAS RN(3)	SUGGESTED CHEMICAL ABSTRACTS SERVICE INDEX NAME(4)	METHODS (5)	PQL (µg/L) (6)
ACENAPHTHENE	83-32-9	ACENAPHTHYLENE, 1, 2-DIHYDRO-	8100 8270	200 10
ACENAPHTHYLENE	208-96-8	ACENAPHTHYLENE	8100 8270	200 10
ACETONE	67-64-1	2-PROPANONE	8280	100
ACETONITRILE; METHYL CYANIDE	75-05-8	ACETONITRILE	8015	100
ACETOPHENONE	98-96-2	ETHANONE, 1-PHENYL-	8270	10
2-ACETYLAMINOFLUORENE; 2-AAF	53-96-3	ACETAMIDE, N-9H-FLUOREN-2-YL-	8270	20
ACROLEIN	107-02-8	2-PROPENAL	8030 8260	5 100
ACRYLONITRILE	107-13-1	2-PROPENENITRILE	8030 8260	5 200
ALDRIN	309-00-2	1, 4: 5, 8-DIMETHANONAPHTHALENE, 1, 2, 3, 4, 10, 10-HEXACHLORO-1, 4, 4A, 5, 8, 8A-HEXAHYDRO- (1, 4, 4A, 5, 8, 8A)	8060 8270	0.05 10
ALLYL CHLORIDE	107-05-1	1-PROPENE, 3-CHLORO-	8010 8260	5 10
4-AMINOBI PHENYL	92-67-1	[1, 1{1}-BI PHENYL]-4-AMINE	8270	20
ANTHRACENE	120-12-7	ANTHRACENE	8100 8270	200 10
ANTIMONY	(TOTAL)	ANTIMONY	6010 7040	300 2000
ARSENIC	(TOTAL)	ARSENIC	7041 6010 7060	30 500 10
BARIUM	(TOTAL)	BARIUM	7061 6010 7080	20 20 1000
BENZENE	71-43-2	BENZENE	8020 8021 8260	2 0.1 5
BENZO[A]ANTHRACENE; BENZANTHRACENE	56-55-3	BENZ[A]ANTHRACENE	8100 8270	200 10
BENZO[B]FLUORANTHENE	205-99-2	BENZ[E]ACEPHENANTHYLENE	8100 8270	200 10
BENZO[K]FLUORANTHENE	207-08-9	BENZO[K]FLUORANTHENE	8100 8270	200 10
BENZO[GHI]PERYLENE	191-24-2	BENZO[GHI]PERYLENE	8100 8270	200 10
BENZO[A]PYRENE	50-32-8	BENZO[A]PYRENE	8100 8270	200 10
BENZYL ALCOHOL	100-51-6	BENZENEMETHANOL	8270	20
BERYLLIUM	(TOTAL)	BERYLLIUM	6010 7090	3 50
ALPHA-BHC	319-84-6	CYCLOHEXANE, 1, 2, 3, 4, 5, 6-HEXACHLORO-, (1, 2, 3, 4, 5, 6)-	8080 8270	0.05 10
BETA-BHC	319-85-7	CYCLOHEXANE, 1, 2, 3, 4, 5, 6-HEXACHLORO-, (1, 2, 3, 4, 5, 6)-	8080 8270	0.05 20
DELTA-BHC	319-86-8	CYCLOHEXANE, 1, 2, 3, 4, 5, 6-HEXACHLORO-, (1, 2, 3, 4, 5, 6)-	8080 8270	0.1 20
GAMMA-BHC; LINDANE	58-89-9	CYCLOHEXANE, 1, 2, 3, 4, 5, 6-HEXACHLORO-, (1, 2, 3, 4, 5, 6)-	8080 8270	0.05 20
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ETHANE, 1, 1{1}-[METHYLENEBIS(OXY)] BIS[2-CHLORO-	8110 8270	5 10
BIS(2-CHLOROETHYL) ETHER; DI CHLOROETHYL ETHER	111-44-4	ETHANE, 1, 1{1}-OXYBIS[2-CHLORO-	8110 8270	3 10
BIS-(2-CHLORO-1-METHYLETHYL) ETHER; 2, 2{1}-DI CHLORODIISOPROPYL ETHER; DCEP, SEE NOTE 7.	108-60-1	PROPANE, 2, 2{1}-OXYBIS[1-CHLORO-	8110 8270	10 10
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	1, 2-BENZENEDI CARBOXYLIC ACID, BIS (2-ETHYLHEXYL) ESTER	8060	20
BROMCHLOROMETHANE; CHLOROBROMOMETHANE	74-97-5	METHANE, BROMCHLORO-	8021 8260	0.1 5
BROMODI CHLOROMETHANE; DI BROMCHLOROMETHANE	75-27-4	METHANE, BROMODI CHLORO-	8010 8021 8260	1 0.2 5
BROMOFORM; TRI BROMOMETHANE	75-25-2	METHANE, TRI BROMO-	8010 8021 8260	2 15 5
4-BROMOPHENYL PHENYL ETHER	101-55-3	BENZENE, 1-BROMO-4-PHOXY-	8110 8270	25 10
BUTYL BENZYL PHTHALATE; BENZYL BUTYL PHTHALATE	85-68-7	1, 2-BENZENEDI CARBOXYLIC ACID, BUTYL PHENYLMETHYL ESTER	8060 8270	5 10

CADMIUM	(TOTAL)	CADMIUM	6010	40
			7130	50
			7131	1
CARBON DISULFIDE	75-15-0	CARBON DISULFIDE	8260	100
CARBON TETRACHLORIDE	56-23-5	METHANE, TETRACHLORO-	8010	1
			8021	0.1
			8260	10
CHLORDANE	SEENOTES	4, 7-METHANO-1H-INDENE, 1, 2, 4, 5, 6, 7, 8, 8-OCTACHLORO-2, 3, 3A, 4, 7, 7A- HEXAHYDRO-	8080	0.1
			8270	50
P-CHLOROANILINE	108-47-8	BENZENAMINE, 4-CHLORO-	8270	20
CHLOROBENZENE	108-90-7	BENZENE, CHLORO-	8010	2
			8020	2
			8021	0.1
			8260	5
			8270	10
CHLOROBENZYLATE	510-15-6	BENZENEACETIC ACID, 4-CHLORO-(4- CHLOROPHENYL)-HYDROXY-, ETHYL ESTER		
P-CHLORO-M-CRESOL; 4-CHLORO-3- METHYLPHENOL	59-50-7	PHENOL, 4-CHLORO-3-METHYL-	8040	5
CHLOROETHANE; ETHYL CHLORIDE	75-00-3	ETHANE, CHLORO-	8270	20
			8010	5
			8021	1
			8260	10
CHLOROFORM; TRI CHLOROMETHANE	67-66-3	METHANE, TRI CHLORO-	8010	0.5
			8021	0.2
			8260	5
2-CHLORONAPHTHALENE	91-58-7	NAPHTHALENE, 2-CHLORO-	8120	10
			8270	10
2-CHLOROPHENOL	95-57-8	PHENOL, 2-CHLORO-	8040	5
			8270	10
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	BENZENE, 1-CHLORO-4-PHENOXY-	8110	40
			8270	10
CHLOROPRENE	126-99-8	1, 3-BUTADIENE, 2-CHLORO-	8010	50
			8260	20
CHROMIUM	(TOTAL)	CHROMIUM	6010	70
			7190	500
			7191	10
CHRYSENE	218-01-9	CHRYSENE	8100	200
			8270	10
COBALT	(TOTAL)	COBALT	6010	70
			7200	500
			7201	10
COPPER	(TOTAL)	COPPER	6010	60
			7210	200
			7211	10
M-CRESOL; 3-METHYLPHENOL	108-39-4	PHENOL, 3-METHYL-	8270	10
O-CRESOL; 2-METHYLPHENOL	95-48-7	PHENOL, 2-METHYL-	8270	10
P-CRESOL; 4-METHYLPHENOL	106-44-5	PHENOL, 4-METHYL-	8270	10
CYANIDE	57-12-5	CYANIDE	9010	200
2, 4-D; 2, 4-DI CHLOROPHENOXYACETIC ACID	94-75-7	ACETIC ACID, (2, 4-DI CHLOROPHENOXY) -	8150	10
4, 4(1)-DDD	72-54-8	BENZENE 1, 1(1)-(2, 2- DI CHLOROETHYLDENE) BIS[4-CHLORO- BENZENE, 1, 1(1)- (DI CHLOROETHYNYLDENE) BIS[4- CHLORO-	8080	0.1
			8270	10
4, 4(1)-DDE	72-55-9	BENZENE, 1, 1(1)- (DI CHLOROETHYNYLDENE) BIS[4- CHLORO-	8080	0.05
			8270	10
4, 4(1)-DDT	50-29-3	BENZENE, 1, 1(1)-(2, 2, 2- TRI CHLOROETHYLDENE) BIS[4-CHLORO- CARBAMOYLIC ACID, BIS(1- METHYLETHYL)-, S-(2, 3-DI CHLORO-2- PROPENYL) ESTER	8080	0.1
			8270	10
DIALLATE	2303-16-4	DI BENZ[A, H]ANTHRACENE	8270	10
DI BENZ[A, H]ANTHRACENE	53-70-3	DI BENZ[A, H]ANTHRACENE	8100	200
			8270	10
DI BENZOFURAN	132-64-9	DI BENZOFURAN	8270	10
DI BROMOCHLOROMETHANE; CHLORODI BROMOMETHANE	124-48-1	METHANE, DI BROMOCHLORO-	8010	1
			8021	0.3
			8260	5
1, 2-DI BROMO-3-CHLOROPROPANE; DBCP	96-12-8	PROPANE, 1, 2-DI BROMO-3-CHLORO- ...	8011	0.1
			8021	30
			8260	25
1, 2-DI BROMOETHANE; ETHYLENE DIBROMIDE; EDB	106-93-4	ETHANE, 1, 2-DI BROMO-	8011	0.1
			8021	10
			8260	5
DI-N-BUTYL PHTHALATE	84-74-2	1, 2-BENZENEDI CARBOXYLIC ACID, DI BUTYL ESTER	8060	5
			8270	10
O-DI CHLOROBENZENE; 1, 2- DI CHLOROBENZENE	95-50-1	BENZENE, 1, 2-DI CHLORO-	8010	2
			8020	5
			8021	0.5
			8120	10
			8260	5
			8270	10
M-DI CHLOROBENZENE; 1, 3- DI CHLOROBENZENE	541-73-1	BENZENE, 1, 3-DI CHLORO-	8010	5
			8020	5
			8021	0.2
			8120	10

P-DI CHLOROBENZENE; 1,4-DI CHLOROBENZENE	108-46-7	BENZENE, 1,4-DI CHLORO-	8260 8270 8010 8020 8021 8120 8260 8270	5 10 2 5 0.1 15 5 10 20
3,3(1)-DI CHLOROBENZIDINE	91-94-1	[1,1(1)-BIPHENYL]-4,4(1)-DIAMINE, 3,3(1)-DI CHLORO-		
TRANS-1,4-DI CHLORO-2-BUTENE	110-57-6	2-BUTENE, 1,4-DI CHLORO-, (E)-	8260	100
DI CHLORODIFLUOROMETHANE; CFC 12; ..	75-71-8	METHANE, DI CHLORODIFLUORO-	8021 8260 8010	0.5 5 1
1,1-DI CHLOROETHANE; ETHYLDIENE CHLORIDE	75-34-3	ETHANE, 1,1-DI CHLORO-	8021 8260 8010	0.5 5 0.5
1,2-DI CHLOROETHANE; ETHYLENE DI CHLORIDE	107-06-2	ETHANE, 1,1-DI CHLORO-	8021 8260 8010	0.3 5 0.5
1,1-DI CHLOROETHYLENE; 1,1- DI CHLOROETHENE; VINYLIDENE CHLORIDE	75-35-4	ETHENE, 1,1-DI CHLORO-	8010 8021 8260	1 0.5 5
CIS-1,2-DI CHLOROETHYLENE; CIS-1,2- DI CHLOROETHENE	156-59-2	ETHENE, 1,2-DI CHLORO-, (Z)-	8021 8260	0.2 5
TRANS-1,2-DI CHLOROETHYLENE TRANS-1, 2-DI CHLOROETHENE	156-60-5	ETHENE, 1,2-DI CHLORO-, (E)-	8010 8021 8260	1 0.5 5
2,4-DI CHLOROPHENOL	120-83-2	PHENOL, 2,4-DI CHLORO-	8040 8270	5 10
2,6-DI CHLOROPHENOL	87-65-0	PHENOL, 2,6-DI CHLORO-	8270	10
1,2-DI CHLOROPROPANE; PROPYLENE DI CHLORIDE	78-87-5	PROPANE, 1,2-DI CHLORO-	8010 8021 8260	0.5 0.05 5
1,3-DI CHLOROPROPANE; TRIMETHYLENE DI CHLORIDE	142-28-9	PROPANE, 1,3-DI CHLORO-	8021 8260	0.3 5
2,2-DI CHLOROPROPANE; ISOPROPYLDIENE CHLORIDE	594-20-7	PROPANE, 2,2-DI CHLORO-	8021 8260	0.5 15
1,1-DI CHLOROPROPENE	563-58-6	1-PROPENE, 1,1-DI CHLORO-	8021 8260	0.2 5
CIS-1,3-DI CHLOROPROPENE	10061-01-5	1-PROPENE, 1,3-DI CHLORO-, (Z)- ...	8010 8260	20 10
TRANS-1,3-DI CHLOROPROPENE	10061-02-6	1-PROPENE, 1,3-DI CHLORO-, (E)- ...	8010 8260	5 10
DIELDRIN	60-57-1	2,7:3,6-DIMETHANONAPHTH[2,3-B] OXIRENE, 3,4,5,6,9,9-HEXA, CHLORO -1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1A,2,2A,3,6,6A,7,7A)-	8060 8270	5 0.05 10
DIETHYL PHTHALATE	84-66-2	1,2-BENZENEDI CARBOXYLIC ACID, DIETHYL ESTER	8060 8270	5 10
O,O-DIETHYL O-2-PYRAZINYL PHOSPHOROTHIOIC ACID; THIOAZIN. DIMETHOATE	297-97-2	PHOSPHOROTHIOIC ACID, O,O-DIETHYL O-PYRAZINYL ESTER	8141 8270	5 20
	60-51-5	PHOSPHOROTHIOIC ACID, O,O- DIMETHYL S-[2-(METHYLAMINO)-2- OXOETHYL] ESTER	8141 8270	3 20
P-(DIMETHYLAMINO)AZOBENZENE	60-11-7	BENZENAMINE, N,N-DIMETHYL-4- (PHENYLAZO)-	8270	10
7,12-DIMETHYLBENZ[A]ANTHRACENE ...	57-97-6	BENZ[A]ANTHRACENE, 7,12-DIMETHYL-	8270	10
3,3(1)-DIMETHYLBENZIDINE	119-93-7	[1,1(1)-BIPHENYL]-4,4(1)-DIAMINE, 3,3(1)-DIMETHYL-	8270	10
2,4-DIMETHYLPHENOL; M-XYLENOL	105-67-9	PHENOL, 2,4-DIMETHYL-	8040 8270	5 10
DIETHYL PHTHALATE	131-11-3	1,2-BENZENEDI CARBOXYLIC ACID, DIETHYL ESTER	8060 8270	5 10
M-DINITROBENZENE	99-65-0	BENZENE, 1,3-DINITRO-	8270	20
4,6-DINITRO-O-CRESOL 4,6-DINITRO-2 -METHYLPHENOL	534-52-1	PHENOL, 2-METHYL-4,6-DINITRO	8040 8270	150 50
2,4-DINITROPHENOL;	51-28-5	PHENOL, 2,4-DINITRO-	8040 8270	150 50
2,4-DINITROTOLUENE	121-14-2	BENZENE, 1-METHYL-2,4-DINITRO- ...	8090 8270	0.2 10
2,6-DINITROTOLUENE	606-20-2	BENZENE, 2-METHYL-1,3-DINITRO- ...	8090 8270	0.1 10
DINOSB; DNBP; 2-SEC-BUTYL-4,6- DINITROPHENOL	88-85-7	PHENOL, 2-(1-METHYLPROPYL)-4,6- DINITRO-	8150 8270	1 20
DI-N-OCTYL PHTHALATE	117-84-0	1,2-BENZENEDI CARBOXYLIC ACID, DI OCTYL ESTER	8060 8270	30 10
DI PHENYLAMINE	122-39-4	BENZENAMINE, N-PHENYL-	8270	10
DI SULFOTON	298-04-4	PHOSPHOROTHIOIC ACID, O,O- DIETHYL S-[2-(ETHYLTHIO)ETHYL] ESTER	8140 8141 8270	2 0.5 10
ENDOSULFAN I	959-98-8	6,9-METHANO-2,4,3- BENZODI OXATHI EPTIN, 6,7,8,9,10,10- HEXA- CHLORO-1,5,5A,6,9,9A- HEXAHYDRO-, 3-OXIDE	8060 8270	0.1 20
ENDOSULFAN II	33213-65-9	6,9-METHANO-2,4,3- BENZODI OXATHI EPTIN, 6,7,8,9,10,10-	8060 8270	0.05 20

ENDOSULFAN SULFATE	1031-07-8	HEXA- CHLORO-1, 5, 5A, 6, 9, 9A- HEXAHYDRO-, 3-OXIDE, (3, 5A, 6, 9, 9A) 6, 9-METHANO-2, 4, 3- BENZODI OXATHI EPTIN, 6, 7, 8, 9, 10, 10- HEXA- CHLORO-1, 5, 5A, 6, 9, 9A- HEXAHYDRO-, 3-3-DI OXIDE	8080 8270	0.5 10
ENDRIN	72-20-8	2, 7: 3, 6-DIMETHANONAPHTH[2, 3-B] OXIRENE, 3, 4, 5, 6, 9, 9-HEXACHLORO- 1A, 2, 2A, 3, 6, 6A, 7, 7A-OCTAHYDRO-, (1A, 2, 2A, 3, 6, 6A, 7, 7A)-	8080 8270	0.1 20
ENDRIN ALDEHYDE	7421-93-4	1, 2, 4-METHENOCYCLOPENTA[CD] PENTALENE-5-CARBOXYALDEHYDE, 2, 2A, 3, 3, 4, 7-HEXACHLORODECAHYDRO-, (1 , 2, 2A, 4, 4A, 5, 6A, 6B, 7B)-	8080 8270	0.2 10
ETHYLBENZENE	100-41-4	BENZENE, ETHYL-	8020 8221 8280	2 0.05 5
ETHYL METHACRYLATE	97-63-2	2-PROPENOIC ACID, 2-METHYL-, ETHYL ESTER	8015 8260 8270	5 10 10
ETHYL METHANESULFONATE	62-50-0	METHANESULFONIC ACID, ETHYL ESTER	8270	20
FAMPHUR	52-85-7	PHOSPHOROTHI OIC ACID, O-[4-[(DIMETHYLAMINO)SULFONYL]PHENYL] O, O-DIMETHYL ESTER	8270	20
FLUORANTHENE	206-44-0	FLUORANTHENE	8100 8270	200 10
FLUORENE	86-73-7	9H-FLUORENE	8100 8270	200 10
HEPTACHLOR	76-44-8	4, 7-METHANO-1H-INDENE, 1, 4, 5, 6, 7, 8, 8-HEPTACHLORO-3A, 4, 7, 7A- TETRAHYDRO-	8080 8270	0.05 10
HEPTACHLOR EPOXIDE	1024-57-3	2, 5-METHANO-2H-INDENO[1, 2-B] OXIRENE, 2, 3, 4, 5, 6, 7, 7- HEPTACHLORO-1A, 1B, 5, 5A, 6, 6A- HEXAHYDRO-, (1A, 1B, 2, 5, 5A, 6, 6A)	8080 8270	1 10
HEXACHLORO BENZENE	118-74-1	BENZENE, HEXACHLORO-	8120 8270	0.5 10
HEXACHLOROBUTADIENE	87-68-3	1, 3-BUTADIENE, 1, 1, 2, 3, 4, 4- HEXACHLORO-	8021 8120 8280 8270	0.5 5 10 10
HEXACHLOROCYCLOPENTADIENE	77-47-4	1, 3-CYCLOPENTADIENE, 1, 2, 3, 4, 5, 5- HEXACHLORO-	8120 8270	0.5 10
HEXACHLOROETHANE	67-72-1	ETHANE, HEXACHLORO-	8120 8280 8270	0.5 10 10
HEXACHLOROPROPENE	1888-71-7	1-PROPENE, 1, 1, 2, 3, 3, 3-HEXACHLORO-	8270	10
2-HEXANONE; METHYL BUTYL KETONE ..	591-78-6	2-HEXANONE	8260	50
INDENO(1, 2, 3-CD) PYRENE	193-39-5	INDENO(1, 2, 3-CD) PYRENE	8100 8270	200 10
ISOBUTYL ALCOHOL	78-83-1	1-PROPANOL, 2-METHYL-	8015 8240	50 100
ISODRIN	465-73-6	1, 4, 5, 8-DIMETHANONAPHTHALENE, 1, 2, 3, 4, 10, 10- HEXACHLORO-1, 4, 4A, 5, 8, 8A HEXAHYDRO- (1, 4, 4A, 5, 8, 8A)-	8270 8280	20 10
ISOPHORONE	78-59-1	2-CYCLOHEXEN-1-ONE, 3, 5, 5- TRIMETHYL-	8090 8270	60 10
ISOSAFROLE	120-58-1	1, 3-BENZODI OXOLE, 5-(1-PROPENYL)-	8270	10
KEPONE	143-50-0	1, 3, 4-METHENO-2H-CYCLOBUTA[CD] PENTALEN-2-ONE, 1, 1A, 3, 3A, 4, 5, 5, 5A, 5B, 6-DECACHLOROOCCTAHYDRO-	8270	20
LEAD	(TOTAL)	LEAD	6010 7420 7421	400 1000 10
MERCURY	(TOTAL)	MERCURY	7470	2
METHACRYLONITRILE	126-98-7	2-PROPENENITRILE, 2-METHYL-	8015 8260	5 100
METHAPYRILENE	91-80-5	1, 2-ETHANEDI AMINE, N, N-DIMETHYL-N {1}-2-PYRIDINYL-N1/2- THI ENYLMETHYL)-	8270	100
METHOXYCHLOR	72-43-5	BENZENE, 1, 1{1)-(2, 2, 2, TRI CHLOROETHYLIDENE) BIS[4-METHOXY	8080 8270	2 10
METHYL BROMIDE; BROMOMETHANE	74-83-9	METHANE, BROMO-	8010 8021	20 10
METHYL CHLORIDE; CHLOROMETHANE ...	74-87-3	METHANE, CHLORO-	8010 8021	1 0.3
3-METHYLCHOLANTHRENE	56-49-5	BENZ[J]ACEANTHRYLENE, 1, 2-DIHYDRO- 3-METHYL-	8270	10
METHYL ETHYL KETONE; MEK; 2- BUTANONE	78-93-3	2-BUTANONE	8015 8260	10 100
METHYL IODIDE; IODOMETHANE	74-88-4	METHANE, IODO-	8010 8280	40 10
METHYL METHACRYLATE	80-62-6	2-PROPENOIC ACID, 2-METHYL-, METHYL ESTER	8015 8260	2 30
METHYL METHANESULFONATE	66-27-3	METHANESULFONIC ACID, METHYL ESTER	8270	10
2-METHYLNAPHTHALENE	91-57-6	NAPHTHALENE, 2-METHYL-	8270	10

METHYL PARATHION; PARATHION METHYL	298-00-0	PHOSPHOROTHIOIC ACID, O, O-DIMETHYL	8140	0.5
			8141	1
			8270	10
4-METHYL-2-PENTANONE; METHYL ISOBUTYL KETONE	108-10-1	2-PENTANONE, 4-METHYL-	8015	5
			8260	100
METHYLENE BROMIDE; DI-BROMOMETHANE	74-95-3	METHANE, DI-BROMO-	8010	15
			8021	20
			8260	10
METHYLENE CHLORIDE; DI-CHLOROMETHANE	75-09-2	METHANE, DI-CHLORO-	8010	5
			8021	0.2
			8260	10
NAPHTHALENE	91-20-3	NAPHTHALENE	8021	0.5
			8100	200
			8260	5
			8270	10
1, 4-NAPHTHOQUINONE	130-15-4	1, 4-NAPHTHALENE-DIONE	8270	10
1-NAPHTHYLAMINE	134-32-7	1-NAPHTHALENAMINE	8270	10
2-NAPHTHYLAMINE	91-59-8	2-NAPHTHALENAMINE	8270	10
NICKEL	(TOTAL)	NICKEL	6010	150
			7520	400
O-NITROANILINE; 2-NITROANILINE	88-74-4	BENZENAMINE, 2-NITRO-	8270	50
M-NITROANILINE; 3-NITROANILINE	99-09-2	BENZENAMINE, 3-NITRO-	8270	50
P-NITROANILINE; 4-NITROANILINE	100-01-6	BENZENAMINE, 4-NITRO-	8270	20
NITROBENZENE	98-95-3	BENZENE, NITRO-	8090	40
			8270	10
O-NITROPHENOL; 2-NITROPHENOL	88-75-5	PHENOL, 2-NITRO-	8040	5
			8270	10
P-NITROPHENOL; 4-NITROPHENOL	100-02-7	PHENOL, 4-NITRO-	8040	10
			8270	50
N-NITROSODI-N-BUTYLAMINE	924-16-3	1-BUTANAMINE, N-BUTYL-N-NITROSO-	8270	10
N-NITROSODIETHYLAMINE	55-18-5	ETHANAMINE, N-ETHYL-N-NITROSO-	8270	20
N-NITROSODIMETHYLAMINE	62-75-9	METHANAMINE, N-METHYL-N-NITROSO-	8070	2
N-NITROSODIPHENYLAMINE	86-30-6	BENZENAMINE, N-NITROSO-N-PHENYL-	8070	5
N-NITROSODIISOPROPYLAMINE; N-NITROSO-N-DIISOPROPYLAMINE; DI-N-PROPYL-NITROSAMINE	621-64-7	1-PROPANAMINE, N-NITROSO-N-PROPYL-	8070	10
N-NITROSOMETHYLETHANAMINE	10595-95-6	ETHANAMINE, N-METHYL-N-NITROSO-	8270	10
N-NITROSOPYPERIDINE	100-75-4	PIPERIDINE, 1-NITROSO-	8270	20
N-NITROSOPYRROLIDINE	930-55-2	PYRROLIDINE, 1-NITROSO-	8270	40
5-NITRO-O-TOLUIDINE	99-55-8	BENZENAMINE, 2-METHYL-5-NITRO-	8270	10
PARATHION	56-38-2	PHOSPHOROTHIOIC ACID, O, O-DIETHYL O-(4-NITROPHENYL) ESTER	8141	0.5
			8270	10
PENTACHLOROBENZENE	608-93-5	BENZENE, PENTACHLORO-	8270	10
PENTACHLORONITROBENZENE	82-68-8	BENZENE, PENTACHLORONITRO-	8270	20
PENTACHLOROPHENOL	87-86-5	PHENOL, PENTACHLORO-	8040	5
			8270	50
PHENACETIN	62-44-2	ACETAMIDE, N-(4-ETHOXYPHENYL)	8270	20
PHENANTHRENE	85-01-8	PHENANTHRENE	8100	200
			8270	10
PHENOL	108-95-2	PHENOL	8040	1
P-PHENYLENEDIAMINE	106-50-3	1, 4-BENZENEDIAMINE	8270	10
PHORATE	298-02-2	PHOSPHOROTHIOIC ACID, O, O-DIETHYL S-[(ETHYLTHIO)METHYL] ESTER	8141	0.5
			8270	10
POLYCHLORINATED BIPHENYLS; PCBs; AROCLORS	SEENOTES	1, 1'-BIPHENYL, CHLORO DERIVATIVES	8060	50
PROPANAMINE	23950-58-5	BENZAMIDE, 3, 5-DICHLORO-N-(1, 1-DIMETHYL-2-PROPYNYL)-	8270	200
PROPIONITRILE; ETHYL CYANIDE	107-12-0	PROPANENITRILE	8015	60
			8260	150
PYRENE	129-00-0	PYRENE	8100	200
			8270	10
SAFROLE	94-59-7	1, 3-BENZODIOXOLE, 5-(2-PROPENYL)-	8270	10
SELENIUM	(TOTAL)	SELENIUM	6010	750
			7740	20
			7741	20
SILVER	(TOTAL)	SILVER	6010	70
			7760	100
			7761	10
SILVEX; 2, 4, 5-TP	93-72-1	PROPANOIC ACID, 2-(2, 4, 5-TRICHLOROPHENOXY)-	8150	2
STYRENE	100-42-5	BENZENE, ETHENYL-	8020	1
			8021	0.1
			8260	10
SULFIDE	18496-25-8	SULFIDE	9030	4000
2, 4, 5-T; 2, 4, 5-	93-76-5	ACETIC ACID, (2, 4, 5-TRICHLOROPHENOXY)	8150	2
, 2, 4, 5-TETRACHLOROBENZENE	95-94-3	BENZENE, 1, 2, 4, 5-TETRACHLORO-	8270	10
1, 1, 1, 2-TETRACHLOROETHANE	630-20-6	ETHANE, 1, 1, 1, 2-TETRACHLORO-	8010	5
			8021	0.05
			8260	5
1, 1, 2, 2-TETRACHLOROETHANE	79-34-5	ETHANE, 1, 1, 2, 2-TETRACHLORO-	8010	0.5
			8021	0.1
			8260	5
TETRACHLOROETHYLENE; TETRACHLOROETHENE; PERCHLOROETHYLENE	127-18-4	ETHENE, TETRACHLORO-	8010	0.5
			8021	0.5
			8260	5

2, 3, 4, 6-TETRACHLOROPHENOL	58-90-2	PHENOL, 2, 3, 4, 6-TETRACHLORO-	8270	10
THALLIUM	(TOTAL)	THALLIUM	6010	400
			7840	1000
			7841	10
TIIN	(TOTAL)	TIIN	6010	40
TOLUENE	108-88-3	BENZENE, METHYL-	8020	2
			8021	0.1
			8280	5
0-TOLUIDINE	95-53-4	BENZENAMINE, 2-METHYL-	8270	10
TOXAPHENE	SEENOTE10	TOXAPHENE	8080	2
1, 2, 4-TRI CHLORO BENZENE	120-82-1	BENZENE, 1, 2, 4-TRI CHLORO-	8021	0.3
			8120	0.5
			8280	10
			8270	10
1, 1, 1-TRI CHLOROETHANE; METHYLCHLOROFORM	71-55-6	ETHANE, 1, 1, 1-TRI CHLORO-	8010	0.3
			8021	0.3
			8280	5
1, 1, 2-TRI CHLOROETHANE	79-00-5	ETHANE, 1, 1, 2-TRI CHLORO-	8010	0.2
			8280	5
TRI CHLOROETHYLENE; TRI CHLOROETHENE	79-01-6	ETHENE, TRI CHLORO-	8010	1
			8021	0.2
			8280	5
TRI CHLOROFLUOROMETHANE; CFC-11 ...	75-69-4	METHANE, TRI CHLOROFLUORO-	8010	10
			8021	0.3
			8280	5
2, 4, 5-TRI CHLOROPHENOL	95-95-4	PHENOL, 2, 4, 5-TRI CHLORO-	8270	10
2, 4, 6-TRI CHLOROPHENOL	88-06-2	PHENOL, 2, 4, 6-TRI CHLORO-	8040	5
			8270	10
1, 2, 3-TRI CHLOROPROPANE	96-18-4	PROPANE, 1, 2, 3-TRI CHLORO-	8010	10
			8021	5
			8280	15
0, 0, 0-TRI ETHYL PHOSPHOROTHI OATE ..	128-68-1	PHOSPHOROTHI OIC ACID, 0, 0, 0- TRI ETHYLESTER	8270	10
SYM-TRINITROBENZENE	99-35-4	BENZENE, 1, 3, 5-TRINITRO-	8270	10
VANADIUM	(TOTAL)	VANADIUM	6010	80
165			7910	2000
			7911	40
VINYL ACETATE	108-05-4	ACETIC ACID, ETHENYL ESTER	8280	50
VINYL CHLORIDE; CHLOROETHENE	75-01-4	ETHENE, CHLORO-	8010	2
			8021	0.4
			8280	10
XYLENE (TOTAL)	SEENOTE11	BENZENE, DIMETHYL-	8020	5
			8021	0.2
			8280	5
ZINC	(TOTAL)	ZINC	6010	20
			7950	50
			7951	0.5

NOTES

{1}THE REGULATORY REQUIREMENTS PERTAIN ONLY TO THE LIST OF SUBSTANCES; THE RIGHT HAND COLUMNS (METHODS AND PQL) ARE GIVEN FOR INFORMATIONAL PURPOSES ONLY. SEE ALSO FOOTNOTES 5 AND 6 {2}COMMON NAMES ARE THOSE WIDELY USED IN GOVERNMENT REGULATIONS, SCIENTIFIC PUBLICATIONS, AND COMMERCE; SYNONYMS EXIST FOR MANY CHEMICALS {3}CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER. WHERE "TOTAL" IS ENTERED, ALL SPECIES IN THE GROUND WATER THAT CONTAIN THIS ELEMENT ARE INCLUDED. {4}CAS INDEX ARE THOSE USED IN THE 9TH COLLECTIVE INDEX. {5}SUGGESTED METHODS REFER TO ANALYTICAL PROCEDURE NUMBERS USED IN EPA REPORT SW-846 "TEST METHODS FOR EVALUATING SOLID WASTE", THIRD EDITION, NOVEMBER 1986, AS REVISED, DECEMBER 1987. ANALYTICAL DETAILS CAN BE FOUND IN SW-846 AND IN DOCUMENTATION ON FILE AT THE AGENCY. CAUTION: THE METHODS LISTED ARE REPRESENTATIVE SW-846 PROCEDURES AND MAY NOT ALWAYS BE THE MOST SUITABLE METHOD(S) FOR MONITORING AN ANALYTE UNDER THE REGULATIONS. {6}PRACTICAL QUANTITATION LIMITS (PQLS) ARE THE LOWEST CONCENTRATIONS OF ANALYTES IN GROUND WATERS THAT CAN BE RELIABLY DETERMINED WITHIN SPECIFIED LIMITS OF PRECISION AND ACCURACY BY THE INDICATED METHODS UNDER ROUTINE LABORATORY OPERATING CONDITIONS. THE PQLS LISTED ARE GENERALLY STATED TO ONE SIGNIFICANT FIGURE. PQLS ARE BASED ON 5 ML SAMPLES FOR VOLATILE ORGANICS AND 1 L SAMPLES FOR SEMIVOLATILE ORGANICS. CAUTION: THE PQL VALUES IN MANY CASES ARE BASED ONLY ON A GENERAL ESTIMATE FOR THE METHOD AND NOT ON A DETERMINATION FOR INDIVIDUAL COMPOUNDS; PQLS ARE NOT A PART OF THE REGULATION. {7}THIS SUBSTANCE IS OFTEN CALLED BIS(2-CHLOROISOPROPYL) ETHER, THE NAME CHEMICAL ABSTRACTS SERVICE APPLIES TO ITS NONCOMMERCIAL ISOMER, PROPANE, 2, 2'-OXYBIS[2-CHLORO- (CAS RN 39638-32-9). {8}CHLORDANE: THIS ENTRY INCLUDES ALPHA-CHLORDANE (CAS RN 5103-71-9), BETA-CHLORDANE (CAS RN 5103-74-2), GAMMA-CHLORDANE (CAS RN 5568-34-7), AND CONSTITUENTS OF CHLORDANE (CAS RN 57-74-9 AND CAS RN 12789-03-6). PQL SHOWN IS FOR TECHNICAL CHLORDANE. PQLS OF SPECIFIC ISOMERS ARE ABOUT 20 {9}POLYCHLORINATED BI-PHENYLS (CAS RN 1336-36-3); THIS CATEGORY CONTAINS CONGENER CHEMICALS, INCLUDING CONSTITUENTS OF AROCLOR 1016 (CAS RN 12874-11-2), AROCLOR 1221 (CAS RN 11104-28-2), AROCLOR 1232 (CAS RN 11141-16-5), AROCLOR 1242 (CAS RN 53469-21-9), AROCLOR 1248 (CAS RN 12872-29-6), AROCLOR 1254 (CAS RN 11097-69-1), AND AROCLOR 1280 (CAS RN 11096-82-5). THE PQL SHOWN IS AN AVERAGE VALUE FOR PCB CONGENERS. {10}TOXAPHENE: THIS ENTRY INCLUDES CONGENER CHEMICALS CONTAINED IN TECHNICAL TOXAPHENE (CAS RN 8001-35-2), I. E., CHLORINATED CAMPHERE. {11}XYLENE (TOTAL): THIS ENTRY INCLUDES O-XYLENE (CAS RN 98-47-6), M-XYLENE (CAS RN 108-38-3), P-XYLENE (CAS RN 106-42-3), AND UNSPECIFIED XYLENES (DIMETHYLBENZENES) (CAS RN 1330-20-7). PQLS FOR METHOD 8021 ARE 0.2 FOR O-XYLENE AND 0.1 FOR M-OR P-XYLENE. THE PQL FOR M-XYLENE IS 2.0

□G/L BY METHOD

□G/L BY METHOD 8020 OR 8260.

MAXIMUM CONTAMINANT LEVELS (MCL) PROMULGATED UNDER THE SAFE DRINKING WATER ACT

CHEMICAL	CAS NO.	MCL (MG/L)
ARSENIC	7440-38-2	0.05
BARIUM	7440-39-3	1.0
BENZENE	71-343-2	0.005
CADMIUM	7440-43-9	0.01
CARBON TETRACHLORIDE	56-23-5	0.005
CHROMIUM (HEXAVALENT)	7440-47-3	0.05
2, 4-DICHLOROPHENOXY ACETIC ACID	94-75-7	0.1
1, 4-DICHLOROBENZENE	106-46-7	0.075
1, 2-DICHLOROETHANE	107-08-2	0.005
1, 1-DICHLOROETHYLENE	75-35-4	0.007
ENDRIN	75-20-8	0.0002
FLUORIDE	7	4.0
LINDANE	58-89-9	0.004
LEAD	7439-92-1	0.05
MERCURY	7439-97-6	0.002
METHOXYCHLOR	72-43-5	0.1
NITRATE		10.0
SELENIUM	7782-49-2	0.01
SILVER	7440-22-4	0.05
TOXAPHENE	8001-35-2	0.005
1, 1, 1-TRICHLOROETHANE	71-55-6	0.2
TRICHLOROETHYLENE	79-01-6	0.005
2, 4, 5-TRICHLOROPHENOXY ACETIC ACID	93-76-5	0.01
VINYL CHLORIDE	75-01-4	0.002

APPENDIX E

CCOD CERTIFIED BUILDING INSPECTOR WORK DAT DOCUMENTATION FORM



City and County of Denver
Certified Asbestos Building Inspector Work Day Documentation
 Project Name _____

DDPNE V1.0

Inspector Name: _____	Date: _____
Inspector Certification Number: _____	Weather: _____
Inspector's Company/Affiliation: _____	
Location Description: _____	
Description of Site Activities: _____	
Equipment Used (Model Number): _____	

CABI Documentation

Identify environmental hazards discussed at the safety meeting:

<input type="checkbox"/> Delineation of Work Area	<input type="checkbox"/> Equipment Mobilization
<input type="checkbox"/> Work Zones	<input type="checkbox"/> Emissions Controls
<input type="checkbox"/> Utility Identification	<input type="checkbox"/> Fencing and Wind Barriers
<input type="checkbox"/> Haul Routes / Access	<input type="checkbox"/> Other: _____

Description of Encountered Debris Materials and Practices

1A	Types of Debris Identified (List all materials, clarify depths of piles): _____ _____ _____
1B	Description of Suspect Debris Material (RACS/ Non-RACS): _____ _____
1C	Description of Hand Removals (Assumed RACS or Analyzed To Be RACS): _____ _____
1D	Friability of Suspect Debris Materials: _____ _____
1E	Observation of Non-Earthen Material or the Appearance of Fill: _____ _____
1F	Observation of Any Other Impacted Soils (Non-Asbestos impacts): _____ _____

Bulk Sample Log

Sample ID#	Time Sampled	Depth	Sample Location/Description	Asbestos Content From Analytical

RACS Management Detail

Decontamination																																																																																			
No.	Items	YES	NO																																																																																
2A	Have all equipment surfaces in contact with RACS been decontaminated?	<input type="radio"/>	<input type="radio"/>																																																																																
	Details:																																																																																		
2B	Have workers conducted personal and equipment decontamination in accordance with applicable procedures?	<input type="radio"/>	<input type="radio"/>																																																																																
	Details:																																																																																		
Engineering and Administrative Controls																																																																																			
No.	Items	YES	NO																																																																																
3	Onsite Staging, Stockpiling, & Storage of RACS	<input type="radio"/>	<input type="radio"/>																																																																																
	Annual Awareness Training for Regulated Work Area Personnel	<input type="radio"/>	<input type="radio"/>																																																																																
	Annual Awareness Training for Non-Regulated Work Area Personnel	<input type="radio"/>	<input type="radio"/>																																																																																
	Details: (provide detailed description of any deficiencies)																																																																																		
Spill Response																																																																																			
No.	Items	YES	NO																																																																																
4		<input type="radio"/>	<input type="radio"/>																																																																																
Details (provide information on corrective actions):																																																																																			
Air Monitoring information As Applicable																																																																																			
General Conditions																																																																																			
No.	Items	YES	NO																																																																																
5A	Were work conditions maintained below stoppage requirements?	<input type="radio"/>	<input type="radio"/>																																																																																
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Half Wind Speed</td> <td style="width: 25%;"> gust Max</td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> </table>				Half Wind Speed	 gust Max																																																																													
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	Details (Provide Prevailing Wind Direction and 30-Minute Readings):																																																																																		
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Details of Wind Shut Down Event (If Applicable):																																																																																			
5B	Visible emissions observed?	<input type="radio"/>	<input type="radio"/>																																																																																
	If visible emissions were observed, was worked stopped?	<input type="radio"/>	<input type="radio"/>																																																																																
	Details (provide information on corrective actions):																																																																																		

Perimeter Monitoring			
6A	Adequate perimeter sampling points based on test area?	<input type="radio"/>	<input type="radio"/>
	No disturbance to sampling equipment or power source?	<input type="radio"/>	<input type="radio"/>
	Were samples compromised in any way?	<input type="radio"/>	<input type="radio"/>
	Details:		
6B	Has the pump been calibrated?	<input type="radio"/>	<input type="radio"/>
	Details (Pump Calibration Method):		
6C	Is there an adjacent public receptor zone within 150 ft. of a Regulated Work Area?	<input type="radio"/>	<input type="radio"/>
	Details (Location):		

Air Sample Log								
Sample ID#	Start Time	Stop Time	Total Minutes:	Flow Rate Start:	Flow Rate Stop:	Sample Location	Volume	f/cc

Contractor Monitoring			
No.	Items	YES	NO
7	Is contractor working in the regulated work area conducting personal monitoring?	<input type="radio"/>	<input type="radio"/>
	Details:		

Work Practices and Completion			
No.	Items	YES	NO
8A	Are work practices conducted in accordance with the project MMP and State regulations?	<input type="radio"/>	<input type="radio"/>
	Have excavation and loading activities been conducted in accordance with applicable procedures?	<input type="radio"/>	<input type="radio"/>
	Details:		
8B	Have loading and transportation requirements been met?	<input type="radio"/>	<input type="radio"/>
	Details:		
8C	Has visible material and associated soils been removed?	<input type="radio"/>	<input type="radio"/>
	Details:		
8D	Have appropriate samples been collected to confirm ACS has been removed?	<input type="radio"/>	<input type="radio"/>
	Details:		

Soils Disposition

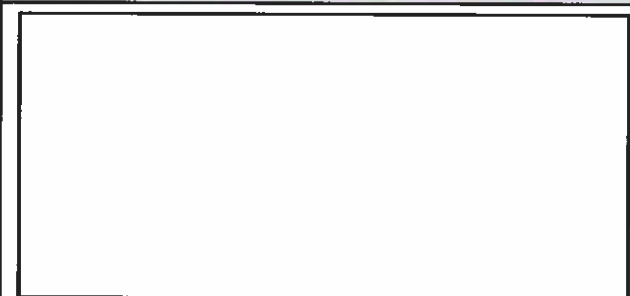
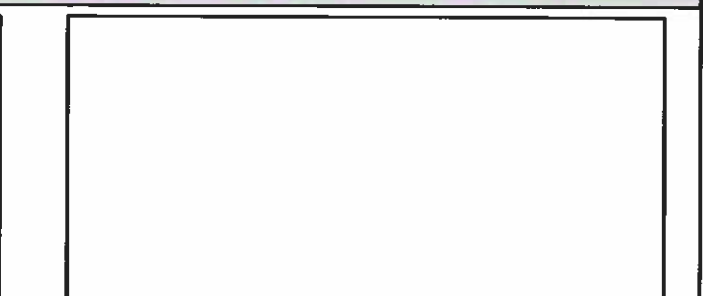
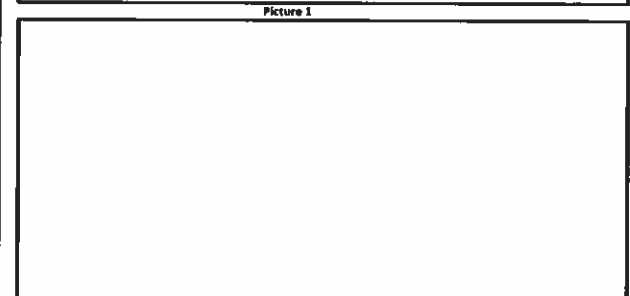
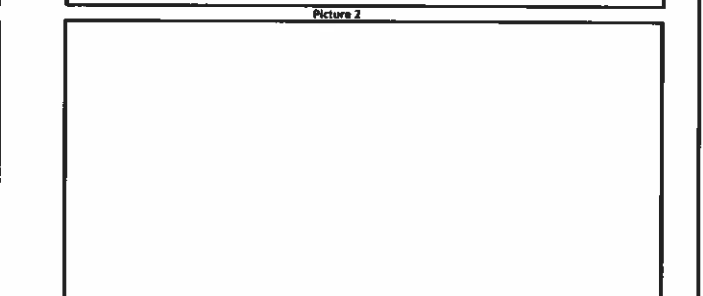
9A	Where did the soil originate (depth, specific area)?
9B	Temporary or final disposition of soil (where on-site or disposed)?
9C	Method of material movement (What type of truck and loading)?

How many cubic yards of soil excavated during shift? (0 - 10000 yds.)	
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Comments:

Provide at least 4 Photos From Daily Operations Where RACS Management is Being Done
During RACS Management Operations, include a Map of RACS Management Location(s) with this Documentation

ASSOCIATED PHOTOS

Picture 1

Picture 2

Picture 3

Picture 4

CABI Field Inspector Name _____ Date _____