CITY AND COUNTY OF DENVER

STATE OF COLORADO

DEPARTMENT OF PUBLIC WORKS

Contract Documents

Contract Number: 201840154

Federal Blvd Reconstruction

5th Ave to Howard Place

February 13, 2018

DENVER
THE MILE HIGH CITY

NOTICE OF APPARENT LOW BIDDER

Ames Construction, Inc.
18450 E 28th Avenue
Aurora, Colorado 80011

The EXECUTIVE DIRECTOR OF PUBLIC WORKS has considered the Bids submitted on **March 15, 2018,** for work to be done and materials to be furnished in and for:

CONTRACT #201840154 Federal Blvd Reconstruction, 5th Avenue to Howard Place

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: **bid item numbers (201 through 700 (Three Hundred and Twenty-Nine [329] total bid items) which includes Seven [7] Force Accounts),** the total estimated cost thereof being: **Twelve Million Eight Hundred Forty-Nine Thousand Two Hundred Dollars and Zero Cents ($12,849,200.00).**

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
THE MILE HIGH CITY

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 29th day of March 2018.

CITY AND COUNTY OF DENVER

By _____
Eulois Cleckley
Executive Director of Public Works

cc: Kristen Moore (CAO), Treasury (taxaudadmin@denvergov.org), Ryan Urich (Treasury), Cindy Ackerman (DSBO), Jim Geist (PM), Prevailing Wage(prevailingwage@denvergov.org), Kandice McKeon (PREV WAGE), File.

CITY AND COUNTY OF DENVER

STATE OF COLORADO

DEPARTMENT OF PUBLIC WORKS

Bid Form Package

Contract Number: 201840154

Federal Blvd Reconstruction

5th Ave to Howard Place

February 13, 2018

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
Capital Project Management

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BID FORM AND SUBMITTAL PACKAGE

FHWA Contract Forms

DENVER
THE MILE HIGH CITY

This Checklist is provided solely for the assistance of the bidders, and need <u>not</u> 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 <u>at the time of Bid Opening.</u> 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.)	☒
BF-6+	a.) Fill in individual bid item dollars and totals in Numerical figures only	☒
	b.) Complete all blanks	☒
	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	☒
	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	☒
BF-9 – BF-10	a.) Fully complete List of Proposed Disadvantaged Business Enterprise Bidders, Subcontractors, Suppliers, Manufacturers, or Brokers – check appropriate boxes.	☒
BF-11	a.) Complete all blanks	☒
	b.) If Addenda have been issued, complete bottom section.	☒
BF-12	a.) Complete appropriate sections - signature(s) required.	☒
	b.) If corporation, then corporate seal required.	☒
BF-13	a.) Fully complete Commitment to Participation	☒
BF-16	a.) If applicable, fully complete Joint Venture Affidavit (Submit 10 days prior to Bid Opening date)	☐ N/A
BF-17 – BF-19	a.) If applicable, fully complete Joint Venture Eligibility Form (Submit 10 days prior to Bid Opening date)	☐
BF-20	a.) Fill in all Bid Bond blanks	☒
	b.) Signatures required	☒
	c.) Corporate Seal if required	☒
	d.) Dated	☒
	e.) Attach Surety Agents Power of Attorney 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.	☒
BF-25 - BF-27	Complete all CDOT forms, including:	
	a.) Contractors Performance Capability Statement	☒
	b.) Anti-Collusion Affidavit	☒
	c.) Assignment of Anti-Trust Claims	☒

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
Capital Project Management

BID FORM AND SUBMITTAL PACKAGE ACKNOWLEDGMENT

CONTRACT NO. 201840154
FEDERAL AID PROJECT NO: NHPP 2873-172/19957
FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

BIDDER: Ames Construction, Inc.
(Legal Name per Colorado Secretary of State)

ADDRESS: 18450 E. 28th Avenue
Aurora, CO 80011

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. 201840154, FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE**, made available to the undersigned bidder pursuant to Notice of Invitation for Bids dated «Issue_Date».

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 Disadvantaged Business Enterprise(s)
Commitment to Disadvantaged Business Enterprise Participation
DBE Letter(s) of Intent
Joint Venture Affidavit (if applicable)
Joint Venture Eligibility Form (if applicable)
Bid Bond
Bidder / Contractor / Vendor / Proposer Disclosure Form

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
Insurance Provision

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: **ATTEST:**

Name: Amey Construction, Inc. **By:**

By:

Title: Senior Vice President [SEAL]

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
Capital Project Management

BID FORM

CONTRACT NO. 201840154
FEDERAL AID PROJECT NO: NHPP 2873-172/19957

FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

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

BIDDER Ames Construction, Inc.

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 **February 13, 2018**, to furnish all required materials, tools, appliances, equipment and plant; to perform all necessary labor and to undertake and complete: **NHPP 2873-172/19957 CITY OF DENVER CONTRACT NO. 201840154, FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE** 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
Bid Bond
Addenda (as applicable)
DBE Documents
Equal Employment Opportunity Provisions (Appendices A, B, E and F)
Bid Form
Commitment to DBE Participation
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
Contractors Performance Capability Statement
Anti-Collusion Affidavit
Assignment of Anti-Trust Claims
Underutilized DBE Bid Conditions Assurance
On-the-Job Training (where applicable)
Required Contract Provisions Federal Aid Construction Contracts
Prevailing Wage Rate Schedule(s)
Technical Specifications
Contract Drawings
Accepted Shop Drawings
Certificate of Insurance

Item No.	Description and Price	Estimated Quantity	Estimated Cost
201	**CLEARING AND GRUBBING** at the unit price of $ 86,000.00 per LUMP SUM.	1 LS	$ 86,000.00
202	**REMOVAL OF STRUCTURES AND OBSTRUCTIONS** at the unit price of $ 25,000.00 per LUMP SUM.	1 LS	$ 25,000.00
202	**REMOVAL OF TREE** at the unit price of $ 900.00 per EACH.	21 EA	$ 18,900.00
202	**REMOVAL OF BOLLARD** at the unit price of $ 70.00 per EACH.	20 EA	$ 1,400.00
202	**REMOVAL OF POWER OUTLET** at the unit price of $ 125.00 per EACH.	10 EA	$ 1,250.00
202	**REMOVAL OF WHEEL STOP** at the unit price of $ 51.00 per EACH.	14 EA	$ 714.00
202	**REMOVAL OF INLET** at the unit price of $ 800.00 per EACH.	8 EA	$ 6,400.00
202	**REMOVAL OF MANHOLE** at the unit price of $ 2,000.00 per EACH.	2 EA	$ 4,000.00
202	**REMOVAL OF GABION** at the unit price of $ 100.00 per CUBIC YARD.	5 CY	$ 500.00
202	**REMOVAL OF PIPE** at the unit price of $ 45.00 per LINEAR FEET.	626 LF	$ 28,170.00
202	**REMOVAL OF FIRE HYDRANT** at the unit price of $ 800.00 per EACH.	3 EA	$ 2400.00
202	**REMOVAL OF WATER SERVICE LINE** at the unit price of $ 830.00 per EACH.	31 EA	$ 25,730.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
202	**REMOVAL OF WATER METER** at the unit price of $ 200.00 per EACH.	28 EA	$ 5,600.00
202	**REMOVAL OF WALL** at the unit price of $ 180.00 per LINEAR FEET.	12 LF	$ 2,160.00
202	**REMOVAL OF SIDEWALK** at the unit price of $ 11.00 per SQUARE YARD.	5,336 SY	$ 58,696.00
202	**REMOVAL OF CURB AND GUTTER** at the unit price of $ 5.00 per LINEAR FEET.	9,574 LF	$ 47,870.00
202	**REMOVAL OF CURB** at the unit price of $ 9.00 per LINEAR FEET.	40 LF	$ 360.00
202	**REMOVAL OF CONCRETE PAVEMENT** at the unit price of $ 7.00 per SQUARE YARD.	5,051 SY	$ 35,357.00
202	**REMOVAL OF ASPHALT MAT** at the unit price of $ 13.00 per SQUARE YARD.	33,179 SY	$ 431,327.00
202	**REMOVAL OF PAVEMENT MARKING** at the unit price of $ 2.00 per SQUARE FEET.	3,175 SF	$ 6,350.00
202	**REMOVAL OF LIGHT STANDARD** at the unit price of $ 330.00 per EACH.	11 EA	$ 3,630.00
202	**REMOVAL OF LIGHT STANDARD FOUNDATION** at the unit price of $ 520.00 per EACH.	17 EA	$ 8,840.00
202	**REMOVAL OF GROUND SIGN** at the unit price of $ 80.00 per EACH.	24 EA	$ 1,920.00
202	**REMOVAL OF SIGN PANEL** at the unit price of $ 32.00 per EACH.	15 EA	$ 480.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
202	**REMOVAL OF SIGN (SPECIAL)** at the unit price of $ 1,600.00 per EACH.	5 EA	$ 8,000.00
202	**REMOVAL OF TRAFFIC SIGNAL EQUIPMENT** at the unit price of $ 11,000.00 per LUMP SUM.	1 LS	$ 11,000.00
202	**REMOVAL OF FENCE** at the unit price of $ 6.00 per LINEAR FEET.	1,319 LF	$ 7,914.00
202	**REMOVAL OF GUARDRAIL TYPE 3** at the unit price of $ 7.00 per LINEAR FEET.	216 LF	$ 1,512.00
202	**ABANDON WATER SERVICE** at the unit price of $ 1,200.00 per EACH.	13 EA	$ 15,600.00
202	**CLEAN VALVE BOX** at the unit price of $ 150.00 per EACH.	34 EA	$ 5,100.00
202	**PLUG PIPE** at the unit price of $ 1,900.00 per EACH.	7 EA	$ 13,300.00
203	**UNCLASSIFIED EXCAVATION (COMPLETE IN PLACE)** at the unit price of $ 30.00 per CUBIC YARD.	11,970 CY	$ 359,100.00
203	**MUCK EXCAVATION** at the unit price of $ 45.00 per CUBIC YARD.	500 CY	$ 22,500.00
203	**COMBINATION LOADER** at the unit price of $ 135.00 per HOUR.	30 HR	$ 4,050.00
203	**POTHOLING** at the unit price of $ 375.00 per HOUR.	100 HR	$ 37,500.00
206	**STRUCTURE EXCAVATION** at the unit price of $ 25.00 per CUBIC YARD.	833 CY	$ 20,825.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
206	**STRUCTURE BACKFILL (CLASS 1)** at the unit price of $ 32.00 per CUBIC YARD.	790 CY	$ 25,280.00
206	**STRUCTURE BACKFILL (CLASS 2)** at the unit price of $ 30.00 per CUBIC YARD.	33 CY	$ 990.00
206	**STRUCTURE BACKFILL (FLOW-FILL)** at the unit price of $ 220.00 per CUBIC YARD.	100 CY	$ 22,000.00
206	**SHORING** at the unit price of $ 40,000.00 per LUMP SUM.	1 LS	$ 40,000.00
206	**SHORING (JACKING PIT)** at the unit price of $ 20,000.00 per LUMP SUM.	1 LS	$ 20,000.00
206	**SHORING (RECEIVING PIT)** at the unit price of $ 10,000.00 per LUMP SUM.	1 LS	$ 10,000.00
207	**TOPSOIL** at the unit price of $ 32.00 per CUBIC YARD.	796 CY	$ 25,472.00
207	**STOCKPILE TOPSOIL** at the unit price of $ 16.00 per CUBIC YARD.	1,000 CY	$ 16,000.00
207	**PLANTER SOIL MIX** at the unit price of $ 85.00 per CUBIC YARD.	671 CY	$ 57,035.00
208	**EROSION LOG TYPE 1 (12 INCH)** at the unit price of $ 20.00 per LINEAR FEET.	54 LF	$ 1,080.00
208	**SILT FENCE** at the unit price of $ 8.00 per LINEAR FEET.	1,000 LF	$ 8,000.00
208	**SILT FENCE (REINFORCED)** at the unit price of $ 9.00 per LINEAR FEET.	336 LF	$ 3,024.00
208	**AGGREGATE BAG** at the unit price of $ 20.00 per LINEAR FEET.	1,825 LF	$ 36,500.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
208	**CONCRETE WASHOUT STRUCTURE** at the unit price of $ 8,500.00 per LUMP SUM.	1 LS	$ 8,500.00
208	**STORM DRAIN INLET PROTECTION (TYPE I)** at the unit price of $ 20.00 per LINEAR FEET.	400 LF	$ 8,000.00
208	**STORM DRAIN INLET PROTECTION (TYPE II)** at the unit price of $ 90.00 per LINEAR FEET.	40 LF	$ 3,600.00
208	**STORM DRAIN INLET PROTECTION (TYPE III)** at the unit price of $ 500.00 per EACH.	3 EA	$ 1,500.00
208	**VEHICLE TRACKING PAD** at the unit price of $ 4,500.00 per EACH.	2 EA	$ 9,000.00
208	**REMOVAL AND DISPOSAL OF SEDIMENT (LABOR)** at the unit price of $ 65.00 per HOUR.	40 HR	$ 2,600.00
208	**REMOVAL AND DISPOSAL OF SEDIMENT (EQUIPMENT)** at the unit price of $ 250.00 per HOUR.	30 HR	$ 7,500.00
208	**SWEEPING (SEDIMENT REMOVAL)** at the unit price of $ 140.00 per HOUR.	190 HR	$ 26,600.00
208	**REMOVAL OF TRASH** at the unit price of $ 340.00 per HOUR.	100 HR	$ 34,000.00
208	**EROSION CONTROL MANAGEMENT (ECM)** at the unit price of $ 270.00 per DAY.	380 DAY	$ 102,600.00
210	**RESET STRUCTURE (SIGN 2)** at the unit price of $ 8,000.00 per EACH.	1 EA	$ 8,000.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
210	**RESET STRUCTURE (SIGN 3)** at the unit price of $ 8,000.00 per EACH.	1 EA	$ 8,000.00
210	**RESET STRUCTURE (SIGN 4)** at the unit price of $ 8,000.00 per EACH.	1 EA	$ 8,000.00
210	**RESET STRUCTURE (SIGN 5)** at the unit price of $ 8,000.00 per EACH.	1 EA	$ 8,000.00
210	**RESET STRUCTURE (SIGN 6)** at the unit price of $ 8,000.00 per EACH.	1 EA	$ 8,000.00
210	**RESET WHEEL STOP** at the unit price of $ 220.00 per EACH.	5 EA	$ 1,100.00
210	**RESET FIRE HYDRANT** at the unit price of $ 1,800.00 per EACH.	3 EA	$ 5,400.00
210	**RESET LIGHT STANDARD** at the unit price of $ 1,900.00 per EACH.	1 EA	$ 1,900.00
210	**RESET GROUND SIGN** at the unit price of $ 150.00 per EACH.	1 EA	$ 150.00
210	**RESET SIGN PANEL** at the unit price of $ 35.00 per EACH.	17 EA	$ 595.00
210	**RESET VARIABLE MESSAGE SIGN** at the unit price of $ 5,000.00 per EACH.	1 EA	$ 5,000.00
210	**RESET TRAFFIC SIGNAL HEAD** at the unit price of $ 1,600.00 per EACH.	1 EA	$ 1,600.00
210	**RESET TRAFFIC SIGNAL POLE** at the unit price of $ 2,200.00 per EACH.	1 EA	$ 2,200.00
210	**RESET TRAFFIC SIGNAL CONTROLLER AND CABINET** at the unit price of $ 500.00 per EACH.	1 EA	$ 500.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
210	**RESET GATE** at the unit price of $ 2,000.00 per EACH.	1 EA	$ 2,000.00
210	**RESET CHAIN LINK FENCE** at the unit price of $ 40.00 per LINEAR FEET.	121 LF	$ 4,840.00
210	**RESET TREE GRATE** at the unit price of $ 1,100.00 per EACH.	1 EA	$ 1,100.00
210	**ADJUST MANHOLE** at the unit price of $ 1,000.00 per EACH.	22 EA	$ 22,000.00
210	**MODIFY MANHOLE** at the unit price of $ 2,000.00 per EACH.	1 EA	$ 2,000.00
210	**ADJUST VALVE BOX** at the unit price of $ 600.00 per EACH.	34 EA	$ 20,400.00
211	**WATER CONTROL** at the unit price of $ 53,000.00 per LUMP SUM.	1 LS	$ 53,000.00
212	**SEEDING (NATIVE)** at the unit price of $ 3,500.00 per ACRE.	.82 ACRE	$ 2,870.00
212	**SOIL CONDITIONING** at the unit price of $ 9,700.00 per ACRE.	.98 ACRE	$ 9,506.00
212	**LANDSCAPE RESTORATION** at the unit price of $ 26,000.00 per LUMP SUM.	1 LS	$ 26,000.00
213	**METAL EDGER** at the unit price of $ 6.00 per LINEAR FEET.	135 LF	$ 810.00
213	**MULCHING (WEED FREE HAY)** at the unit price of $ 1,600.00 per ACRE.	.55 ACRE	$ 880.00
213	**MULCHING (WOOD)** at the unit price of $ 5.00 per CUBIC FEET.	488 CF	$ 2,440.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
213	**MULCHING (DECORATIVE)** at the unit price of $ 6.00 per CUBIC FEET.	1,185 CF	$ 7,110.00
213	**TREE PLANTER (GRATES)** at the unit price of $ 3,100.00 per EACH.	31 EA	$ 96,100.00
213	**LANDSCAPE BOULDER** at the unit price of $ 500.00 per EACH.	8 EA	$ 4,000.00
214	**LANDSCAPE MAINTENANCE (24 MONTH)** at the unit price of $ 79,000.00 per LUMP SUM.	1 LS	$ 79,000.00
214	**DECIDUOUS TREE (2 INCH CALIPER)** at the unit price of $ 615.00 per EACH.	16 EA	$ 9,840.00
214	**DECIDUOUS TREE (3 INCH CALIPER)** at the unit price of $ 720.00 per EACH.	38 EA	$ 27,360.00
214	**DECIDUOUS SHRUB (5 GALLON CONTAINER)** at the unit price of $ 50.00 per EACH.	174 EA	$ 8,700.00
214	**EVERGREEN SHRUB (5 GALLON CONTAINER)** at the unit price of $ 55.00 per EACH.	16 EA	$ 880.00
214	**PERENNIALS (1 GALLON CONTAINER)** at the unit price of $ 20.00 per EACH.	666 EA	$ 13,320.00
216	**SOIL RETENTION BLANKET (STRAW-COCONUT) (PHOTODEGRADABLE CLASS 1)** at the unit price of $ 3.00 per SQUARE YARD.	1,320 SY	$ 3,960.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
240	**WILDLIFE BIOLOGIST** at the unit price of $ 155.00 per HOUR.	40 HR	$ 6,200.00
240	**REMOVAL OF NESTS** at the unit price of $ 155.00 per HOUR.	40 HR	$ 6,200.00
250	**ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT** at the unit price of $ 3,600.00 per LUMP SUM.	1 LS	$ 3600.00
250	**PROJECT SPECIFIC RACS MANAGEMENT PLAN** at the unit price of $ 2,600.00 per LUMP SUM.	1 LS	$ 2,600.00
250	**MATERIALS MANAGEMENT PLAN SUPERVISOR** at the unit price of $ 67.00 per HOUR.	2,816 HR	$ 188,672.00
250	**HEALTH AND SAFETY OFFICER** at the unit price of $ 67.00 per HOUR.	200 HR	$ 13,400.00
250	**CERTIFIED ASBESTOS BUILDING INSPECTOR** at the unit price of $ 88.00 per HOUR.	1,408 HR	$ 123,904.00
250	**IMPORT MATERIAL SAMPLING EVENT** at the unit price of $ 5,200.00 per EACH.	2 EA	$ 10,400.00
250	**MATERIAL HANDLING (STOCKPILE)** at the unit price of $ 36.00 per CUBIC YARD.	2,556 CY	$ 92,016.00
250	**SOLID WASTE DISPOSAL** at the unit price of $ 46.00 per CUBIC YARD.	2,556 CY	$ 117,576.00
250	**HAUL NON-HAZARDOUS WASTE** at the unit price of $ 52.00 per CUBIC YARD.	2,000 CY	$ 104,000.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
304	**AGGREGATE BASE COURSE (CLASS 6)** at the unit price of $ 45.00 per CUBIC YARD.	7,049 CY	$ 317,205.00
403	**HOT MIX ASPHALT (PATCHING) (ASPHALT)** at the unit price of $ 150.00 per TON.	869 TON	$ 130,350.00
403	**HOT MIX ASPHALT (GRADING S) (100) (PG 64-22)** at the unit price of $ 126.00 per TON.	668 TON	$ 84,168.00
403	**HOT MIX ASPHALT (GRADING SX) (100) (PG 76-28)** at the unit price of $ 179.00 per TON.	397 TON	$ 71,063.00
412	**CONCRETE PAVEMENT (8 INCH)** at the unit price of $ 50.00 per SQUARE YARD.	2,741 SY	$ 137,050.00
412	**CONCRETE PAVEMENT (10.5 INCH)** at the unit price of $ 65.00 per SQUARE YARD.	26,561 SY	$ 1,726,465.00
412	**CONCRETE PAVEMENT (10.5 INCH) (FAST TRACK)** at the unit price of $ 80.00 per SQUARE YARD.	405 SY	$ 32,400.00
412	**CONCRETE PAVEMENT (10.5 INCH) (SPECIAL)** at the unit price of $ 87.00 per SQUARE YARD.	875 SY	$ 76,125.00
412	**CONCRETE PAVEMENT (11 INCH)** at the unit price of $ 67.00 per SQUARE YARD.	599 SY	$ 40,133.00
412	**CONCRETE PAVEMENT (11 INCH) (FAST TRACK)** at the unit price of $ 86.00 per SQUARE YARD.	619 SY	$ 53,234.00
420	**GEOTEXTILE (SEPARATOR) (CLASS 1)** at the unit price of $ 1.50 per SQUARE YARD.	29,209 SY	$ 43,813.50

Item No.	Description and Price	Estimated Quantity	Estimated Cost
503	**DRILLED CAISSON (30 INCH)** at the unit price of $ 205.00 per LINEAR FEET.	1,112 LF	$ 227,960.00
503	**DRILLED CAISSON (36 INCH)** at the unit price of $ 380.00 per LINEAR FEET.	93 LF	$ 35,340.00
503	**DRILLED CAISSON (48 INCH)** at the unit price of $ 445.00 per LINEAR FEET.	51 LF	$ 22,695.00
504	**RETAINING WALL (BOULDER)** at the unit price of $ 160.00 per SQUARE FEET.	72 SF	$ 11,520.00
506	**RIPRAP (6 INCH)** at the unit price of $ 200.00 per CUBIC YARD.	4 CY	$ 800.00
514	**PEDESTRIAN RAILING (STEEL)** at the unit price of $ 360.00 per LINEAR FEET.	93 LF	$ 33,480.00
514	**PEDESTRIAN RAILING (STEEL) (SPECIAL)** at the unit price of $ 400.00 per LINEAR FEET.	50 LF	$ $ 20,000.00
601	**CONCRETE CLASS B** at the unit price of $ 1,600.00 per CUBIC YARD.	5 CY	$ 8,000.00
601	**CONCRETE CLASS D (WALL)** at the unit price of $ 800.00 per CUBIC YARD.	139 CY	$ 111,200.00
601	**STRUCTURAL CONCRETE COATING** at the unit price of $ 20.00 per SQUARE YARD.	222 SY	$ 4,440.00
602	**REINFORCING STEEL** at the unit price of $ 1.00 per POUND.	14,764 LB	$ 14,764.00
602	**REINFORCING STEEL (EPOXY COATED)** at the unit price of $ 2.00 per POUND.	240 LB	$ 480.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
603	**15 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 163.00 per LINEAR FEET.	73 LF	$ 11,899.00
603	**18 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 148.00 per LINEAR FEET.	992 LF	$ 146,816.00
603	**24 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 167.00 per LINEAR FEET.	728 LF	$ 121,576.00
603	**30 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 235.00 per LINEAR FEET.	207 LF	$ 48,645.00
603	**36 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 305.00 per LINEAR FEET.	30 LF	$ 9,150.00
603	**42 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 330.00 per LINEAR FEET.	613 LF	$ 202,290.00
603	**54 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)** at the unit price of $ 465.00 per LINEAR FEET.	220 LF	$ 102,300.00
603	**30x19 INCH REINFORCED CONCRETE PIPE ELLIPTICAL (COMPLETE IN PLACE)** at the unit price of $ 274.00 per LINEAR FEET.	67 LF	$ 18,358.00
603	**34x22 INCH REINFORCED CONCRETE PIPE ELLIPTICAL (COMPLETE IN PLACE)** at the unit price of $ 244.00 per LINEAR FEET.	244 LF	$ 59,536.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
603	**45x29 INCH REINFORCED CONCRETE PIPE ELLIPTICAL (COMPLETE IN PLACE)** at the unit price of $ 360.00 per LINEAR FEET.	48 LF	$ 17,280.00
603	**54 INCH REINFORCED CONCRETE PIPE (JACKED)** at the unit price of $ 1,600.00 per LINEAR FEET.	75 LF	$ 120,000.00
604	**INLET NO 14 L 6 (5 FOOT)** at the unit price of $ 7,200.00 per EACH.	4 EA	$ 28,800.00
604	**INLET NO 14 L 6 (10 FOOT)** at the unit price of $ 9,000.00 per EACH.	2 EA	$ 18,000.00
604	**INLET NO 14 L 9 (5 FOOT)** at the unit price of $ 7,800.00 per EACH.	4 EA	$ 31,200.00
604	**INLET NO 14 L 12 (5 FOOT)** at the unit price of $ 9,400.00 per EACH.	6 EA	$ 56,400.00
604	**INLET NO 14 L 12 (10 FOOT)** at the unit price of $ 13,000.00 per EACH.	1 EA	$ 13,000.00
604	**INLET NO 14 L 15 (5 FOOT)** at the unit price of $ 12,000.00 per EACH.	3 EA	$ 36,000.00
604	**INLET NO 14 L 15 (10 FOOT)** at the unit price of $ 16,000.00 per EACH.	2 EA	$ 32,000.00
604	**INLET NO 16 L 3'-4" VALLEY (5 FOOT)** at the unit price of $ 4,700.00 per EACH.	1 EA	$ 4,700.00
604	**MANHOLE STANDARD (4' ID) (5 FOOT)** at the unit price of $ 3,800.00 per EACH.	4 EA	$ 15,200.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
604	**MANHOLE STANDARD (4' ID) (10 FOOT)** at the unit price of $ 5,300.00 per EACH.	3 EA	$ 15,900.00
604	**MANHOLE STANDARD (5' ID) (5 FOOT)** at the unit price of $ 4,400.00 per EACH.	1 EA	$ 4,400.00
604	**MANHOLE STANDARD (5' ID) (10 FOOT)** at the unit price of $ 6,000.00 per EACH.	3 EA	$ 18,000.00
604	**MANHOLE STANDARD (6' ID) (5 FOOT)** at the unit price of $ 5,800.00 per EACH.	2 EA	$ 11,600.00
604	**MANHOLE STANDARD (6' ID) (15 FOOT)** at the unit price of $ 8,700.00 per EACH.	1 EA	$ 8,700.00
604	**MANHOLE STANDARD TYPE B (15 FOOT)** at the unit price of $ 17,000.00 per EACH.	3 EA	$ 51,000.00
604	**MANHOLE STANDARD TYPE B (SPECIAL) (10 FOOT)** at the unit price of $ 22,000.00 per EACH.	1 EA	$ 22,000.00
604	**MANHOLE STANDARD TYPE B (SPECIAL) (15 FOOT)** at the unit price of $ 24,000.00 per EACH.	2 EA	$ 48,000.00
604	**MANHOLE STANDARD TYPE P (20 FOOT)** at the unit price of $ 31,000.00 per EACH.	2 EA	$ 62,000.00
605	**4 INCH NON-PERFORATED PIPE UNDERDRAIN** at the unit price of $ 35.00 per LINEAR FEET.	558 LF	$ 19,530.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
605	**4 INCH PERFORATED PIPE UNDERDRAIN** at the unit price of $ 35.00 per LINEAR FEET.	462 LF	$ 16,170.00
606	**GUARDRAIL TYPE 3 (6-3 POST SPACING) (31 IN.MGS)** at the unit price of $ 50.00 per LINEAR FEET.	32 LF	$ 1,600.00
606	**TRANSITION TYPE 3G (31 IN.MGS)** at the unit price of $ 2,400.00 per EACH.	1 EA	$ 2,400.00
606	**TRANSITION TYPE 3J (31 IN.MGS)** at the unit price of $ 1,200.00 per EACH.	1 EA	$ 1,200.00
606	**END ANCHORAGE TYPE 3K (31 IN.MGS)** at the unit price of $ 2,000.00 per EACH.	1 EA	$ 2,000.00
606	**BRIDGE RAIL TYPE 10M (SPECIAL)** at the unit price of $ 245.00 per LINEAR FEET.	93 LF	$ 22,785.00
607	**FENCE (PLASTIC)** at the unit price of $ 7.00 per LINEAR FEET.	500 LF	$ 3,500.00
607	**FENCE (TEMPORARY)** at the unit price of $ 8.00 per LINEAR FEET.	990 LF	$ 7,920.00
607	**FENCE CHAIN LINK (72 INCH)** at the unit price of $ 36.00 per LINEAR FEET.	324 LF	$ 11,664.00
607	**24 FOOT GATE DOUBLE (CHAIN LINK) (ROLLING)** at the unit price of $ 3,100.00 per EACH.	1 EA	$ 3,100.00
607	**30 FOOT GATE DOUBLE (CHAIN LINK) (ROLLING)** at the unit price of $ 3,900.00 per EACH.	2 EA	$ 7,800.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
607	**36 FOOT GATE DOUBLE (CHAIN LINK) (ROLLING)** at the unit price of $ 4,700.00 per EACH.	1 EA	$ 4,700.00
608	**CONCRETE SIDEWALK** at the unit price of $ 40.00 per SQUARE YARD.	4,773 SY	$ 190,920.00
608	**CONCRETE SIDEWALK (SPECIAL)** at the unit price of $ 50.00 per SQUARE YARD.	141 SY	$ 7,050.00
608	**CONCRETE SIDEWALK (6 INCH PATTERNED CONCRETE)** at the unit price of $ 7.00 per SQUARE FEET.	2,093 SF	$ 14,651.00
608	**CONCRETE SIDEWALK (8 INCH) (SPECIAL)** at the unit price of $ 60.00 per SQUARE YARD.	157 SY	$ 9,420.00
608	**CONCRETE SIDEWALK (AMENITY ZONE)** at the unit price of $ 52.00 per SQUARE YARD.	1,517 SY	$ 78,884.00
608	**CONCRETE SIDEWALK (STAIRS)** at the unit price of $ 105.00 per SQUARE FEET.	146 SF	$ 15,330.00
608	**CONCRETE CURB RAMP** at the unit price of $ 115.00 per SQUARE YARD.	502 SY	$ 57,730.00
608	**SIDEWALK CHASE DRAIN** at the unit price of $ 240.00 per LINEAR FEET.	68 LF	$ 16,320.00
609	**CURB TYPE 2 (SECTION B)** at the unit price of $ 13.00 per LINEAR FEET.	456 LF	$ 5,928.00
609	**CURB AND GUTTER TYPE 2 (SECTION I-B)** at the unit price of $ 17.00 per LINEAR FEET.	2,598 LF	$ 44,166.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
609	**CURB AND GUTTER TYPE 2 (SECTION II-B)** at the unit price of $ 18.00 per LINEAR FEET.	5,259 LF	$ 94,662.00
609	**CURB AND GUTTER TYPE 2 (SECTION II-B) (SPECIAL)** at the unit price of $ 33.00 per LINEAR FEET.	34 LF	$ 1,122.00
609	**CURB AND GUTTER TYPE 2 (SECTION II-M)** at the unit price of $ 21.00 per LINEAR FEET.	115 LF	$ 2,415.00
609	**4 INCH MOUNTABLE CURB (OUTFALL)** at the unit price of $ 12.00 per LINEAR FEET.	1,956 LF	$ 23,472.00
609	**GUTTER TYPE 2 (8 FOOT)** at the unit price of $ 54.00 per LINEAR FEET.	27 LF	$ 1,458.00
609	**CURB TYPE 4 (SECTION B)** at the unit price of $ 53.00 per LINEAR FEET.	525 LF	$ 27,825.00
609	**CURB (BARRIER)** at the unit price of $ 19.00 per LINEAR FEET.	710 LF	$ 13,490.00
610	**MEDIAN COVER MATERIAL (PATTERNED CONCRETE)** at the unit price of $ 4.50 per SQUARE FEET.	12,091 SF	$ 54,409.50
610	**MEDIAN COVER MATERIAL (COLORED CONCRETE)** at the unit price of $ 9.00 per SQUARE FEET.	720 SF	$ 6,480.00
613	**1/2 INCH ELECTRICAL CONDUIT (PLASTIC)** at the unit price of $ 10.00 per LINEAR FEET.	20 LF	$ 200.00
613	**3/4 INCH ELECTRICAL CONDUIT** at the unit price of $ 10.00 per LINEAR FEET.	290 LF	$ 2900.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
613	**2 INCH ELECTRICAL CONDUIT (PLASTIC)** at the unit price of $ 10.00 per LINEAR FEET.	5,755 LF	$ 57,550.00
613	**2 INCH ELECTRICAL CONDUIT (BORED)** at the unit price of $ 15.00 per LINEAR FEET.	800 LF	$ 12,000.00
613	**3 INCH ELECTRICAL CONDUIT (PLASTIC)** at the unit price of $ 19.00 per LINEAR FEET.	3,885 LF	$ 73,815.00
613	**3 INCH ELECTRICAL CONDUIT (BORED)** at the unit price of $ 18.00 per LINEAR FEET.	1,600 LF	$ 28,800.00
613	**4 INCH ELECTRICAL CONDUIT (PLASTIC)** at the unit price of $ 13.00 per LINEAR FEET.	1,640 LF	$ 21,320.00
613	**PULL BOX (24"x36"x12") = TYPE B (TRAFFIC)** at the unit price of $ 750.00 per EACH.	10 EA	$ 7,500.00
613	**PULL BOX (SPECIAL)** at the unit price of $ 1,200.00 per EACH.	8 EA	$ 9,600.00
613	**WIRING** at the unit price of $ 95,000.00 per LUMP SUM.	1 LS	$ 95,000.00
613	**LIGHT STANDARD METAL (35 FOOT)** at the unit price of $ 2,800.00 per EACH.	31 EA	$ 86,800.00
613	**CONCRETE FOUNDATION PAD** at the unit price of $ 1,100.00 per EACH.	4 EA	$ 4,400.00
613	**LIGHT STANDARD FOUNDATION** at the unit price of $ 1,100.00 per EACH.	31 EA	$ 34,100.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
613	**LIGHTING CONTROL CENTER** at the unit price of $ 5,300.00 per EACH.	4 EA	$ 21,200.00
613	**LUMINAIRE (LED) (14,000 LUMENS)** at the unit price of $ 520.00 per EACH.	39 EA	$ 20,280.00
613	**TEMPORARY LIGHTING** at the unit price of $ 5,100.00 per LUMP SUM.	1 LS	$ 5,100.00
614	**SIGN PANEL (CLASS 1)** at the unit price of $ 20.00 per SQUARE FEET.	522 SF	$ 10,440.00
614	**STEEL SIGN POST (2 x 2 INCH TUBING)** at the unit price of $ 14.00 per LINEAR FEET.	564 LF	$ 7,896.00
614	**PEDESTRIAN SIGNAL FACE (16) (COUNTDOWN)** at the unit price of $ 600.00 per EACH.	16 EA	$ 9,600.00
614	**TRAFFIC SIGNAL FACE (12-12-12)** at the unit price of $ 980.00 per EACH.	39 EA	$ 38,220.00
614	**TRAFFIC SIGNAL FACE (12-12-12-12)** at the unit price of $ 1,300.00 per EACH.	4 EA	$ 5,200.00
614	**TRAFFIC SIGNAL CONTROLLER CABINET** at the unit price of $ 22,000.00 per EACH.	2 EA	$ 44,000.00
614	**PEDESTRIAN PUSH BUTTON** at the unit price of $ 400.00 per EACH.	8 EA	$ 3,200.00
614	**INTERSECTION DETECTION SYSTEM (CAMERA)** at the unit price of $ 6,600.00 per EACH.	8 EA	$ 52,800.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
614	**EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM** at the unit price of $ 8,900.00 per EACH.	2 EA	$ 17,800.00
614	**TRAFFIC SIGNAL-LIGHT POLE STEEL (1-30 FOOT MAST ARM)** at the unit price of $ 11,000.00 per EACH.	1 EA	$ 11,000.00
614	**TRAFFIC SIGNAL-LIGHT POLE STEEL (1-40 FOOT MAST ARM)** at the unit price of $ 12,000.00 per EACH.	1 EA	$ 12,000.00
614	**TRAFFIC SIGNAL-LIGHT POLE STEEL (1-50 FOOT MAST ARM)** at the unit price of $ 15,000.00 per EACH.	2 EA	$ 30,000.00
614	**TRAFFIC SIGNAL-LIGHT POLE STEEL (1-55 FOOT MAST ARM)** at the unit price of $ 16,000.00 per EACH.	1 EA	$ 16,000.00
614	**TRAFFIC SIGNAL-LIGHT POLE STEEL (1-60 FOOT MAST ARM)** at the unit price of $ 18,000.00 per EACH.	3 EA	$ 54,000.00
614	**TRAFFIC SIGNAL PEDESTAL POLE STEEL** at the unit price of $ 1,800.00 per EACH.	1 EA	$ 1,800.00
614	**TELEMETRY (FIELD)** at the unit price of $ 2,800.00 per EACH.	3 EA	$ 8,400.00
614	**TRAFFIC SIGNAL CONTROLLER (SOLID STATE) (FULLY ACTUATED) (12 PHASE)** at the unit price of $ 2,900.00 per EACH.	2 EA	$ 5,800.00
614	**TEST FIBER OPTIC CABLE** at the unit price of $ 4,300.00 per LUMP SUM.	1 LS	$ 4,300.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
614	**FIBER OPTIC CABLE (SPECIAL)** at the unit price of $ 4.00 per LINEAR FEET.	3,050 LF	$ 12,200.00
614	**CLOSED CIRCUIT TELEVISION CAMERA** at the unit price of $ 4,800.00 per EACH.	1 EA	$ 4,800.00
614	**ELECTRIC METER (PEDESTAL)** at the unit price of $ 4,900.00 per EACH.	3 EA	$ 14,700.00
619	**WATER METER** at the unit price of $ 420.00 per EACH.	39 EA	$ 16,380.00
619	**METER PIT (24 INCH)** at the unit price of $ 2,000.00 per EACH.	37 EA	$ 74,000.00
619	**METER VAULT** at the unit price of $ 4,400.00 per EACH.	2 EA	$ 8,800.00
619	**CURB STOP AND BOX** at the unit price of $ 620.00 per EACH.	40 EA	$ 24,800.00
619	**3 INCH DUCTILE IRON PIPE** at the unit price of $ 145.00 per LINEAR FEET.	31 LF	$ 4,495.00
619	**6 INCH DUCTILE IRON PIPE** at the unit price of $ 125.00 per LINEAR FEET.	131 LF	$ 16,375.00
619	**8 INCH DUCTILE IRON PIPE** at the unit price of $ 130.00 per LINEAR FEET.	138 LF	$ 17,940.00
619	**3/4 INCH COPPER PIPE** at the unit price of $ 45.00 per LINEAR FEET.	809 LF	$ 36,405.00
619	**1 INCH COPPER PIPE** at the unit price of $ 31.00 per LINEAR FEET.	291 LF	$ 9,021.00
619	**1-1/2 INCH COPPER PIPE** at the unit price of $ 100.00 per LINEAR FEET.	38 LF	$ 3,800.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
619	**3/4 INCH COPPER PIPE CONNECTIONS** at the unit price of $ 190.00 per EACH.	32 EA	$ 6,080.00
619	**1 INCH COPPER PIPE CONNECTIONS** at the unit price of $ 240.00 per EACH.	6 EA	$ 1,440.00
619	**1-1/2 INCH COPPER PIPE CONNECTIONS** at the unit price of $ 300.00 per EACH.	2 EA	$ 600.00
619	**6 INCH PLASTIC PIPE (C900)** at the unit price of $ 66.00 per LINEAR FEET.	989 LF	$ 65,274.00
619	**8 INCH PLASTIC PIPE (C900)** at the unit price of $ 68.00 per LINEAR FEET.	855 LF	$ 58,140.00
619	**3 INCH GATE VALVE & VALVE BOX** at the unit price of $ 1,400.00 per EACH.	2 EA	$ 2,800.00
619	**6 INCH GATE VALVE & VALVE BOX** at the unit price of $ 1,600.00 per EACH.	7 EA	$ 11,200.00
619	**8 INCH GATE VALVE & VALVE BOX** at the unit price of $ 2,300.00 per EACH.	12 EA	$ 27,600.00
619	**6 INCH TAPPING VALVE & VALVE BOX** at the unit price of $ 3,800.00 per EACH.	3 EA	$ 11,400.00
619	**8 INCH TAPPING VALVE & VALVE BOX** at the unit price of $ 5,500.00 per EACH.	1 EA	$ 5,500.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
619	**6 INCH SWIVEL TEE (ALL BRANCH SIZES)** at the unit price of $ 1,400.00 per EACH.	2 EA	$ 2,800.00
619	**8 INCH SWIVEL TEE (ALL BRANCH SIZES)** at the unit price of $ 1,200.00 per EACH.	6 EA	$ 7,200.00
619	**6 INCH TEE (ALL BRANCH SIZES)** at the unit price of $ 1,000.00 per EACH.	3 EA	$ 3,000.00
619	**8 INCH TEE (ALL BRANCH SIZES)** at the unit price of $ 1,100.00 per EACH.	4 EA	$ 4,400.00
619	**6 INCH HORIZONTAL BEND (ALL ANGLES)** at the unit price of $ 800.00 per EACH.	4 EA	$ 3,200.00
619	**8 INCH HORIZONTAL BEND (ALL ANGLES)** at the unit price of $ 920.00 per EACH.	2 EA	$ 1,840.00
619	**6 INCH VERTICAL BEND (ALL ANGLES)** at the unit price of $ 800.00 per EACH.	10 EA	$ 8,000.00
619	**8 INCH VERTICAL BEND (ALL ANGLES)** at the unit price of $ 930.00 per EACH.	28 EA	$ 26,040.00
619	**6 INCH TAPPING SLEEVE (ALL BRANCH SIZES)** at the unit price of $ 1,100.00 per EACH.	2 EA	$ 2,200.00
619	**8 INCH TAPPING SLEEVE (ALL BRANCH SIZES)** at the unit price of $ 1,400.00 per EACH.	1 EA	$ 1,400.00
619	**30 INCH TAPPING SLEEVE (ALL BRANCH SIZES)** at the unit price of $ 3,000.00 per EACH.	1 EA	$ 3,000.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
619	**FIRE HYDRANT ASSEMBLY** at the unit price of $ 4,300.00 per EACH.	7 EA	$ 30,100.00
619	**FIRE HYDRANT ASSEMBLY (EXTRA DEPTH)** at the unit price of $ 4,400.00 per EACH.	3 EA	$ 13,200.00
620	**FIELD OFFICE (CLASS 1)** at the unit price of $ 75,000.00 per EACH.	1 EA	$ 75,000.00
620	**SANITARY FACILITY** at the unit price of $ 4,000.00 per EACH.	1 EA	$ 4,000.00
621	**DETOUR PAVEMENT** at the unit price of $ 65.00 per SQUARE YARD.	1,750 SY	$ 113,750.00
622	**MEDIAN CONCRETE PLANTER WALL** at the unit price of $ 300.00 per LINEAR FEET.	937 LF	$ 281,100.00
622	**MASONRY WORK SANDSTONE CURB (MEDIAN WALL)** at the unit price of $ 110.00 per LINEAR FEET.	254 LF	$ 27,940.00
622	**MASONRY WORK SANDSTONE FACE (MEDIAN WALL)** at the unit price of $ 155.00 per LINEAR FEET.	140 LF	$ 21,700.00
622	**STONE END MARKERS** at the unit price of $ 1,700.00 per EACH.	36 EA	$ 61,200.00
623	**1 INCH BACKFLOW PREVENTER ASSEMBLY WITH CONCRETE PAD** at the unit price of $ 2,200.00 per EACH.	2 EA	$ 4,400.00
623	**BACKFLOW ENCLOSURE ASSEMBLY** at the unit price of $ 2,300.00 per EACH.	2 EA	$ 4,600.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
623	**PLUMBER** at the unit price of $ 5,300.00 per EACH.	2 EA	$ 10,600.00
623	**1-1/2" HYDROMETER** at the unit price of $ 2,600.00 per EACH.	2 EA	$ 5,200.00
623	**RADIO REMOTE WITH TRANCEIVER (TURNOVER ITEM) - PARKS** at the unit price of $ 1,500.00 per EACH.	2 EA	$ 3,000.00
623	**ELECTRICIAN-CONTROLLER HOOKUP** at the unit price of $ 5,200.00 per EACH.	2 EA	$ 10,400.00
623	**120 VOLT ELECTRICAL CONDUCTOR** at the unit price of $ 13.00 per LINEAR FEET.	100 LF	$ 1,300.00
623	**12 STATION AUTOMATIC CENTRAL CONTROLLER ASSEMBLY - PARKS** at the unit price of $ 17,500.00 per EACH.	2 EA	$ 35,000.00
623	**RAIN SENSOR** at the unit price of $ 600.00 per EACH.	2 EA	$ 1,200.00
623	**2-WIRE COMMUNICATION CABLE** at the unit price of $ 0.70 per LINEAR FEET.	4,580 LF	$ 3,206.00
623	**1 INCH TYPE K COPPER PIPING** at the unit price of $ 18.00 per LINEAR FEET.	20 LF	$ 360.00
623	**1 INCH STOP & WASTE VALVE ASSEMBLY WITH VALVE BOX** at the unit price of $ 1,600.00 per EACH.	2 EA	$ 3,700.00
623	**1-1/2 INCH GATE VALVE** at the unit price of $ 250.00 per EACH.	23 EA	$ 5,750.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
623	**1 INCH QUICK COUPLER VALVE** at the unit price of $ 210.00 per EACH.	12 EA	$ 2,520.00
623	**3/4 INCH DRAIN VALVE** at the unit price of $ 330.00 per EACH.	13 EA	$ 4,290.00
623	**1-1/2 INCH CL200 PVC MAINLINE** at the unit price of $ 3.00 per LINEAR FEET.	4,580 LF	$ 13,740.00
623	**2 INCH CL 160 PVC SLEEVES** at the unit price of $ 3.20 per LINEAR FEET.	2,725 LF	$ 8,720.00
623	**2 INCH HDPE SLEEVES** at the unit price of $ 4.00 per LINEAR FEET.	1,675 LF	$ 6,700.00
623	**4 INCH CL 160 PVC SLEEVES** at the unit price of $ 5.00 per LINEAR FEET.	1,945 LF	$ 9,725.00
623	**4 INCH HDPE SLEEVES** at the unit price of $ 9.00 per LINEAR FEET.	1,675 LF	$ 15,075.00
623	**1 INCH 80# NSF POLY LATERAL** at the unit price of $ 3.00 per LINEAR FEET.	2,280 LF	$ 6,840.00
623	**1 INCH AUTOMATIC CONTROL VALVE** at the unit price of $ 480.00 per EACH.	9 EA	$ 4,320.00
623	**1 INCH DRIP VALVE KIT WITH BALL VALVE AND BASKET FILTER** at the unit price of $ 700.00 per EACH.	4 EA	$ 2,800.00
623	**0.5 GPM BUBBLER HEAD ASSEMBLY** at the unit price of $ 18.00 per EACH.	68 EA	$ 1,224.00
623	**12 INCH POP-UP SPRAY HEAD WITH NOZZLE** at the unit price of $ 32.00 per EACH.	8 EA	$ 256.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
623	**SUBSURFACE DRIPPERLINE** at the unit price of $ 0.50 per LINEAR FEET.	2,425 LF	$ 1,212.50
623	**DRIPLINE BLOWOUT WITH INDICATOR POPUP** at the unit price of $ 50.00 per EACH.	8 EA	$ 400.00
625	**CONSTRUCTION SURVEYING** at the unit price of $ 150,000.00 per LUMP SUM.	1 LS	$ 150,000.00
625	**CONSTRUCTION SURVEYING (HOURLY)** at the unit price of $ 160.00 per HOUR.	150 HR	$ 24,000.00
626	**MOBILIZATION** at the unit price of $ 1,255,029.50 per LUMP SUM.	1 LS	$ 1,255,029.50
626	**PUBLIC INFORMATION SERVICES (TIER II)** at the unit price of $ 62,000.00 per LUMP SUM.	1 LS	$ 62,000.00
627	**PAVEMENT MARKING PAINT** at the unit price of $ 52.00 per GALLON.	150 GAL	$ 7,800.00
627	**RAISED PAVEMENT MARKER** at the unit price of $ 26.00 per EACH.	41 EA	$ 1,066.00
627	**PREFORMED THERMOPLASTIC PAVEMENT MARKING (60 MIL) (WORD-SYMBOL)** at the unit price of $ 21.00 per SQUARE FEET.	258 SF	$ 5,418.00
627	**PREFORMED THERMOPLASTIC PAVEMENT MARKING (60 MIL) (XWALK-STOPLINE)** at the unit price of $ 11.00 per SQUARE FEET.	2,611 SF	$ 28,721.00
627	**PREFORMED PLASTIC PAVEMENT MARKING (TYPE II) (INLAID)** at the unit price of $ 16.00 per SQUARE FEET.	2,502 SF	$ 40,032.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
627	**THERMOPLASTIC PAVEMENT MARKING** at the unit price of $ 8.00 per SQUARE FEET.	1,736 SF	$ 13,888.00
629	**SURVEY MONUMENT (TYPE 1)** at the unit price of $ 400.00 per EACH.	72 EA	$ 28,800.00
629	**SURVEY MONUMENT (TYPE 3A)** at the unit price of $ 750.00 per EACH.	12 EA	$ 9,000.00
629	**SURVEY MONUMENT (TYPE 6)** at the unit price of $ 650.00 per EACH.	18 EA	$ 11,700.00
630	**FLAGGING** at the unit price of $ 27.00 per HOUR.	3,600 HR	$ 97,200.00
630	**UNIFORMED TRAFFIC CONTROL** at the unit price of $ 79.00 per HOUR.	80 HR	$ 6,320.00
630	**TRAFFIC CONTROL INSPECTION** at the unit price of $ 100.00 per DAY.	171 DAY	$ 17,100.00
630	**TRAFFIC CONTROL MANAGEMENT** at the unit price of $ 575.00 per DAY.	429 DAY	$ 246,675.00
630	**BARRICADE (TYPE 3 M-A) (TEMPORARY)** at the unit price of $ 52.00 per EACH.	16 EA	$ 832.00
630	**CONSTRUCTION TRAFFIC SIGN (PANEL SIZE A)** at the unit price of $ 37.00 per EACH.	33 EA	$ 1,221.00
630	**CONSTRUCTION TRAFFIC SIGN (PANEL SIZE B)** at the unit price of $ 53.00 per EACH.	97 EA	$ 5,141.00
630	**PORTABLE MESSAGE SIGN PANEL** at the unit price of $ 13,000.00 per EACH.	2 EA	$ 26,000.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
630	**ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL (C TYPE)** at the unit price of $ 2,100.00 per EACH.	2 EA	$ 4,200.00
630	**DRUM CHANNELIZING DEVICE** at the unit price of $ 47.00 per EACH.	250 EA	$ 11,750.00
630	**CONCRETE BARRIER (TEMPORARY)** at the unit price of $ 38.00 per LINEAR FEET.	1,000 LF	$ 38,000.00
630	**TRAFFIC CONE** at the unit price of $ 20.00 per EACH.	100 EA	$ 2,000.00
630	**IMPACT ATTENUATOR (TEMPORARY)** at the unit price of $ 2,600.00 per EACH.	2 EA	$ 5,200.00
630	**TRAFFIC SIGNAL (TEMPORARY)** at the unit price of $ 43,000.00 per EACH.	2 EA	$ 86,000.00
	322 ITEMS		
	FORCE ACCOUNTS		
700	**F/A PARTNERING** at the unit price of $10,000.00 per FORCE ACCOUNT.	F/A	$ 10,000.00
700	**F/A ON-THE-JOB TRAINEE** at the unit price of $4,480.00 per FORCE ACCOUNT.	F/A	$ 4,480.00
700	**F/A REMOVALS** at the unit price of $25,000.00 per FORCE ACCOUNT.	F/A	$ 25,000.00
700	**F/A ADJUST UTILITIES** at the unit price of $200,000.00 per FORCE ACCOUNT.	F/A	$ 200,000.00

Item No.	Description and Price	Estimated Quantity	Estimated Cost
700	**F/A FURNISH & INSTALL ELECRTICAL SERVICE** at the unit price of $35,000.00 per FORCE ACCOUNT.	F/A	$ 35,000.00
700	**F/A EROSION CONTROL** at the unit price of $30,000.00 per FORCE ACCOUNT.	F/A	$ 30,000.00
700	**F/A ENVIORNMENTAL HEALTH & SAFETY MANAGEMENT** at the unit price of $30,000.00 per FORCE ACCOUNT.	F/A	$ 30,000.00
	7 FORCE ACCOUNTS		
	329 TOTAL ITEMS		

Bid Items Total Amount (201 through 700 (Three Hundred and Twenty-Nine[329] total bid items) which includes (Seven[7]) Force Accounts) $ 12,828,855.00

Textura ® Fee from table on Page BF-3 FIXED **% of Bid Items Total Amount** $ 20,345.00

Bid Items Total Amount plus Textura® Fee equals Total Bid Amount $ 12,849,200.00

Total Bid Amount

Twelve million eight hundred forty nine thousand two hundred dollars and zero cents

Dollars ($ 12,849,200.00 **)**

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 in the sum of the full amount of this bid, executed by a surety company acceptable to the Manager.

The Travelers Casualty and Surety Company of America, a corporation of the State of CT, 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 Five Percent (5%) of Total 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: N/A

Address: N/A Address: N/A

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

There are no such persons, firms or corporations.

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
Caisson Drilling	0.82%	Ludwig Caisson Drilling, Inc. 704 Topeka Way, Castle Rock
Concrete Pavement, Flatwork, Curb & Gutter	21.36%	Villa Lobos Concrete 5472 Lincoln St., Denver
Rebar Installation	0.20%	Nehemiah Rebar Services, Inc. 512 Wilcox St., Castle Rock
Erosion control Management	0.74%	Smith Environmental + Engineering 250 Perry Lane, Dacono
Electrical	7.81%	Sturgeon Electric Company 12150 E. 112th Ave., Henderson
Environmental Health and Safety Management	2.52%	Blanchard Engineering + Testing 3000 W. 10th Ave., Broomfield
Fence Installation	0.41%	Stealock General Fence contractor 2690 E. 78th Ave., Denver
Guardrail Installation	0.11%	Ideal Fencing corp. 5795 Ideal Drive, Erie
HMA Pavement	2.47%	Charon Paving, Inc. 1701 E. 114th Pl., Northglenn
Landscaping	3.17%	Environmental Logistics, Inc 1101 East 64th Ave., Denver
QC Testing	1.68%	Reynolds + Associates 10940 S. Parker Rd. #772, Parker
Pavement Markings, Traffic control, Permanent Signs	4.44%	Colorado Barricade Co. 2295 S. Lipan St., Denver
Cast-In-Place Box Base Manholes Inlets &c	1.09%	Garza Concrete Structures Inc. 7301 Ivy St., Commerce City
Pipe Boring/Jacking	0.68%	Underground Infrastructure Technologies 1208 Quail St., Lakewood
Retaining Wall (Boulder)	0.09%	Rock + Co. 995 N. 5th Ave., Brighton
Aggregate Hauling	1.07%	Calabrese Trucking Inc. 6475 Huron St., Denver

(Copy this page if additional room is required.)

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
On-Site Hauling	1.76%	Blaser Trucking Company, Inc. PO Box 513, Bennett
On-Site Hauling	1.76%	Chacon's Construction + Transport Inc 7961 N. Federal Blvd. #202, Westminster

(Copy this page if additional room is required.)

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
Capital Project Management

DENVER
OFFICE OF ECONOMIC DEVELOPMENT

List of Proposed DBE 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
DSBO@denvergov.org

City & County of Denver Project No.: 201840514

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

Non-Certified Prime Bidder

Business Name: Ames Construction, Inc		
Address: 18450 E. 28th Avenue, Aurora, CO 80011	**Contact Person:** Kole Murray	
Type of Service: Prime Bidder/General Contractor	**Dollar Amount: $:** 6,250,306	**Percent of Project:** 47%

Certified DBE Prime Bidder

Business Name:		
Address:	**Contact Person:**	
Type of Service:	**Dollar Amount: $:**	**Percent of Project:**

Subcontractors, Suppliers Manufacturers or Brokers (check one box)

X	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
Business Name: Garza Concrete Structures, Inc.							
Address: 7301 Ivy St., Commerce City, CO 80022			**Type of Service:** Subcontractor				
Contact Person: MJ Garza			**Dollar Amount: $:** 139,415.00			**Percent of Project:**	1.09
X	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
Business Name: Tom Calabrese Trucking, Inc.							
Address: 6441 Osceolo St. Arvada, CO 80033			**Type of Service:** Subcontractor				
Contact Person: Carol Calabrese			**Dollar Amount: $:** 137,181.00			**Percent of Project:**	1.07
X	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
Business Name: Reynolds & Associates							
Address: 10214 Progress Lane, Parker, CO 80134			**Type of Service:** Subcontractor				
Contact Person: Robert Cooley			**Dollar Amount: $:** 214,519.00			**Percent of Project:**	1.68

Subcontractors, Suppliers Manufacturers or Brokers (check one box)

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
X							

Business Name: Environmental Logistics, Inc.		
Address: 1101 E. 64th Ave. Denver, CO 80229	Type of Service: Subcontractor	
Contact Person: Mike Mirowski	Dollar Amount $: 404,952.00	Percent of Project: 3.17

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
X							

Business Name: Chacon Paving, Inc.		
Address: 1701 E. 114th Place, Northglenn, CO 80233	Type of Service: Subcontractor	
Contact Person: Jose Chacon	Dollar Amount $: 315, 900.00	Percent of Project: 2.47

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
X							

Business Name: Blaesar Trucking, Inc.		
Address: P.O. Box 513, Bennett, CO 80102	Type of Service: Subcontractor	
Contact Person: Kim Blaesar	Dollar Amount $: 225,000.00	Percent of Project: 1.76

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)
X							

Business Name: Chacon's Construction & Transport, Inc.		
Address: 7961 N. Federal Blvd. #202 Westminster CO 80030	Type of Service: Subcontractor	
Contact Person: Lola Renteria	Dollar Amount $: 225,000.00	Percent of Project: 1.76

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)

Business Name:		
Address:	Type of Service:	
Contact Person:	Dollar Amount $:	Percent of Project:

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)

Business Name:		
Address:	Type of Service:	
Contact Person:	Dollar Amount $:	Percent of Project:

	Subcontractor (√)		Supplier (√)		Manufacturer (√)		Broker (√)

Business Name:		
Address:	Type of Service:	
Contact Person:	Dollar Amount $:	Percent of Project:

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 DBE(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 DBE "Letter of Intent" in five working days (5), on each of its DBE or DBE 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 words 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: 18450 E. 28th Avenue

City, State, Zip Code: Aurora, CO 80011

Telephone Number of Bidder: 303-363-1000 Fax No. 303-363-4101

Contact Name for this Project: Kole Murray

Social Security or Federal Employer ID Number of Bidder: 41-0871375

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

Brighton Boulevard Segment 2/Globeville Phase 2

For information relative thereto, please refer to:

Name: Kole Murray

Title: Chief Estimator

Address: 18450 E. 28th Avenue, Aurora CO 80011

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

Addenda Number 1 Date 3/8/2018

Addenda Number _____ Date _____

Addenda Number _____ Date _____

Dated this 15th day of March, 2018

Q12. How frequent do you anticipate the tours and events will be?

A12. The frequency and number of Tours and Special Events is not known. However, for the purposes of bidding, four tours and special events can be assumed.

Q13. Census data shows the project zip code area to be 17% LEP. Please confirm all materials need to be produced bilingually.

A13. This issue is covered in the Project Special Provisions, Revision of Section 626, Public Information Services (Tier II), Item (13).

Q14. Please give specifics on outreach collateral items and frequency in order for all bidders to be able to provide equivalent bids (quarterly newsletter, monthly social media updates, etc.).

A14. Public Information Collateral shall be as described throughout Revision of Section 626, Public Information Services (Tier II), including the provisions of Item (14). Collateral shall include, but not be limited to, newsletters, fact sheets, flyers, social media updates, e-mail updates, and draft press releases. In addition to the requirements contained in the Specification, quarterly newsletters will be required. All collateral items and specifics shall be addressed in the Public Information Plan.

Q15. Will water be provided by the owner?

A15. The Contractor will be responsible for obtaining and providing all water needed to complete the Work, except for the water used to flush, disinfect, fill and test Denver Water's water lines. Water used to flush, disinfect, fill and test Denver Water's water lines will be provided by Denver Water in accordance with Denver Water's standards and requirements. All the Contractor's costs of whatsoever nature required to obtain and provide the water that the Contractor is responsible for obtaining and providing shall be included in the Work, and no additional payment will be made for obtaining and providing the required water.

Q16. There is no quality control testing bid item. Does this mean that QC testing will be provided by the owner? If not, where should this be priced?

A16. The Contractor is responsible for all Quality Control testing that is required by the Contract Documents. All the Contractor's costs of whatsoever nature required to perform the specified Quality Control Testing and associated requirements shall be included in the Work, and no additional payment will be made for satisfying the Quality Control requirements. The City of Denver will not provide the Quality Control testing that is required of the Contractor. The City of Denver will provide Quality Assurance testing to satisfy City requirements and requirements set by CDOT because Federal Funds will be utilized."

Lesley B. Thomas
City Engineer

3.8.18
Date

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

Ames Construction, Inc
Contractor

ADDENDUM NO. 1 DATE: 3/15/18

Signature of Bidder:

If an Individual: _____ doing business as _____.

If a Partnership: _____

by: _____,General Partner.

If a Corporation: Ames Construction, Inc.

a Minnesota, Corporation,

by: _____, its Senior Vice 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)

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
Capital Project Managememt

DENVER
OFFICE OF ECONOMIC DEVELOPMENT

COMMITMENT TO DBE PARTICIPATION

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 has satisfied the DBE participant requirements in the following manner (Please check the appropriate boxes):

☒ The Bidder/Proposer is committed to the minimum of 13 % DBE utilization on the project, and will submit Letters of Intent (LOI) for each subcontractor/subconsultant listed in the Bid Forms as follows:
Hard Bids: Five (5) business days after the bid opening.
Request for Proposals/Qualifications: With the proposal when due.

☐ The Bidder/Proposer is unable to meet the project goal of _____% DBE, but is committed to a minimum of _____% DBE 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 five (5) days after bid opening as a matter of responsibility as in accordance with regulations of the U.S. Department of Transportation, 49 CFR Part 26 §26.53

☐ The Bidder/Proposer is a certified DBE in good standing with the City and is committed to self-perform a minimum of 30% of the work on the contract.

Bidder/Proposer (Name of Firm): Ames Construction, Inc.

Firm's Representative (Please print): Kole Murray

Signature (Firm's Representative):

Title: Chief Estimator

Address: 18450 E. 28th Avenue

City: Aurora		State: CO	Zip: 80011
Phone: 303-363-1000	Fax: 303-363-4101	Email: kolemurray@amesco.com	

A copy of the DBE 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. 907
Denver, CO 80202
Phone: 720-913-1999

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 dsbo@denvergov.org ,*
- *FOR RFPs and RFQs: LOIs should be included with Submittal*

Contract No.: 201840154	**Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	Self-Performing: ☐ Yes ☒ No	Phone: 303-363-1000	
Contact Person: Kole Murray	Email: KoleMurray@amesco.com	Fax: 303-363-4101	
Address: 18450 E. 28th Ave.	City: Aurora	State: CO	Zip: 80011

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: Garza Concrete Structures, Inc		Phone: 3032893251	
Contact Person: M. J. Garza	Email: mjg@garzacs.com	Fax: 3032892628	
Address: 7301 Ivy ST	City: Commerce City	State: CO	Zip: 80022

Please check the designation which applies to the certified firm.	M/WBE (√)		SBE (√)		EBE (√)		DBE (√)	✓

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/DBEs scope of work or supply corresponds to.**

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✓	Subcontractor/Subconsultant (√)		Supplier (√)		Broker (√)

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:

$ 139,415.00	1.09 %
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 sub consultant 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:	$139,415.00
Bidder/Consultant's Signature:	Date: 3/15/18
Title: Chief Estimator	
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature:	Date: 3-12-18
Title: Vice 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. 507
Denver, CO 80202
Phone: 720-913-1999

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 dsbo@denvergov.org ,*
- *FOR RFPs and RFQs: LOIs should be included with Submittal*

Contract No.: 201840154	**Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	Self-Performing: ☐ Yes ☒ No	Phone: 303-363-1000	
Contact Person: Kole Murray	Email: KoleMurray@amesco.com	Fax: 303-363-4101	
Address: 18450 E. 28th Ave.	City: Aurora	State: CO	Zip: 80011

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: Tom Calabrese Trucking Inc.		Phone: 3034878182	
Contact Person: Carol Calabrese	Email: Carol@tcalabresetrucking.com	Fax: 3034878182	
Address: 14411 Osceola Street	City: Arvada	State: Co	Zip: 80033

Please check the designation which applies to the certified firm.	M/WBE (√)		SBE (√)	✓	EBE (√)		DBE (√)	✓

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: Albert Frei & Sons

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/DBEs scope of work or supply corresponds to.**

304, 506, 603, 604, 605, 619, 621

X	Subcontractor/Subconsultant (√)		Supplier (√)		Broker (√)

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:

$ 137,181.00	1.07 %
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 sub consultant 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:	$ 137,181.00
Bidder/Consultant's Signature:	Date: 3/15/18
Title: Chief Estimator	
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature: Carol Calabrese	Date: 3-5-2018
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. 907
Denver, CO 80202
Phone: 720-913-1999

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 dsbo@denvergov.org ,*
- *FOR RFPs and RFQs: LOIs should be included with Submittal*

Contract No.: 201840154	**Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	**Self-Performing:** ☐ Yes ☒ No	**Phone:** 303-363-1000	
Contact Person: Kole Murray	**Email:** KoleMurray@amesco.com	**Fax:** 303-363-4101	
Address: 18450 E. 28th Ave.	**City:** Aurora	**State:** CO	**Zip:** 80011

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: Reynolds & Associates		**Phone:** 303-841-0144	
Contact Person: Robert Cooley	**Email:** Office@reynolds geotech.com	**Fax:** 303-841-0136	
Address: 10214 Progress Lane	**City:** Parker	**State:** CO	**Zip:** 80134

Please check the designation which applies to the certified firm.	**M/WBE (√)** X		**SBE (√)** X		**EBE (√)** X		**DBE (√)** x	X

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/DBEs scope of work or supply corresponds to.

626

X	**Subcontractor/Subconsultant (√)**		**Supplier (√)**		**Broker (√)**

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:

$ 214,519.00	1.68 %
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 sub consultant 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:	$ 214,519.00
Bidder/Consultant's Signature:	**Date:** 3/15/18
Title: Chief Estimator	
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature: Harmon Reynolds	**Date:** 03/15/18
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. 907
Denver, CO 80202
Phone: 720-913-1999

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 dsbo@denvergov.org,*
- *FOR RFPs and RFQs: LOIs should be included with Submittal*

Contract No.: 201840154 | **Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	**Self-Performing:** ☐ Yes ☒ No	**Phone:** 303-363-1000
Contact Person: Kole Murray	**Email:** KoleMurray@amesco.com	**Fax:** 303-363-4101
Address: 18450 E. 28th Ave.	**City:** Aurora	**State:** CO **Zip:** 80011

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: Environmental Logistics		**Phone:** 3-275-0661
Contact Person: Mike Muccardi	**Email:** Mike@enviro...	**Fax:** 3-766-9940
Address: 1101 E. 64th Ave	**City:** Denver	**State:** CO **Zip:** 80229

Please check the designation which applies to the certified firm.	M/WBE (✓)	✓	SBE (✓)	✓	EBE (✓)		DBE (✓)	✓

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. <u>On unit price bids only, identify which bid line items the M/WBE/SBE/EBE/DBEs scope of work or supply corresponds to.</u>

207, 212, 213, 214, 216, 623,

X	Subcontractor/Subconsultant (✓)		Supplier (✓)		Broker (✓)

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:

$404,952.00	3.17 %
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 sub consultant 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:	$404,952.00
Bidder/Consultant's Signature: [signature]	**Date:** 3/15/18
Title: Chief Estimator	
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature: [signature]	**Date:** 3-14-18
Title: V.P.	

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. 907
Denver, CO 80202
Phone: 720-913-1999

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 dsbo@denvergov.org ,*
- *FOR RFPs and RFQs: LOIs should be included with Submittal*

Contract No.: 201840154	**Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	**Self-Performing:** ☐ Yes ☒ No	**Phone:** 303-363-1000	
Contact Person: Kole Murray	**Email:** KoleMurray@amesco.com	**Fax:** 303-363-4101	
Address: 18450 E. 28th Ave.	**City:** Aurora	**State:** CO	**Zip:** 80011

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: Chacon Paving Inc							**Phone:** 303-450-0616	
Contact Person: Jose Chacon		**Email:** jose@chaconpavinginc.comcastbiz.net					**Fax:** 303-255-2459	
Address: 1701 E 114th Place		**City:** Nortghlenn					**State:** CO	**Zip:** 80233
Please check the designation which applies to the certified firm.	**M/WBE (√)**	X	**SBE (√)**	X	**EBE (√)**		**DBE (√)**	X

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/DBEs scope of work or supply corresponds to.**

403

X	**Subcontractor/Subconsultant (√)**		**Supplier (√)**		**Broker (√)**

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:

$315,900.00	2.47 %
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 sub consultant 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:	$315,900.00
Bidder/Consultant's Signature:	**Date:** 3/15/18
Title: Chief Estimator	
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature:	**Date:** 3/14/2018
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
201 West Colfax Ave., Dept. 907
Denver, CO 80202
Phone: 720-913-1999

LETTER OF INTENT (LOI)

INSTRUCTIONS FOR COMPLETION & SUBMISSION:

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

Contract No.: 201840154	**Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	**Self-Performing:** ☐ Yes ☑ No	**Phone:** 303-363-1000
Contact Person: Kole Murray	**Email:** KoleMurray@amesco.com	**Fax:** 303-363-4101
Address: 18450 E. 28th Ave.	**City:** Aurora	**State:** CO **Zip:** 80011

B. The Following Section is To Be Completed by the M/WBE, SBE, EBE or DBE, as any Tier
This Letter of Intent Must be Signed by the M/WBE, SBE, EBE or DBE and Bidder/Consultant

Name of Certified Firm: Blaeser Trucking, Company		**Phone:** 808 644-5929
Contact Person: Kim Blaesar	**Email:** office @blaesertrucking.com	303--644-5896
Address: P.O. Box 513	**City:** Bennett	**State:** CO **Zip:** 80102

Please check the designation(s) which applies to the certified firm:

M/WBE (1)	SBE (2)	EBE (3)	DBE (4)
✓			✓

Indirect Utilization: If the 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/EBE/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:

202, 203, 208, 603

Subcontractor/subconsultant (1)	Supplier (2)	Broker (3)
✓		

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:

$ 225,000.00 — 1.74 %

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 sub consultant 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: $ 225,000.00

Bidder/Consultant's Signature: [signature] Date: 3/15/18

Title: Chief Estimator

M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature: [signature] Date: 3/8/18

Title: President

If the above named subcontractor 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. 907
Denver, CO 80202
Phone: 720-913-1999

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 dsbo@denvergov.org ,*
- *FOR RFPs and RFQs: LOIs should be included with Submittal*

Contract No.: 201840154	**Project Name:** Federal Blvd Reconstruction, 5th Ave to Howard Place

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: Ames Construction, Inc.	Self-Performing: ☐ Yes ☒ No	Phone: 303-363-1000	
Contact Person: Kole Murray	Email: KoleMurray@amesco.com	Fax: 303-363-4101	
Address: 18450 E. 28th Ave.	City: Aurora	State: CO	Zip: 80011

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: Chacon's Construction & Transport LLC		Phone: 720-317-6813	
Contact Person: Lola Renteria	Email: lola@chaconstransport.com	303-331-8251	
Address: 7961 N Federal Blvd #207	City: Westminster	State: CO	Zip: 80030

Please check the designation which applies to the certified firm.	M/WBE (√)		SBE (√)		EBE (√)		DBE (√)	
		✓		✓		✓		✓

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/DBEs scope of work or supply corresponds to.

202, 203, 208, 603

✓ Subcontractor/Subconsultant (√)		Supplier (√)		Broker (√)

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:

$ 225,000.00	1.76 %
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 sub consultant 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:	$ 225,000.00
Bidder/Consultant's Signature:	Date: 3/15/18
Title: Chief Estimator	
M/WBE, SBE, EBE or DBE or Self-Performing Firm's Signature:	Date: 3/7/18
Title: Office manager	

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 ✓	
☒	Project Number & Project Name 20184015 Federal Blvd Reconstruction, 5th Ave to Howard Place
☒	**Section A:** Name of Bidder/Consultant, Contact Person, Address, City, State, Zip, Phone, Email
☒	**Section B:** Name of Certified Firm, Contact Person, Address, City, State, Zip, Phone, Email
☒	Designation checked for MBE/WBE, SBE, EBE or DBE
☐ N/A	**Indirect Utilization:** Name of subcontractor/subconsultant, supplier or broker is indicated if using the participation of a 2nd tier subcontractor/subconsultant, supplier or broker.
☒	Scope of work performed or item supplied by M/WBE, SBE, EBE or DBE
☒	Line items performed, if line-item bid.
☒	Copy of M/WBE, SBE, EBE or DBE Letter of Certification Attached
☒	Designation checked for Subcontractor/Subconsultant, Supplier or Broker
	If project is a hard bid...
☒	Bidder has indicated dollar amount for value of work going to Subcontractor/ Subconsultant, Supplier or Broker
☒	Bidder has indicated percentage for value of work going to Subcontractor/ Subconsultant, Supplier or Broker
	If project is an RFP/RFQ...
☐ N/A	Consultant has indicated percentage for value of work going to Subcontractor/ Subconsultant, Supplier or Broker Name & contact name for MWBE.
☐ N/A	Fee amount if fee amount of work to be performed is requested.
☒	Bidder/Consultant's Signature, Title & Date
☒	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.)**
☐ N/A	Email to DSBO@denvergov.org SUBMITTED WITH BID

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.

DENVER
OFFICE OF ECONOMIC DEVELOPMENT

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 initialing action under Federal or State laws concerning false statements.

Name of Firm: N/A

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: _____

DENVER
OFFICE OF ECONOMIC DEVELOPMENT

JOINT VENTURE ELIGIBILITY FORM

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

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: N/A			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)

N/A

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 there 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:

N/A

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/M/WBE/DBE, non- S/E/M/WBE/DBE or joint venture:

	Non- SBE/EBE/M/WBE/DBE	SBE/EBE/M/WBE/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

Capital Project Management

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT Ames Construction, Inc., 18450 E. 28th Ave., Aurora, CO 80011, as Principal, and Travelers Casualty and Surety Company of America, One Tower Square, Hartford, CT 06183, a corporation organized and existing under and by virtue of the laws of the State of Connecticut, 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 Obligee, in full and just sum of Five Percent (5%) of Total 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 March 15, 2018, for the construction of: **Contract No. 201840154, FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE,** as set forth in detail in the Contract Documents for the City and County of Denver, Colorado, and said Obligee 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 Obligee 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 therefor, on the prescribed form presented to him for signature, enter into a written contract with the Obligee 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 Obligee, 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 Obligee 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 15th day of March, 2018.

ATTEST

Secretary, **Michael J. Kellen**

Ames Construction, Inc.

Principal

By

Title **Raymond G. Ames, President**

Travelers Casualty and Surety Company of America

Surety

By

Kurt C. Lundblad, Attorney-in-Fact

Seal if Bidder is Corporation

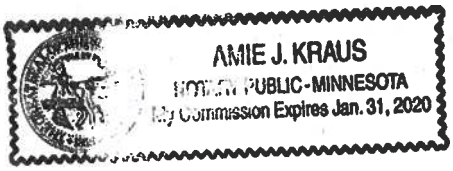
(Attach Power-of-Attorney)

[SEAL]

CORPORATE ACKNOWLEDGMENT

State of **Minnesota**)
) ss
County of **Dakota**)

On this **15th** day of **March** **2018**, before me appeared **Raymond G. Ames**, to me personally known, who, being by me duly sworn, did say that he/she is the **President** of **Ames Construction, Inc.**, a corporation, that the seal affixed to the foregoing instrument is the corporate seal of said corporation, and that said instrument was executed in behalf of said corporation by authority of its Board of Directors, and that said **Raymond G. Ames** acknowledged said instrument to be the free act and deed of said corporation.

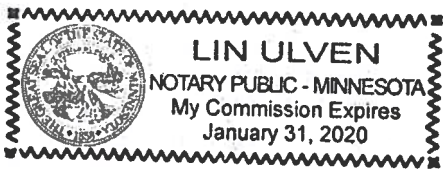


Notary Public Scott County, MN
My commission expires 1.31.2020

SURETY ACKNOWLEDGMENT

State of Minnesota)
) ss
County of Hennepin)

On this **15th** day of **March** **2018**, before me appeared **Kurt C. Lundblad**, to me personally know, who being by me duly sworn, did say that (s)he is the Attorney-in-Fact of **Travelers Casualty and Surety Company of America**, a corporation, that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was executed in behalf of said corporation by authority of its Board of Directors; and that said **Kurt C. Lundblad** acknowledged said instrument to be the free act and deed of said corporation.



Notary Public Ramsey County, Minnesota
My commission expires 1/31/2020

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In-Fact No. **232642**

Surety Bond No. or Project Description: **Contract No. 201840154, Federal Blvd Reconstruction, 5th Ave. to Howard Place**

Principal: **Ames Construction, Inc.**

Obligee: **City and County of Denver**

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc. is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **John E. Tauer, R. W. Frank, Craig Remick, Rachel Thomas, Nicole Stillings, Joshua R. Loftis, Brian J. Oestreich, Sandra M. Engstrum, Jerome T. Ouimet, Kurt C. Lundblad, Melinda C. Blodgett, R. C. Bowman, R. Scott Egginton, Ted R. Jorgensen, Emily White, Lin Ulven and Colby D. White** of the City of **Minneapolis** State of **Minnesota,** their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this **26th** day of **September , 2017.**

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut

City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the **26th** day of **September , 2017,** before me personally appeared **Robert L. Raney,** who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June, 2021.**

Marie C. Tetreault
Marie C. Tetreault, Notary Public

DENVER
OFFICE OF ECONOMIC DEVELOPMENT

Office of Economic Development
Division of Small Business Opportunity
201 W. Colfax Ave, Dept. 907
Denver, CO 80202
p: 720.913.1999
f: 720.913.1809
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: kolemurray@amesco.com

Please include the Email address of the contact person facilitating this solicitation for the City and County of Denver: diane.mora@denvergov.org

Agency Name:

__Arts and Venue	__Purchasing Division	__Sheriff Department
__Auditor Office	__Human Services	__Technology Services
__Community Planning	__Economic Development	__Other
__Denver International Airport	__Parks and Recreation	
__Environmental Health	__Police Department	
__Fire Department	x Public Works	

Project Name: Federal Blvd Reconstruction, 5th Ave to Howard Place
BID / RFP No.: 201840154
Name of Contractor/Consultant: Ames Construction, Inc.
What industry is your business? Heavy Civil/Heavy Highway Construction
Address:
18450 E. 28th Avenue
Aurora, CO 80011

Business Phone No.: 303-363-1000
Business Facsimile No.: 303-363-4101

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 90% Part-Time 10%

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.

Ames hires and trains employees based on our company-wide diversity and EEO policy.

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.

N/A

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.

Our procurement program always includes soliciting bids from DBE/MBE subcontractors and suppliers. Budget information can be provided upon request.

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.

N/A

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 — Date: 3/15/2018

Kole Murray
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."

COLORADO DEPARTMENT OF TRANSPORTATION – Form 605

CONTRACTORS PERFORMANCE CAPABILITY STATEMENT

Project # 201840154

1. List names of partnerships or joint ventures ☒ none

List decreases in the contractors fiscal or workmanship qualifications compared to the last prequalification statement submitted to CDOT. (Attach additional sheets if necessary

a. Key personnel changes ☒ none

b. Key equipment changes ☒ none

c. Fiscal capability changes (legal actions, etc.) ☒ none

d. Other changes that may affect the contractors ability to perform work ☒ none

I DECLARE UNDER PENALTY OF PERFURY IN THE SECOND DEGREE, AND ANY OTHER APPLICABLE STATE OR FEDERAL LAWS, THAT THE STATEMENTS MADE ON THIS DOCUMENT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE

Contractor's firm or company name	By	Date
Ames Construction, Inc.	Title Senior Vice President	3/15/18
2nd Contractor's firm or company name (if joint venture)	By	Date
	Title	

Form 605

COLORADO DEPARTMENT OF TRANSPORTATION **ANTI-COLLUSION AFFIDAVIT**	Project No.: 201840154 Location: Federal Blvd, 5th Ave to Howard Place

I hereby attest that I am the person responsible within my firm for the final decision as to the price(s) and amount of this bid or, if not, that I have written authorization, enclosed herewith, from that person to make the statements set out below on his or her behalf and on behalf of my firm.

I further attest that:

1. The price(s) and amount of this bid have been arrived at independently, without consultation, communication or agreement for the purpose or with the effect of restricting competition with any other firm or person who is a bidder or potential prime bidder.

2A. Neither the price(s) nor the amount of this bid have been disclosed to any other firm or person who is a bidder or potential prime bidder on this project, and will not be so disclosed prior to bid opening.

2B. Neither the prices not the amount of the bid of any other firm or person who is a bidder or potential prime bidder on this project have been disclosed to me or my firm.

3A. No attempt has been made to solicit, cause or induce any firm or person who is a bidder or potential prime bidder to refrain from bidding on this project, or to submit a bid higher than the bid of this firm, or any intentionally high or non-competitive bid or other form of complementary bid.

3B. No agreement has been promised or solicited for any other firm or person who is a bidder or potential prime bidder on this project to submit an intentionally high, noncompetitive or other form of complementary bid on this project.

4. The bid of my firm is made in good faith and not pursuant to any consultation, communication, agreement or discussion with, or inducement or solicitation by or from any firm or person to submit any intentionally high, noncompetitive or other form of complimentary bid.

5. My firm has not offered or entered into a subcontract or agreement regarding the purchase or sale of materials or services from any firm or person, or offered, promised or paid cash or anything of value to any firm or person, whether in connection with this or any other project, in consideration for an agreement or promise by any firm or person to refrain from bidding or to submit any intentionally high, noncompetitive or other form of complementary bid or agreeing or promising to do so on this project.

6. My firm has not accepted or been promised any subcontract or agreement regarding the sale of materials or services to any firm or person, and has not been promised or paid cash or anything of value by any firm or person whether in connection with this or any other project, in consideration for my firm's submitting any intentionally high, noncompetitive or other form of complementary bid, or agreeing or promising to do so, on this project.

7. I have made a diligent inquiry of all members, officers, employees, and agents of my firm with responsibilities relating to the preparation, approval or submission of my firm's bid on this project and have been advised by each of them that he or she has not participated in any communication, consultation, discussion, agreement, collusion, or other conduct inconsistent with any of the statements and representations made in this affidavit.

8. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as a fraudulent concealment from the Colorado Department of Transportation, of the true facts relating to the submission of bids for this contract.

I DECLARE UNDER PENALTY OF PERJURY IN THE SECOND DEGREE, AND ANY OTHER APPLICABLE STATE OR FEDERAL LAWS, THAT THE STATEMENTS MADE ON THIS DOCUMENT ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

Contractors firm or company name: Ames Construction, Inc.	By:	Date: 3/15/18
	Title: Senior Vice President	
2nd Contractors firm or company name:	By:	Date:
	Title:	

Sworn to before me this 15th day of March 2018

Notary Public Catherine Ann Harrison

My commission expires: 8/21/2021

NOTE: THIS DOCUMENT MUST BE SIGNED IN INK.

CATHERINE ANN HARRISON
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 19974014716
My Commission Expires August 21, 2021

Form 606

COLORADO DEPARTMENT OF TRANSPORTATION **ASSIGNMENT OF ANTITRUST CLAIMS**	Project No.: 201840154

Contractor and Colorado Department of Transportation (CDOT) recognize that in actual economic practice antitrust violations ultimately impact CDOT. Therefore, for good cause and as consideration for executing this contract and for receiving payments hereunder:

1. Contractor hereby irrevocably assigns to CDOT any and all claims it may now have or which may hereafter accrues to it under federal or state antitrust laws in connection with the particular project, goods or services purchased or acquired by CDOT pursuant to this contract.
2. Contractor hereby expressly agrees:
   a. That, upon becoming aware that a third party has commenced a civil action asserting on Contractor's behalf an antitrust claim which has been assigned to CDOT hereunder, Contractor shall immediately advise in writing:
      (1) Such third party that the antitrust claim has been assigned to CDOT, and
      (2) CDOT that such civil action is pending and the date on which, in accordance with subparagraph a.(1) above, Contractor notified such third party that the antitrust claim had been assigned to CDOT.
   b. To take no action which will in any way diminish the value of the claims or rights assigned or dedicated to CDOT hereunder; and
   c. Promptly to pay over to CDOT its proper share of any payment under an antitrust claim brought on Contractor's behalf by any third party and which claim has been assigned to CDOT hereunder.
3. Further, Contractor agrees that in the event it hires one or more subcontractors to perform any of its duties under the contract, Contractor shall require that each such subcontractor:
   a. Irrevocably assign to CDOT (as a third party beneficiary) any and all claims that such subcontractor may have or which may thereafter accrue to the subcontractor under federal or state antitrust laws in connection with any goods or services provided by the subcontractor in carrying out the subcontractor's obligations to Contractor;
   b. Upon becoming aware that a third party has commenced a civil action on the subcontractor's behalf asserting an antitrust claim which has been assigned to CDOT hereunder, shall immediately advise in writing:
      (1) Such third party that the antitrust claim has been assigned to CDOT, and
      (2) Contractor and CDOT that such civil action is pending and the date on which, in accordance with subparagraph b.(1) above, the subcontractor notified such third party that the antitrust claim had been assigned to CDOT;
   c. Take no action which will in any way diminish the value of the claims or rights assigned or dedicated to CDOT hereunder; and
   d. Promptly pay over to CDOT its proper share of any payment under an antitrust claim brought on the subcontractor's behalf by any third party and which claim has been assigned or dedicated to CDOT pursuant hereto.

I, acting in my capacity as officer of a bidder (bidders if a joint venture) do agree to the above assignment of antitrust claims.

Contractors firm or company name: Ames Construction, Inc.	By:	Date: 3/15/18
	Title: Senior Vice President	
2ND Contractors firm or company name:	By:	Date:
	Title:	

Form 621

CITY AND COUNTY OF DENVER

STATE OF COLORADO

DEPARTMENT OF PUBLIC WORKS

Bid Documents Package

Contract Number: 201840154

Federal Blvd Reconstruction

5th Ave to Howard Place

February 13, 2018

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

TABLE OF CONTENTS FOR CONTRACT DOCUMENTS

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated Quantity	
201	CLEARING AND GRUBBING	1	LS
202	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	1	LS
202	REMOVAL OF TREE	21	EA
202	REMOVAL OF BOLLARD	20	EA
202	REMOVAL OF POWER OUTLET	10	EA
202	REMOVAL OF WHEEL STOP	14	EA
202	REMOVAL OF INLET	8	EA
202	REMOVAL OF MANHOLE	2	EA
202	REMOVAL OF GABION	5	CY
202	REMOVAL OF PIPE	626	LF
202	REMOVAL OF FIRE HYDRANT	3	EA
202	REMOVAL OF WATER SERVICE LINE	31	EA
202	REMOVAL OF WATER METER	28	EA
202	REMOVAL OF WALL	12	LF
202	REMOVAL OF SIDEWALK	5,336	SY
202	REMOVAL OF CURB AND GUTTER	9,574	LF
202	REMOVAL OF CURB	40	LF
202	REMOVAL OF CONCRETE PAVEMENT	5,051	SY
202	REMOVAL OF ASPHALT MAT	33,179	SY

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated Quantity	
202	REMOVAL OF PAVEMENT MARKING	3,175	SF
202	REMOVAL OF LIGHT STANDARD	11	EA
202	REMOVAL OF LIGHT STANDARD FOUNDATION	17	EA
202	REMOVAL OF GROUND SIGN	24	EA
202	REMOVAL OF SIGN PANEL	15	EA
202	REMOVAL OF SIGN (SPECIAL)	5	EA
202	REMOVAL OF TRAFFIC SIGNAL EQUIPMENT	1	LS
202	REMOVAL OF FENCE	1,319	LF
202	REMOVAL OF GUARDRAIL TYPE 3	216	LF
202	ABANDON WATER SERVICE	13	EA
202	CLEAN VALVE BOX	34	EA
202	PLUG PIPE	7	EA
203	UNCLASSIFIED EXCAVATION (COMPLETE IN PLACE)	11,970	CY
203	MUCK EXCAVATION	500	CY
203	COMBINATION LOADER	30	HR
203	POTHOLING	100	HR
206	STRUCTURE EXCAVATION	833	CY
206	STRUCTURE BACKFILL (CLASS 1)	790	CY
206	STRUCTURE BACKFILL (CLASS 2)	33	CY

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated Quantity	
206	STRUCTURE BACKFILL (FLOW-FILL)	100	CY
206	SHORING	1	LS
206	SHORING (JACKING PIT)	1	LS
206	SHORING (RECEIVING PIT)	1	LS
207	TOPSOIL	796	CY
207	STOCKPILE TOPSOIL	1,000	CY
207	PLANTER SOIL MIX	671	CY
208	EROSION LOG TYPE 1 (12 INCH)	54	LF
208	SILT FENCE	1,000	LF
208	SILT FENCE (REINFORCED)	336	LF
208	AGGREGATE BAG	1,825	LF
208	CONCRETE WASHOUT STRUCTURE	1	LS
208	STORM DRAIN INLET PROTECTION (TYPE I)	400	LF
208	STORM DRAIN INLET PROTECTION (TYPE II)	40	LF
208	STORM DRAIN INLET PROTECTION (TYPE III)	3	EA
208	VEHICLE TRACKING PAD	2	EA
208	REMOVAL AND DISPOSAL OF SEDIMENT (LABOR)	40	HR
208	REMOVAL AND DISPOSAL OF SEDIMENT (EQUIPMENT)	30	HR
208	SWEEPING (SEDIMENT REMOVAL)	190	HR

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
208	REMOVAL OF TRASH	100	HR
208	EROSION CONTROL MANAGEMENT (ECM)	380	DAY
210	RESET STRUCTURE (SIGN 2)	1	EA
210	RESET STRUCTURE (SIGN 3)	1	EA
210	RESET STRUCTURE (SIGN 4)	1	EA
210	RESET STRUCTURE (SIGN 5)	1	EA
210	RESET STRUCTURE (SIGN 6)	1	EA
210	RESET WHEEL STOP	5	EA
210	RESET FIRE HYDRANT	3	EA
210	RESET LIGHT STANDARD	1	EA
210	RESET GROUND SIGN	1	EA
210	RESET SIGN PANEL	17	EA
210	RESET VARIABLE MESSAGE SIGN	1	EA
210	RESET TRAFFIC SIGNAL HEAD	1	EA
210	RESET TRAFFIC SIGNAL POLE	1	EA
210	RESET TRAFFIC SIGNAL CONTROLLER AND CABINET	1	EA
210	RESET GATE	1	EA
210	RESET CHAIN LINK FENCE	121	LF

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated Quantity	
210	RESET TREE GRATE	1	EA
210	ADJUST MANHOLE	22	EA
210	MODIFY MANHOLE	1	EA
210	ADJUST VALVE BOX	34	EA
211	WATER CONTROL	1	LS
212	SEEDING (NATIVE)	.82	ACRE
212	SOIL CONDITIONING	.98	ACRE
212	LANDSCAPE RESTORATION	1	LS
213	METAL EDGER	135	LF
213	MULCHING (WEED FREE HAY)	.55	ACRE
213	MULCHING (WOOD)	488	CF
213	MULCHING (DECORATIVE)	1,185	CF
213	TREE PLANTER (GRATES)	31	EA
213	LANDSCAPE BOULDER	8	EA
214	LANDSCAPE MAINTENANCE (24 MONTH)	1	LS
214	DECIDUOUS TREE (2 INCH CALIPER)	16	EA
214	DECIDUOUS TREE (3 INCH CALIPER)	38	EA
214	DECIDUOUS SHRUB (5 GALLON CONTAINER)	174	EA
214	EVERGREEN SHRUB (5 GALLON CONTAINER)	16	EA
214	PERENNIALS (1 GALLON CONTAINER)	666	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
216	SOIL RETENTION BLANKET (STRAW-COCONUT) (PHOTODEGRADABLE CLASS 1)	1,320	SY
240	WILDLIFE BIOLOGIST	40	HR
240	REMOVAL OF NESTS	40	HR
250	ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT	1	LS
250	PROJECT SPECIFIC RACS MANAGEMENT PLAN	1	LS
250	MATERIALS MANAGEMENT PLAN SUPERVISOR	2,816	HR
250	HEALTH AND SAFETY OFFICER	200	HR
250	CERTIFIED ASBESTOS BUILDING INSPECTOR	1,408	HR
250	IMPORT MATERIAL SAMPLING EVENT	2	EA
250	MATERIAL HANDLING (STOCKPILE)	2,556	CY
250	SOLID WASTE DISPOSAL	2,556	CY
250	HAUL NON-HAZARDOUS WASTE	2,000	CY
304	AGGREGATE BASE COURSE (CLASS 6)	7,049	CY
403	HOT MIX ASPHALT (PATCHING) (ASPHALT)	869	TON
403	HOT MIX ASPHALT (GRADING S) (100) (PG 64-22)	668	TON
403	HOT MIX ASPHALT (GRADING SX) (100) (PG 76-28)	397	TON
412	CONCRETE PAVEMENT (8 INCH)	2,741	SY
412	CONCRETE PAVEMENT (10.5 INCH)	26,561	SY

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
412	CONCRETE PAVEMENT (10.5 INCH) (FAST TRACK)	405	SY
412	CONCRETE PAVEMENT (10.5 INCH) (SPECIAL)	875	SY
412	CONCRETE PAVEMENT (11 INCH)	599	SY
412	CONCRETE PAVEMENT (11 INCH) (FAST TRACK)	619	SY
420	GEOTEXTILE (SEPARATOR) (CLASS 1)	29,209	SY
503	DRILLED CAISSON (30 INCH)	1,112	LF
503	DRILLED CAISSON (36 INCH)	93	LF
503	DRILLED CAISSON (48 INCH)	51	LF
504	RETAINING WALL (BOULDER)	72	SF
506	RIPRAP (6 INCH)	4	CY
514	PEDESTRIAN RAILING (STEEL)	93	LF
514	PEDESTRIAN RAILING (STEEL) (SPECIAL)	50	LF
601	CONCRETE CLASS B	5	CY
601	CONCRETE CLASS D (WALL)	139	CY
601	STRUCTURAL CONCRETE COATING	222	SY
602	REINFORCING STEEL	14,764	LB
602	REINFORCING STEEL (EPOXY COATED)	240	LB
603	15 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	73	LF

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
603	18 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	992	LF
603	24 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	728	LF
603	30 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	207	LF
603	36 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	30	LF
603	42 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	613	LF
603	54 INCH REINFORCED CONCRETE PIPE (COMPLETE IN PLACE)	220	LF
603	30x19 INCH REINFORCED CONCRETE PIPE ELLIPTICAL (COMPLETE IN PLACE)	67	LF
603	34x22 INCH REINFORCED CONCRETE PIPE ELLIPTICAL (COMPLETE IN PLACE)	244	LF
603	45x29 INCH REINFORCED CONCRETE PIPE ELLIPTICAL (COMPLETE IN PLACE)	48	LF
603	54 INCH REINFORCED CONCRETE PIPE (JACKED)	75	LF
604	INLET NO 14 L 6 (5 FOOT)	4	EA
604	INLET NO 14 L 6 (10 FOOT)	2	EA
604	INLET NO 14 L 9 (5 FOOT)	4	EA
604	INLET NO 14 L 12 (5 FOOT)	6	EA
604	INLET NO 14 L 12 (10 FOOT)	1	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
604	INLET NO 14 L 15 (5 FOOT)	3	EA
604	INLET NO 14 L 15 (10 FOOT)	2	EA
604	INLET NO 16 L 3'-4" VALLEY (5 FOOT)	1	EA
604	MANHOLE STANDARD (4' ID) (5 FOOT)	4	EA
604	MANHOLE STANDARD (4' ID) (10 FOOT)	3	EA
604	MANHOLE STANDARD (5' ID) (5 FOOT)	1	EA
604	MANHOLE STANDARD (5' ID) (10 FOOT)	3	EA
604	MANHOLE STANDARD (6' ID) (5 FOOT)	2	EA
604	MANHOLE STANDARD (6' ID) (15 FOOT)	1	EA
604	MANHOLE STANDARD TYPE B (15 FOOT)	3	EA
604	MANHOLE STANDARD TYPE B (SPECIAL) (10 FOOT)	1	EA
604	MANHOLE STANDARD TYPE B (SPECIAL) (15 FOOT)	2	EA
604	MANHOLE STANDARD TYPE P (20 FOOT)	2	EA
605	4 INCH NON-PERFORATED PIPE UNDERDRAIN	558	LF
605	4 INCH PERFORATED PIPE UNDERDRAIN	462	LF
606	GUARDRAIL TYPE 3 (6-3 POST SPACING) (31 IN.MGS)	32	LF
606	TRANSITION TYPE 3G (31 IN.MGS)	1	EA
606	TRANSITION TYPE 3J (31 IN.MGS)	1	EA

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
606	END ANCHORAGE TYPE 3K (31 IN.MGS)	1	EA
606	BRIDGE RAIL TYPE 10M (SPECIAL)	93	LF
607	FENCE (PLASTIC)	500	LF
607	FENCE (TEMPORARY)	990	LF
607	FENCE CHAIN LINK (72 INCH)	324	LF
607	24 FOOT GATE DOUBLE (CHAIN LINK) (ROLLING)	1	EA
607	30 FOOT GATE DOUBLE (CHAIN LINK) (ROLLING)	2	EA
607	36 FOOT GATE DOUBLE (CHAIN LINK) (ROLLING)	1	EA
608	CONCRETE SIDEWALK	4,773	SY
608	CONCRETE SIDEWALK (SPECIAL)	141	SY
608	CONCRETE SIDEWALK (6 INCH PATTERNED CONCRETE)	2,093	SF
608	CONCRETE SIDEWALK (8 INCH) (SPECIAL)	157	SY
608	CONCRETE SIDEWALK (AMENITY ZONE)	1,517	SY
608	CONCRETE SIDEWALK (STAIRS)	146	SF
608	CONCRETE CURB RAMP	502	SY
608	SIDEWALK CHASE DRAIN	68	LF
609	CURB TYPE 2 (SECTION B)	456	LF

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
609	CURB AND GUTTER TYPE 2 (SECTION I-B)	2,598	LF
609	CURB AND GUTTER TYPE 2 (SECTION II-B)	5,259	LF
609	CURB AND GUTTER TYPE 2 (SECTION II-B) (SPECIAL)	34	LF
609	CURB AND GUTTER TYPE 2 (SECTION II-M)	115	LF
609	4 INCH MOUNTABLE CURB (OUTFALL)	1,956	LF
609	GUTTER TYPE 2 (8 FOOT)	27	LF
609	CURB TYPE 4 (SECTION B)	525	LF
609	CURB (BARRIER)	710	LF
610	MEDIAN COVER MATERIAL (PATTERNED CONCRETE)	12,091	SF
610	MEDIAN COVER MATERIAL (COLORED CONCRETE)	720	SF
613	1/2 INCH ELECTRICAL CONDUIT (PLASTIC)	20	LF
613	3/4 INCH ELECTRICAL CONDUIT	290	LF
613	2 INCH ELECTRICAL CONDUIT (PLASTIC)	5,755	LF
613	2 INCH ELECTRICAL CONDUIT (BORED)	800	LF
613	3 INCH ELECTRICAL CONDUIT (PLASTIC)	3,885	LF
613	3 INCH ELECTRICAL CONDUIT (BORED)	1,600	LF
613	4 INCH ELECTRICAL CONDUIT (PLASTIC)	1,640	LF
613	PULL BOX (24"x36"x12") = TYPE B (TRAFFIC)	10	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
613	PULL BOX (SPECIAL)	8	EA
613	WIRING	1	LS
613	LIGHT STANDARD METAL (35 FOOT)	31	EA
613	CONCRETE FOUNDATION PAD	4	EA
613	LIGHT STANDARD FOUNDATION	31	EA
613	LIGHTING CONTROL CENTER	4	EA
613	LUMINAIRE (LED) (14,000 LUMENS)	39	EA
613	TEMPORARY LIGHTING	1	LS
614	SIGN PANEL (CLASS 1)	522	SF
614	STEEL SIGN POST (2 x 2 INCH TUBING)	564	LF
614	PEDESTRIAN SIGNAL FACE (16) (COUNTDOWN)	16	EA
614	TRAFFIC SIGNAL FACE (12-12-12)	39	EA
614	TRAFFIC SIGNAL FACE (12-12-12-12)	4	EA
614	TRAFFIC SIGNAL CONTROLLER CABINET	2	EA
614	PEDESTRIAN PUSH BUTTON	8	EA
614	INTERSECTION DETECTION SYSTEM (CAMERA)	8	EA
614	EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM	2	EA
614	TRAFFIC SIGNAL-LIGHT POLE STEEL (1-30 FOOT MAST ARM)	1	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
614	TRAFFIC SIGNAL-LIGHT POLE STEEL (1-40 FOOT MAST ARM)	1	EA
614	TRAFFIC SIGNAL-LIGHT POLE STEEL (1-50 FOOT MAST ARM)	2	EA
614	TRAFFIC SIGNAL-LIGHT POLE STEEL (1-55 FOOT MAST ARM)	1	EA
614	TRAFFIC SIGNAL-LIGHT POLE STEEL (1-60 FOOT MAST ARM)	3	EA
614	TRAFFIC SIGNAL PEDESTAL POLE STEEL	1	EA
614	TELEMETRY (FIELD)	3	EA
614	TRAFFIC SIGNAL CONTROLLER (SOLID STATE) (FULLY ACTUATED) (12 PHASE)	2	EA
614	TEST FIBER OPTIC CABLE	1	LS
614	FIBER OPTIC CABLE (SPECIAL)	3,050	LF
614	CLOSED CIRCUIT TELEVISION CAMERA	1	EA
614	ELECTRIC METER (PEDESTAL)	3	EA
619	WATER METER	39	EA
619	METER PIT (24 INCH)	37	EA
619	METER VAULT	2	EA
619	CURB STOP AND BOX	40	EA
619	3 INCH DUCTILE IRON PIPE	31	LF
619	6 INCH DUCTILE IRON PIPE	131	LF
619	8 INCH DUCTILE IRON PIPE	138	LF

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
619	3/4 INCH COPPER PIPE	809	LF
619	1 INCH COPPER PIPE	291	LF
619	1-1/2 INCH COPPER PIPE	38	LF
619	3/4 INCH COPPER PIPE CONNECTIONS	32	EA
619	1 INCH COPPER PIPE CONNECTIONS	6	EA
619	1-1/2 INCH COPPER PIPE CONNECTIONS	2	EA
619	6 INCH PLASTIC PIPE (C900)	989	LF
619	8 INCH PLASTIC PIPE (C900)	855	LF
619	3 INCH GATE VALVE & VALVE BOX	2	EA
619	6 INCH GATE VALVE & VALVE BOX	7	EA
619	8 INCH GATE VALVE & VALVE BOX	12	EA
619	6 INCH TAPPING VALVE & VALVE BOX	3	EA
619	8 INCH TAPPING VALVE & VALVE BOX	1	EA
619	6 INCH SWIVEL TEE (ALL BRANCH SIZES)	2	EA
619	8 INCH SWIVEL TEE (ALL BRANCH SIZES)	6	EA
619	6 INCH TEE (ALL BRANCH SIZES)	3	EA
619	8 INCH TEE (ALL BRANCH SIZES)	4	EA
619	6 INCH HORIZONTAL BEND (ALL ANGLES)	4	EA
619	8 INCH HORIZONTAL BEND (ALL ANGLES)	2	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
619	6 INCH VERTICAL BEND (ALL ANGLES)	10	EA
619	8 INCH VERTICAL BEND (ALL ANGLES)	28	EA
619	6 INCH TAPPING SLEEVE (ALL BRANCH SIZES)	2	EA
619	8 INCH TAPPING SLEEVE (ALL BRANCH SIZES)	1	EA
619	30 INCH TAPPING SLEEVE (ALL BRANCH SIZES)	1	EA
619	FIRE HYDRANT ASSEMBLY	7	EA
619	FIRE HYDRANT ASSEMBLY (EXTRA DEPTH)	3	EA
620	FIELD OFFICE (CLASS 1)	1	EA
620	SANITARY FACILITY	1	EA
621	DETOUR PAVEMENT	1,750	SY
622	MEDIAN CONCRETE PLANTER WALL	937	LF
622	MASONRY WORK SANDSTONE CURB (MEDIAN WALL)	254	LF
622	MASONRY WORK SANDSTONE FACE (MEDIAN WALL)	140	LF
622	STONE END MARKERS	36	EA
623	1 INCH BACKFLOW PREVENTER ASSEMBLY WITH CONCRETE PAD	2	EA
623	BACKFLOW ENCLOSURE ASSEMBLY	2	EA
623	PLUMBER	2	EA
623	1-1/2" HYDROMETER	2	EA

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
623	RADIO REMOTE WITH TRANCEIVER (TURNOVER ITEM) - PARKS	2	EA
623	ELECTRICIAN-CONTROLLER HOOKUP	2	EA
623	120 VOLT ELECTRICAL CONDUCTOR	100	LF
623	12 STATION AUTOMATIC CENTRAL CONTROLLER ASSEMBLY - PARKS	2	EA
623	RAIN SENSOR	2	EA
623	2-WIRE COMMUNICATION CABLE	4,580	LF
623	1 INCH TYPE K COPPER PIPING	20	LF
623	1 INCH STOP & WASTE VALVE ASSEMBLY WITH VALVE BOX	2	EA
623	1-1/2 INCH GATE VALVE	23	EA
623	1 INCH QUICK COUPLER VALVE	12	EA
623	3/4 INCH DRAIN VALVE	13	EA
623	1-1/2 INCH CL200 PVC MAINLINE	4,580	LF
623	2 INCH CL 160 PVC SLEEVES	2,725	LF
623	2 INCH HDPE SLEEVES	1,675	LF
623	4 INCH CL 160 PVC SLEEVES	1,945	LF
623	4 INCH HDPE SLEEVES	1,675	LF
623	1 INCH 80# NSF POLY LATERAL	2,280	LF
623	1 INCH AUTOMATIC CONTROL VALVE	9	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
623	1 INCH DRIP VALVE KIT WITH BALL VALVE AND BASKET FILTER	4	EA
623	0.5 GPM BUBBLER HEAD ASSEMBLY	68	EA
623	12 INCH POP-UP SPRAY HEAD WITH NOZZLE	8	EA
623	SUBSURFACE DRIPPERLINE	2,425	LF
623	DRIPLINE BLOWOUT WITH INDICATOR POPUP	8	EA
625	CONSTRUCTION SURVEYING	1	LS
625	CONSTRUCTION SURVEYING (HOURLY)	150	HR
626	MOBILIZATION	1	LS
626	PUBLIC INFORMATION SERVICES (TIER II)	1	LS
627	PAVEMENT MARKING PAINT	150	GAL
627	RAISED PAVEMENT MARKER	41	EA
627	PREFORMED THERMOPLASTIC PAVEMENT MARKING (60 MIL) (WORD-SYMBOL)	258	SF
627	PREFORMED THERMOPLASTIC PAVEMENT MARKING (60 MIL) (XWALK-STOPLINE)	2,611	SF
627	PREFORMED PLASTIC PAVEMENT MARKING (TYPE II) (INLAID)	2,502	SF
627	THERMOPLASTIC PAVEMENT MARKING	1,736	SF
629	SURVEY MONUMENT (TYPE 1)	72	EA
629	SURVEY MONUMENT (TYPE 3A)	12	EA

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
629	SURVEY MONUMENT (TYPE 6)	18	EA
630	FLAGGING	3,600	HR
630	UNIFORMED TRAFFIC CONTROL	80	HR
630	TRAFFIC CONTROL INSPECTION	171	DAY
630	TRAFFIC CONTROL MANAGEMENT	429	DAY
630	BARRICADE (TYPE 3 M-A) (TEMPORARY)	16	EA
630	CONSTRUCTION TRAFFIC SIGN (PANEL SIZE A)	33	EA
630	CONSTRUCTION TRAFFIC SIGN (PANEL SIZE B)	97	EA
630	PORTABLE MESSAGE SIGN PANEL	2	EA
630	ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL (C TYPE)	2	EA
630	DRUM CHANNELIZING DEVICE	250	EA
630	CONCRETE BARRIER (TEMPORARY)	1,000	LF
630	TRAFFIC CONE	100	EA
630	IMPACT ATTENUATOR (TEMPORARY)	2	EA
630	TRAFFIC SIGNAL (TEMPORARY)	2	EA
	322 ITEMS		

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

STATEMENT OF QUANTITIES

Item No.	Description	Estimated	Quantity
	FORCE ACCOUNTS		
700	F/A PARTNERING	$10,000.00	F/A
700	F/A ON-THE-JOB TRAINEE	$4,480.00	F/A
700	F/A REMOVALS	$25,000.00	F/A
700	F/A ADJUST UTILITIES	$200,000.00	F/A
700	F/A FURNISH & INSTALL ELECRTICAL SERVICE	$35,000.00	F/A
700	F/A EROSION CONTROL	$30,000.00	F/A
700	F/A ENVIORNMENTAL HEALTH & SAFETY MANAGEMENT	$30,000.00	F/A
	7 FORCE ACCOUNTS		
	329 TOTAL ITEMS		

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

NOTICE OF INVITATION FOR BIDS
FEDERAL AID PROJECT NO: NHPP 2873-172/19957
CITY OF DENVER CONTRACT NO. 201840154

FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

BID SCHEDULE:
11:00 a.m. Local Time
March 15, 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:
Work on this project involves the complete reconstruction of Federal Blvd. from W. 7th Ave. to W. Holden Place, including removal of all existing pavement and replacement with new concrete pavement, new raised landscaped medians, and the addition of a new third northbound lane. New sidewalks and curb ramps will also be constructed, as well as new traffic signals at W. 8th and W. 10th Avenues, and new trees on the east side of Federal Blvd. will be installed. Restriping of Federal Blvd. will be done on either end of the new widened stretch of roadway. The work also includes removals, installation of storm sewers, jacking of storm sewer, new outfall to Weir Gulch, retaining wall, curb and gutter, asphalt pavement and tie-in to side streets, irrigation systems for new landscaping, erosion control, traffic control, public involvement, and other related items. The Contractor will be required to prepare a Project Specific Regulated Asbestos Containing Soil Management Plan and provide a Certified Asbestos Building Inspector on-site during all excavation activities as specified in the Contract Documents.

ESTIMATED CONSTRUCTION COST:
The estimated cost of construction for this project is between $14,663,438.00 and $15,727,107.00.

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 **#5526736**. 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 **February 20, 2018**. This meeting will take place at: WEBB Building, 201 W Colfax Ave, 4th floor conference room 4.I.5., Denver Colorado 80202.

DEADLINE TO SUBMIT QUESTIONS: February 27, 2018 by 2:00 p.m. local time.

PREQUALIFICATION REQUIREMENTS:
Each bidder must be prequalified as a **1A Civil General** or **1F(2) Concrete Roadway and Paving** in the **$18,000,000.00** 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, 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.

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION:
Federally-funded construction, reconstruction, remodeling, and professional design services contracts made and entered into by the City and County of Denver are subject to Federal Statutes and Regulations regarding Disadvantaged Business Enterprise participation and all Disadvantaged Business Enterprises Utilization.

The Director of the Division of Small Business Opportunity is authorized to establish project goals for expenditures on construction, reconstruction and remodeling and professional design services work let by the City and County of Denver. The specific goal for this project is:

13% Disadvantaged Business Enterprise (DBE)

The project goal must be met with certified participants as set forth in 49 CFR Part 26. For compliance with good faith effort requirements, as set forth in Part 26, the DBE solicitation level required for this project is 100% of the City and Denver's certified DBE's and 100% of the State of Colorado's Department of Transportation (CDOT's) certified DBE's.

The Director of the Division of Small Business Opportunity urges all participants in the construction, reconstruction, remodeling, and professional design services projects not to discriminate against women and minorities or any other persons and to assist in achieving these goals.

The CDOT Form 347, Certification of EEO Compliance, is no longer required to be submitted in the bid package. This form certified that the contractor/proposed subcontractors were in compliance with the Joint Reporting Committee EEO-1 form requirements. The EEO-1 Report must still be submitted to the Joint Reporting Committee if the contractors and subcontractors meet the eligibility requirements (29CRF 1602.7); CDOT will, however, no longer require certification.

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.

Publication Dates:	February 13, 14, 15, 2018
Published In:	The Daily Journal

If applicable, a shortened version of this Notice of Invitation for Bids and the Statement of Quantities can be viewed on the City and County of Denver website at: www.work4denver.com

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
Capital Project Management

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, interlineation, 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-4, 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 on the 2nd floor at 201 W. Colfax Avenue, Denver, CO 80202.

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, responsible, 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 re-bid 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 non-responsive 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 contract documents are ready for execution the Apparent Low Bidder who 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 materials purchased prior to the issuance of the 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.

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 WAGE RATE REQUIREMENTS

In preparing any bid hereunder, the Contractor must comply with and should carefully consider 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.

At the time of the preparation of the Contract Documents, the then-current prevailing wage rates applicable to this Project shall be bound within the Contract Documents made available to potential bidders for the Project. If, more than ten (10) days prior to the actual date of bid opening, the Career Service Board determines that prevailing wages rates different from those bound in the Contract Documents are applicable to one or more of the various classes of laborers, mechanics and workers encompassed by this Project, such different prevailing wage rates shall be provided in an addendum. If different prevailing wage rates are determined by the Career Service Board ten (10) or less days prior to the actual date of bid opening, the City will determine on a case by case basis in its sole discretion whether such different prevailing wage rates are to be included in an addendum. In conjunction with such determination, the City may elect, in its sole discretion, to postpone the date of bid opening on the Project. In any event, the bidder will be held, at

the actual date of bid opening, to those prevailing wage rates incorporated into the Contract Documents and as modified by any such addenda.

These prevailing wage rates shall be considered the **minimum** City prevailing wage rates to be paid by all contractors or subcontractors for a period not to exceed one (1) year from the date of the Contract. Increases in prevailing wages subsequent to the date of the Contract for a period not to exceed one (1) year shall not be mandatory on either the contractor or subcontractors. Future increases in prevailing wages on contracts whose period of performance exceeds one (1) year shall be mandatory for the contractor and subcontractors only on the yearly anniversary date of the Contract. The **minimum** City prevailing wage rate for any such subsequent yearly period or portion thereof shall be the wage rates in effect on the yearly anniversary date of the contract which begins such subsequent period. In no event shall any increases in prevailing wages over the amounts thereof as stated in such Technical Specifications and addenda thereto result in any increased liability on the part of the City and the possibility and risk of any such increase is assumed by all contractors entering into any such contract with the City. Decreases in prevailing wages subsequent to the date of the contract for a period not to exceed one year (1) shall not be permitted. Decreases in prevailing wages on contracts whose period of performance exceeds one (1) year shall not be effective except on the yearly anniversary date of the contract.

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 is 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 DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENTS

Department of Transportation (DOT) 49 CFR Part 26 ("Part 26") applies to this Project and will be incorporated into any agreement entered into by the City and contained in County of Denver Bid Documents. It is the policy of DOT and the City and County of Denver that DBEs to ensure non-discrimination in the award and administration of DOT-assisted contracts financed in whole or in part with Federal funds. Consequently, the Bidders must fully comply with the DBE requirements of Part 26 in bidding and performing hereunder.

The contractor, sub recipient or subcontractor shall not discriminate on the basis or race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deemed appropriate. Each contract signed by the contractor with a subcontractor must include this paragraph.

Part 26 provides for the adoption of a good faith goals program, to be administered by the Division of Small Business Opportunity (DSBO). As such, each bidder must comply with the terms and conditions of the Part 26 in making its bid and, if awarded the Contract, in performing all Work thereunder. A bidder's failure to comply with Part 26, any Rules or Regulations promulgated pursuant thereto, or any additional requirements contained herein may render a bid non-responsive and may constitute cause for rejection.

In order to comply with the bid requirements of Part 26, a Bidder shall either meet the established DBE Project goal or, in the alternative, demonstrate that the bidder has made sufficient good faith efforts to meet the goal. In preparing a bid to meet the established DBE Project goal, bidders should consider the following instructions relating to compliance with Part 26:

1. Under Part 26, the Director of the Division of Small Business Opportunity establishes a project goal for this project. 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 Disadvantage Business Enterprise Bidders, Sub-contractors, Suppliers, Manufacturers, or Brokers" the name, address, work description/supply, committed level of participation and other required information for each DBE of any tier which the bidder intends to use in performing the Work on this Project. Only DBEs identified, and the levels of participation listed for each on this 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 in determining responsiveness.

3. All DBE firms listed on the Bid Form must be properly certified under guidelines of the Department of Transportation 49 CFR Part 26 by the City of Denver DSBO's Office or the State of Colorado Department of Transportation (CDOT's) Office in order to count towards meeting the designated goals. Both DSBO and CDOT maintain a current listing of certified DBE firms. The DBE Directory is located at www.dot.state.co.us/app_ucp/. Bidders are encouraged to utilize these directories to assist them in locating DBEs for the work/supply required on the project. The most current directories must be utilized in preparing a bid. DBE certification does not, however, constitute a representation or warranty by the City as to the qualification of any listed firm.

4. In accordance with the requirements of Part 26, DSBO will evaluate each bid to determine the responsiveness of the bid to Part 26 requirements. In determining if a Bidder's committed levels of participation meet or exceed the stated DBE goal, DSBO will 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 DBE percentage goal established for the project to determine the exact dollar amounts of required DBE participation for the Project. These amounts will then be

compared against the dollar amounts for the DBE firm(s) committed for participation by the Bidder. If the total dollar amount of participation listed meets or exceeds the established DBE dollar amount goal listed, then the DSBO will determine that goals have been met.

b. In addition, DSBO will determine the exact commitment percentage for each listed DBE firm by dividing the dollar amount listed for each firm by the total base bid dollar amount submitted by the bidder. These individual percentages, when totaled for all listed DBEs, will establish the total committed percentage level of DBE participation that the bidder must comply with during the life of the Contract. In all cases, the committed percentage level of DBE participation must equal or exceed the assigned DBE goal for the Project.

c. In providing the exact dollar amount of participation for each listed DBE firm 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 both dollar amounts and percentage for DSBO to determine that the bidder has met or exceeded the applicable DBE goal.

d. As previously mentioned compliance with the DBE 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 goals. However, should any designated alternate be selected by the City for inclusion in the Contract ultimately awarded, the DBE 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 DBE goal percentage based upon the total base bid, including all such items that he 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 DBE goal on the remaining reduced amount.

5. In accordance with Part 26 the City and County of Denver will require the total DBE participation commitment to be achieved in accordance with the following:

DBE bidders can count themselves for self-performance toward meeting the DBE goal, but only for the scope of work and at a percentage level they will be actually performing themselves.

DBE credit will be counted only for work actually performed by the DBEs own forces.

Work actually performed by DBEs is deemed to include the cost of materials and supplies purchased and equipment leased by the DBE from non-DBE sources. Work subcontracted can only count if the subcontractor is another DBE.

The entire fee or commission charged by a DBE, if reasonable and not excessive, will be counted.

Under Joint Ventures, the total value of distinct and clearly defined portions of the work of the contract that the DBE performs with its own workforce will be counted.

Each DBE must perform a "commercially useful function" to be counted toward the goal and at least 30% of the work must be performed by a DBE of the total cost of its contract for the DBE to be presumed to be performing a "commercially useful function".

Supplies or materials can be only counted for 60% of the total cost of the materials or supplies toward meeting the DBE goal and a DBE manufacture can count 100% of the cost of the materials or supplies toward the goal. Manufactures' representatives and packagers shall be counted in the same manner as brokers.

In utilizing the DBE participation of a Broker, only the bona fide fees and commissions earned by them for their performance of a commercially useful function will count toward meeting the project goals. The Bidder must separate the bona fide brokerage fees and 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.

6. On or before the fifth (5th) working day after bid opening, all of the Bidders are required to submit an executed "DBE Letter of Intent" for each DBE listed on the Bid Form as a subcontractor, supplier, manufacturer, or broker of any tier. Each Letter of Intent shall be submitted only for the DBEs listed at the time of bid opening, since this is the only participation that will be counted toward satisfaction of the project goals. A form for the DBE Letter of Intent is included with the Bid Form. The DBE 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 DBE and/or that its subcontractor(s) and supplier(s), manufacturer(s), and broker(s) will do so. Each DBE Letter of Intent shall be accompanied by either a copy of the City and County of Denver's (DSBO) DBE certification letter or the State of Colorado's (CDOT) DBE certification letter and DBE Work Codes Sheet for each proposed DBE firm 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.

In preparing a bid to demonstrate a good faith effort, Bidders should consider the following instructions relating to compliance with Part 26:

1. If any Bidder is unable to meet the designated project DBE goal at the time the bids are opened or elects to present a good faith effort in lieu of or in addition to attempting to satisfy the designated project goals, that Bidder shall submit on or before the fifth (5th) working day after the bid opening a detailed statement, with supporting documentation, setting forth its good faith efforts made prior to bid opening. The different kinds of efforts as well as the quantity and intensity of the efforts will be considered in determining whether the Bidder has made a good faith effort. A Bidder who fails to meet the project goal and cannot show, to the Director's satisfaction, that it made a good faith effort to meet the DBE goal shall be considered non-responsive.

2. For compliance with good faith effort requirements as set forth in Part 26, the DBE solicitation level required for this project is 100% of the City and County of Denver's certified DBE's and 100% of the State of Colorado's Colorado Department of Transportation (CDOT's) certified DBE's. Therefore, both DBE certified lists must be utilized in solicitation effort in order to meet the good faith effort requirement. The statement of good faith efforts shall include a specific response to each of the following as further defined by rule or regulation. The Bidder must identify the portions of the project that it will self-perform, and the Bidder must solicit DBE participation in every category in which it will not self perform. The required level of DBE participation is set forth in the Notice of Invitation for Bids, which is also contained within the project Contract documents. A Bidder may include any additional information the Bidder believes may be relevant. Failure of a Bidder to show good faith efforts as to any one of the following categories shall render its overall good faith showing insufficient and its bid non-responsive. Item (1) through (4) of the D.R.M.C. Section 28-208, Subsection (b) are set forth below:

    a. If pre-bid meetings are scheduled by the City at which DBEs may be informed of subcontracting opportunities under a proposed contract to be bid, attendance at such pre-bid meetings is not mandatory; however, bidders are responsible for the information provided at these meetings. The good faith effort statement must reflect the bidder's knowledge of the information provided at these meetings.

b. Written verification of the placing of an advertisement soliciting bids from DBEs for three (3) consecutive days in general or construction-related publications approved by the Director. All such advertisements must expressly advertise a given project and expressly state that DBE participation on that project is being sought; other incidental references to the project or listing of the bidder as a plan holder are not sufficient. All such advertisements shall begin at least fifteen (15) days prior to bid opening. If the City publishes notice for bids on a project less than fifteen (15) days prior to bid opening, verification of advertisements for at least four (4) consecutive days shall be provided.

c. Verification of efforts made by the Bidder to contact, by written notice, all certified DBEs who have the capability to perform the work of the contract, that their interest in the contract is being solicited, in sufficient time to allow the DBEs to participate effectively is required. The notice shall expressly describe the potential subcontracting, supplier or broker opportunities for all applicable certification categories for the particular project.

d. Verification that, reasonably consistent with industry practice and the Bidder's past practices on similar projects, the Bidder analyzed the needs of the project in light of such industry practice and past practice, together with the goal of facilitating DBE participation on the project and identified portions of the work to be performed by DBEs in order to achieve the project goal.

d. For each DBE which contacted the Bidder or which the Bidder contacted or attempted to subcontract with, consistent with industry practice, a statement giving the reasons why the Bidder and the DBE did not succeed in reaching a subcontracting, supplier, manufacturer or broker agreement.

e. Verification that the Bidder rejected DBEs because they did not submit the lowest bid or they were not qualified. Such verification shall include a verified statement of the amounts of all bids received from potential subcontractors, suppliers, manufacturers or brokers on the project and a verified statement that the Bidder rejected DBEs because they did not submit the lowest bid from among such bids or were not qualified.

f. Verification that the Bidder made efforts to assist DBEs in obtaining bonds, if any are required.

In accordance with Part 26 the Bidder agrees that it is committed to meeting either the DBE participation goal or the DBE participation set forth in its statement of good faith efforts. This commitment must be expressly indicated on the "Commitment to Disadvantaged Business Enterprise Participation" form included with the Bid Form. This commitment includes the following understandings:

1. The Bidder understands it must maintain the committed DBE participation goal level throughout the life of the Contract and as required in 49 CFR Section 26.53 (f) (1) & (2) which states: A prime may not terminate for convenience a DBE subcontractor (or an approved substitute DBE firm) and then perform the work of the terminated subcontract with its own forces of those of an affiliate, without prior written consent. When a DBE subcontractor is terminated or fails to complete its work on the contract for any reason, the prime contractor is required to make good faith efforts to find other DBE subcontractor to substitute for the original DBE. These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, to the extent needed to meet the contract goal.

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 toward satisfying the DBE participation goal and other affirmative action efforts.

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,

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 the 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 a DBE at the time of Contract award, then such amendment, change order or other modification shall be contemporaneously submitted to the DSBO. 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 Bidder shall be subject to goals for DBEs equal to the original goal on the Contract which were included in the bid or showing of good faith efforts.

Prime Contractor agree to pay each subcontractor under this prime contract for satisfactory performance on a contract no later than seven (7) days from the receipt of each payment the prime contractor receives from the City and County of Denver. The prime contractor agrees further to return retainage payments to each subcontractor within thirty (30) days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for a good cause following written approval of the City and County of Denver. This clause applies both to DBE and non-DBE subcontractors.

All Bidders are charged with knowledge of and are solely responsible for complying with each requirement of Part 26 in making a bid and, if awarded, in performing the Work described in the Contract Documents. 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 49 CFR Part 26, appropriate DOT Rules and Regulations, or contact the Project's designated DSBO representative at (720) 913-1700.

INSTRUCTIONS TO BIDDERS - All bidders must submit an DSBO "Bidder's List Data Form" for themselves, as well as any subcontractor/supplier/manufacture/manufacture representative/broker that contacted the bidder or that the bidder contacted who provided a bid or quote, regardless if the firm is a DBE or a non-DBE firm. DSBO is required by DOT 49 CFR Part 26 Regulations to create and maintain a bidders list on DOT-assisted projects. Therefore, bidders need to provide these completed forms at the time of bid as a part of their "Bid Form & Submittal Document".

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 Diane Mora who can be reached via email at diane.mora@denvergov.org.

IB-28 FEDERAL REQUIREMENTS

This project is funded, in whole or in part, by federal funding made available through the Federal Highway Administration ("FHWA") and administered by the Colorado Department of Transportation ("CDOT"). As such, each bidder must comply review and comply with certain bid requirements (the "Federal Forms") in formulating and submitting its bid for the Project, and, if awarded a contract pursuant to this bid, must comply with certain "Federal Requirements." The required Federal Forms are included in the Bid Package at pages BF-25 through BF-29. The Federal Requirements are attached to the Bid Document Package, pages at BDP-62 through BDP-73. The Contractor shall be presumed to have considered and completed all Federal Requirements and Forms as part of its bid and shall be presumed to have carefully considered and accounted for all costs of complying with the Federal Requirements in formulating and submitting a bid hereunder.

IB-29 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

For more information:
http://www.denvergov.org/constructioncontracts/ContractAdministration/BiddingProcess/TexturaPaymentSystem/tabid/443165/Default.aspx

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.

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

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 compliance. The Contractor further agrees to refrain from entering into any contract or contract

modification subject to Article III, Division 2 of Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who has not demonstrated eligibility for, City contracts.

The Contractor will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the Manager and Director. In addition, the Contractor agrees that failure or refusal to comply with these undertakings the Manager may take any or all of the following actions:

A. Cancellation, termination, or suspension in whole or in part of this contract.

B. Refrain from extending any further assistance to the applicant under the program with respect to which the failure occurred until satisfactory assurance of future compliance has been received from such applicant.

C. Refer the case to the City Attorney for appropriate legal proceedings.

SUBCONTRACTS: Each prime Contractor or Subcontractor shall include the equal opportunity clause in each of its subcontracts.

APPENDIX B

EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. 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 considerations for employment without regard to race, color, religion, sex, or national origin.

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. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor 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 Government contracts or federally assisted construction contracts in accordance with procedure authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. 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 provision, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

EQUAL EMPLOYMENT OPPORTUNITY IS THE LAW

Discrimination is Prohibited by
the Civil Rights Act of 1964
and by Executive Order No. 11246

Title VII of the Civil Rights Act of 1964

Administered by: The Equal Employment Opportunity Commission

Prohibits discrimination because of Race, Color, Religion, sex, or National Origin by Employers with 25 or more employees, by Labor Organizations with a hiring hall of 25 or more members, by Employment Agencies, and b Joint Labor-Management Committees for Apprenticeship or Training.

ANY PERSON who believes that he or she has been discriminated against SHOULD CONTACT:

The Equal Employment Opportunity Commission (EEOC)
2401 E Street, NW
Washington, D.C. 20506

Executive Order No. 11256

Administered by: The Office of Federal Contract Compliance Programs

Prohibits discrimination because of Race, Color, Religion, Sex, or National Origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment, by all Federal Government Contractors and Subcontractors, and by Contractors Performing Work Under a Federal Assisted Construction Contract, regardless of the number of employees in either case.

ANY PERSON who believes that he or she has been discriminated against SHOULD CONTACT:

The Office of Federal Contract Compliance Programs
U. S. Department of Labor
Washington, D.C. 20210

APPENDIX E

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity
(Executive Order 11246, as amended)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area are as follows:

   Timetables: Until Further Notice

   Goals:

   (a) Minority Participation in Each Trade: 13.8 percent

   (b) Female Participation in Each Trade: 6.9 percent

   These goals are applicable to all the contractor's construction work (whether or not it is Federal on Federally-assisted) performed in the covered area. If the contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goal established for such geographic area where the work is actually performed. With regard to this second area, the contractor also is subject to the goal for both its Federally involved and non-Federally involved construction.

   The contractor's compliance with the executive order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a, and its efforts to meet the goal. The hours of minority employment and training must be substantially uniform throughout the length of the contract, and in each grade, and the contract shall make a good faith effort to employ minorities evenly on each of its projects. The transfer of minority employees or trainees from contractor to contractor or from project to project, for the sole purpose of meeting the contractor's goal, shall be a violation of the contract, the executive order, and the regulations in 41 CFR Part 60-4. Compliance with the goal will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director, OFCCP, within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employee identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographic area in which the contract is performed.

4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is the City and County of Denver, Colorado.

STANDARD FEDERAL ASSURANCES

NOTE: As used below the term "contractor" shall mean and include the "Party of the Second Part," and the term "sponsor" shall mean the "City".

During the term of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations. The contractor shall comply with the Regulations relative to nondiscrimination in federally assisted programs of the Department of Transportation (hereinafter "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

2. Nondiscrimination. The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, sex, creed or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

3. Solicitations for Subcontractors, Including Procurements of Materials and Equipment. In all solicitations either by competitive bidding or negotiations made by the contractor for work to be performed under a subcontract, including procurements or materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

4. Information and Reports. The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the sponsor, as appropriate, and shall set forth what efforts it has made to obtain the information.

5. Sanctions for Noncompliance. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it may determine to be appropriate, including, but not limited to:

a. Withholding of payments to the contractor under the contract until the contractor complies, and/or

b. Cancellation, termination, or suspension of the contract, in whole or in part.

6. Incorporation of Provisions. The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (41 CFR 60-4.3)
(VERSION 2, 4/23/90)

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

d. "Minority" includes:

(1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);

(3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained

from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246 or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by

publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint

contractor union, contractor community, or other similar groups of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

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/

Executive Director of Public Works
City and County of Denver

EQUAL OPPORTUNITY PROVISIONS (Cont'd)

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 Office of Contract Compliance. 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.

A. 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 Division of Small Business Opportunity 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.

B. 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.

C. 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
ENGINEERING DIVISION

FEDERAL AID PROJECT NO. NHPP 2873-172/19957
CITY OF DENVER CONTRACT NO. 201840154

FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

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

Ames Construction, Inc.
18450 E 28th Avenue
Aurora, Colorado 80011

hereinafter referred to as the "Contractor," party of the second part,

WITNESSETH, commencing on **February 13, 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:

FEDERAL AID PROJECT NO. NHPP 2873-172/19957
CITY OF DENVER CONTRACT NO. 201840154

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
Bid Bond
Addenda (as applicable)
DBE Documents
Equal Employment Opportunity Provisions (Appendices A, B, E and F)
Bid Form
Commitment to DBE Participation
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 **600** (Six Hundred 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 (201 through 700 (Three Hundred and Twenty-Nine[329] total bid items) which includes Seven[7] Force Accounts),** the total estimated cost thereof being, **Twelve Million Eight Hundred Forty-Nine Thousand Two Hundred Dollars and Zero Cents ($12,849,200.00).** 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. DBE AND EQUAL OPPORTUNITY REQUIREMENTS

The Contractor agrees to comply with all requirements of the City's Equal Employment Opportunity program and the Federal Disadvantaged Business Enterprise Participation program as set out in Article III, Division 2, Chapter 28 of the Denver Revised Municipal Code, and any rules, regulations and guidelines set forth thereunder for such programs. This compliance shall include the obligation to maintain throughout the term of the contract that level of DBE participation upon which the Contract was initially awarded, unless otherwise authorized by the law or any rules, regulations or guidelines.

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 City 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. 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: PWADM-201840154-00

Contractor Name: Ames Construction, Inc.

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:

Attorney for the City and County of Denver

By_____

REGISTERED AND COUNTERSIGNED:

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: 201840154

Vendor Name: **Ames Construction, Inc.**

By: _____

Name: Raymond G. Ames
(please print)

Title: President / CEO
(please print)

ATTEST: [if required]

By: _____

Name: Michael J. Kellen
(please print)

Title: Secretary / CFO
(please print)

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

Construction Contract General Conditions

INDEX

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

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) *****General Contract Conditions 1801 and 1802 concerning warranties and guarantees are hereby deleted in their entirety *****
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: http://www.denvergov.org/dpw_contract_admin/ContractAdministration/ContractorReferenceDocuments/tabid/440535/Default.aspx. *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 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 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-3 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 (the "Director") 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 Director 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 /Engineering Division,

City Project Manager		Telephone
Jim Geist		(720)913-4504
Design Consultant	Consultant Name	Telephone
Tsiouvaras Simmons Holderness	Randal Lapsley	(303)771-6200

SC-4 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 $7,000.00 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-5 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-6 RESERVED

SC-7 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:

Agency/Firm	Name	Telephone
Public Works/Engineering Division	Jim Geist	(720)913-4504

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.

SC-8 CONSTRUCTION INSPECTION BY THE CITY

General Condition 1701, AUTHORITY OF INSPECTORS, is modified as follows:

1701.1 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-9 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-10 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-11 TERMINOLOGY

Terminology used in Colorado Department of Transportation (CDOT) Standards and Specifications and City and County of Denver (CCD) Standards and Specifications may differ but shall be considered interchangeable where appropriate. Examples are Department of Public Works (CCD) and Department (CDOT), Project Manager (CCD) and Engineer (CDOT), Traffic Maintenance Plan (CCD) and Traffic Control Plan (CDOT).

SC-12 TECHNICAL SPECIFICATIONS

Section 106 of the CDOT Standard Specifications is hereby incorporated into this contract except where conflicts exist between Section 106 and the General Contract Conditions or Special Contract Conditions. Where conflicts exist, the General Contract Conditions or Special Contract Conditions shall govern.

SC-13 MODIFICATION TO GENERAL CONTRACT CONDITION 405

General Contract Condition 405 is hereby revised for this project as follows:

G.C. 405.2 shall include the following:

Shop Drawings shall be submitted in accordance with Section 105.02 of the CDOT Standard Specifications. Any work performed by the Contractor prior to receipt of approved shop drawings is at the sole risk of the Contractor.

SC-14 MODIFICATION TO GENERAL CONTRACT CONDITION 809

General Contract Condition 809 is hereby revised for this project as follows:

Add G.C. 809.3 as follows:

.3 Fossils may be uncovered during excavation for the project. The Colorado Department of Transportation will furnish a paleontologist to monitor project excavations. The Contractor shall notify the Engineer at least five working days prior to the start of excavation operations to allow for scheduling of the monitor. The paleontologist, Mr. Steve Wallace, can be contacted at (303) 757-9632.

If fossils are encountered, they will be evaluated and, if deemed important, removed prior to further excavation. When directed, the Contractor shall excavate the site in such manner as to preserve the fossils uncovered and shall remove them as directed by the Engineer.

SC–15 FEDERAL REQUIREMENTS

This Project is funded, in whole or in part, by federal funding made available through the Federal Highway Administration ("FHWA") and administered by the Colorado Department of Transportation ("CDOT"). As such, performance under this contract is subject to certain "Federal Requirements" contained or referenced in Attachment A to this contract, attached hereto and incorporated herein by this reference. The Contractor shall thoroughly review and shall strictly comply with all Federal Requirements in performing its Work under this contract.

SC-16 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-17 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)

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 18: INSURANCE

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

(1) <u>General Conditions:</u> 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 affect 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-19 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

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CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

PERFORMANCE AND PAYMENT BOND **Bond No. 106912858**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned **Ames Construction, Inc. 18450 E 28th Avenue Aurora, Colorado 80011**, a corporation organized and existing under and by virtue of the laws of the State of **CO**, hereafter referred to as the "Contractor", and **Travelers Casualty and Surety Company of America**, a corporation organized and existing under and by virtue of the laws of the State of **Connecticut**, 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 **Twelve Million Eight Hundred Forty-Nine Thousand Two Hundred Dollars and Zero Cents ($12,849,200.00)**, 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. 201840154, FEDERAL PROJECT NO: NHPP 2873-172/19957, FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE**, 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 7th day of June, 2018.

Attest:

Secretary, **Michael J. Kellen**

Ames Construction, Inc.
Contractor

By:
President, Raymond G. Ames

Travelers Casualty and Surety Company of America
Surety

By:
Attorney-In-Fact, John E. Tauer

(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:
Assistant City Attorney

APPROVED FOR THE CITY AND COUNTY OF DENVER

By:
MAYOR

By:
EXEC. DIR. OF PUBLIC WORKS

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 232642 **Certificate No.** 007394634

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

John E. Tauer, R. W. Frank, Craig Remick, Rachel Thomas, Nicole Stillings, Joshua R. Loftis, Brian J. Oestreich, Sandra M. Engstrum, Jerome T. Ouimet, Kurt C. Lundblad, Melinda C. Blodgett, R. C. Bowman, R. Scott Egginton, Ted R. Jorgensen, Emily White, Lin Ulven, and Colby D. White

of the City of Minneapolis, State of Minnesota, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 26th day of September, 2017.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the 26th day of September, 2017, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

_____
Marie C. Tetreault, Notary Public

58440-5-16 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

cobb strecker dunphy & zimmermann

PERFORMANCE AND PAYMENT BOND
SURETY AUTHORIZATION

May 25, 2018

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

RE: Ames Construction, Inc.
Contract No: 201840154
Federal Project No. NHPP 2873-172/19957
Project Name: FEDERAL BLVD RECONSTRUCTION, 5th AVE TO HOWARD PLACE
Contract Amount: $12,849,200.00
Performance and Payment Bond No.: 106912858

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through Travelers Casualty and Surety Company of America insurance company, on May 25, 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 (612) 349-2401.

Thank you.

Sincerely,

John E. Tauer, Vice President
Attorney-in-Fact for Travelers Casualty and Surety Company of America

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 5/25/2018

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 Cobb Strecker Dunphy & Zimmermann 225 South Sixth Street Suite 1900 Minneapolis MN 55402	**CONTACT NAME:** Teresa Wasick **PHONE (A/C, No, Ext):** 612-349-2413 **FAX (A/C, No):** 612-349-2490 **E-MAIL ADDRESS:** twasick@csdz.com
INSURED AMESCONI Ames Construction, Inc. 2000 Ames Drive Burnsville, MN 55306	**INSURER(S) AFFORDING COVERAGE** / **NAIC #** **INSURER A :** Travelers Indemnity Company of America — 25666 **INSURER B :** Travelers Property Casualty — 25674 **INSURER C :** **INSURER D :** **INSURER E :** **INSURER F :**

COVERAGES **CERTIFICATE NUMBER:** 292511958 **REVISION NUMBER:**

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	X **COMMERCIAL GENERAL LIABILITY** CLAIMS-MADE [X] OCCUR X Contr Liab Per X Policy Form/XCU GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:			VTC2HCO1H525546TIA17	12/1/2017	12/1/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG 	$ 2,000,000 $ 300,000 $ 5,000 $ 2,000,000 $ 4,000,000 $ 4,000,000 $
B	**AUTOMOBILE LIABILITY** X ANY AUTO OWNED AUTOS ONLY / SCHEDULED AUTOS HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY			VTC2JCAP1H525534TIL17	12/1/2017	12/1/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) 	$ 2,000,000 $ $ $ $
B	X **UMBRELLA LIAB** X OCCUR **EXCESS LIAB** CLAIMS-MADE DED X RETENTION $ 10,000			VTSMJCUP1H525558TIL17	12/1/2017	12/1/2018	EACH OCCURRENCE AGGREGATE 	$ 10,000,000 $ 10,000,000 $
B B	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N: N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		VTC2JUB1H52539817 VTRJUB1H52541717	12/1/2017 12/1/2017	12/1/2018 12/1/2018	X PER STATUTE / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
B	Stop Gap			VTC2JUB1H52539817	12/1/2017	12/1/2018	Applies to	ND, OH, WA, WY

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Contract #201840154; Federal Blvd. Reconstruction, 5th Avenue to Howard Place, Denver, CO
Federal Aid Project No. NHPP 2873-172/19957

As required by written contract, the City and County of Denver, its Elected and Appointed Officials, Employees and Volunteers are included as Additional Insured as respects the Commercial General Liability and Business Automobile Liability applies on a primary and non-contributory basis.

Waiver of Subrogation only if required by written contract with respect to General Liability, Automobile Liability, Workers' Compensation and Umbrella/Excess Liability applies in favor of:
See Attached...

CERTIFICATE HOLDER

City and County of Denver
State of Colorado
Department of Public Works
Contract Administration
201 West Colfax Avenue, Dept 614
Denver CO 80202

CANCELLATION

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

R. Scott Eggleston

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PERFORMANCE AND PAYMENT BOND
SURETY AUTHORIZATION
(SAMPLE)

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

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

RE: (Company name)

Contract No: **201840154**
Federal Project No. **NHPP 2873-172/19957**
Project Name: **FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE**
Contract Amount:
Performance and Payment Bond No.:

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through _____ insurance company, on _____, 20_____.

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 _____.

Thank you.

Sincerely,

NOTICE OF APPARENT LOW BIDDER
(SAMPLE)

Date

To: «Contractor»
«Address»
«City_State_Zip»

Gentlemen:

The EXECUTIVE DIRECTOR OF PUBLIC WORKS has considered the Bids submitted on March 15, 2018 for work to be done and materials to be furnished in and for:

PROJECT No. 201840154 FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

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

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).

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 _____
Executive Director 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

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Current Date

(S A M P L E)

Name
Company
Street
City/State/Zip

FEDERAL AID PROJECT NO. NHPP 2873-172/19957
CITY OF DENVER CONTRACT NO. 201840154, FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

NOTICE TO PROCEED

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 **201840154 FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE** with the work of constructing contract number**,** as set forth in detail in the contract documents for the City and County of Denver.

With a contract time of **600** (Six Hundred) 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.

Very truly yours,

Lesley B. Thomas
City Engineer

By:

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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DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

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

_____ Date: _____, 20___.
(CITY PROJECT NAME AND NUMBER)

_____ Subcontract #:_____.
(NAME OF CONTRACTOR)

Subcontract Value: $_____.

_____ Last Progress Payment: $_____.
(NAME OF SUBCONTRACTOR/SUPPLIER) Date: _____.

Check Applicable Box: Total Paid to Date: $_____.

[ ] DBE Date of Last Work: _____.

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 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) s.
CITY OF _____)

_____
(Name of Subcontractor)

Signed and sworn before me this
day of _____, 20___. By:_____

_____.
Notary Public/Commissioner of Oaths Title: _____
My Commission Expires

DENVER
THE MILE HIGH CITY

City and County of Denver

Division of Small Business Opportunity

Contractor's/Consultant's Certification of Payment (CCP)

Office of Economic Development
Compliance Unit
201 W. Colfax Ave., Dept. 907
Denver, CO 80202
Phone: 720.913.1999
Fax: 720.913.1803

Prime Contractor or Consultant:	Phone:	Project Manager:
Pay Application #:	Pay Period:	Amount Requested: $
Project #:	Project Name:	
Current Completion Date:	Percent Complete:	Prepared By:
(I) - Original Contract Amount: $		(II) - Current Contract Amount: $

		A	B	C	D	E	F	G	H
Prime/Subcontractor/Supplier Name	M/W/S/ DBE/ NON	Original Contract Amount	% Bid (A/I)	Current Contract Amount Including Amendments	% Revised (C/II)	Requested Amount of this Pay Application	Amount Paid on the Previous Pay Application # ____	Net Paid To Date	Paid % Achieved (G/II)
Totals									

The undersigned certifies that the information contained in this document is true, accurate and that the payments shown have been made to all subcontractors and suppliers used on this project and listed herein. Please use an additional form, if more space is necessary.

Prepared By (Signature):	Date:

Page of

COMP-FRM-027 rev 022311

DENVER
OFFICE OF ECONOMIC DEVELOPMENT

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. 907
Denver, CO 80202
Phone: 720-913-1999
Fax: 720-913-1603
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 work or task order.

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).

COMP-REF-031

Rev 03.18.15

Date

Name
Company
Street
City/State/Zip

(SAMPLE)
RE: Certificate of Contract Release for
FEDERAL AID PROJECT NO. NHPP 2873-172/19957
CITY OF DENVER CONTRACT NO. 201840154
FEDERAL BLVD RECONSTRUCTION, 5TH AVE TO HOWARD PLACE

Certificate of Contract Release

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
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REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: 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, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

CITY AND COUNTY OF DENVER

STATE OF COLORADO

DENVER
THE MILE HIGH CITY

DEPARTMENT OF PUBLIC WORKS

Davis Bacon Wages

Contract Number: 201840154

Federal Blvd Reconstruction

5th Ave to Howard Place

February 13, 2018

General Decision Number: CO180019 01/05/2018 CO19

Superseded General Decision Number: CO20170019

State: Colorado

Construction Type: Highway

Counties: Denver and Douglas Counties in Colorado.

HIGHWAY 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

CARP9901-008 11/01/2016

	Rates	Fringes
CARPENTER (Form Work Only)	$ 25.50	7.47

ELEC0068-016 03/01/2011

	Rates	Fringes
TRAFFIC SIGNALIZATION:		
Traffic Signal Installation		
Zone 1	$ 26.42	4.75%+8.68
Zone 2	$ 29.42	4.75%+8.68

TRAFFIC SIGNAL INSTALLER ZONE DEFINITIONS

Zone 1 shall be a 35 mile radius, measured from the following addresses in each of the following cities:
Colorado Springs - Nevada & Bijou
Denver - Ellsworth Avenue & Broadway
Ft. Collins - Prospect & College
Grand Junction - 12th & North Avenue
Pueblo - I-25 & Highway 50
All work outside of these areas shall be paid Zone 2 rates.

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* ENGI0009-008 05/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
(3)-Hydraulic Backhoe (Wheel Mounted, under 3/4 yds), Hydraulic Backhoe (Backhoe/Loader combination), Drill Rig Caisson (smaller than Watson 2500 and similar), Loader (up to and including 6 cu. yd.)	$ 27.60	10.10
(3)-Loader (under 6 cu. yd.) Denver County	$ 27.60	10.10
(3)-Motor Grader (blade-rough) Douglas County	$ 27.60	10.10
(4)-Crane (50 tons and under), Scraper (single bowl, under 40 cu. yd)	$ 27.75	10.10
(4)-Loader (over 6 cu. yd) Denver County	$ 27.75	10.10
(5)-Drill Rig Caisson (Watson 2500 similar or larger), Crane (51-90 tons), Scraper (40 cu.yd and over),	$ 27.92	10.10
(5)-Motor Grader (blade-finish) Douglas County	$ 27.92	10.10
(6)-Crane (91-140 tons)	$ 28.55	10.10

SUCO2011-004 09/15/2011

	Rates	Fringes
CARPENTER (Excludes Form Work)	$ 19.27	5.08
CEMENT MASON/CONCRETE FINISHER		
Denver	$ 20.18	5.75
Douglas	$ 18.75	3.00
ELECTRICIAN (Excludes Traffic Signal Installation)	$ 35.13	6.83
FENCE ERECTOR (Excludes Link/Cyclone Fence Erection)	$ 13.02	3.20
GUARDRAIL INSTALLER	$ 12.89	3.20
HIGHWAY/PARKING LOT STRIPING:Painter		
Denver	$ 12.62	3.21
Douglas	$ 13.89	3.21
IRONWORKER, REINFORCING (Excludes Guardrail		

Installation)	$ 16.69	5.45
IRONWORKER, STRUCTURAL (Includes Link/Cyclone Fence Erection, Excludes Guardrail Installation)	$ 18.22	6.01
LABORER		
Asphalt Raker	$ 16.29	4.25
Asphalt Shoveler	$ 21.21	4.25
Asphalt Spreader	$ 18.58	4.65
Common or General		
Denver	$ 16.76	6.77
Douglas	$ 16.29	4.25
Concrete Saw (Hand Held)	$ 16.29	6.14
Landscape and Irrigation	$ 12.26	3.16
Mason Tender-Cement/Concrete		
Denver	$ 16.96	4.04
Douglas	$ 16.29	4.25
Pipelayer		
Denver	$ 13.55	2.41
Douglas	$ 16.30	2.18
Traffic Control (Flagger)	$ 9.55	3.05
Traffic Control (Sets Up/Moves Barrels, Cones, Install Signs, Arrow Boards and Place Stationary Flags)(Excludes Flaggers)	$ 12.43	3.22
PAINTER (Spray Only)	$ 16.99	2.87
POWER EQUIPMENT OPERATOR:		
Asphalt Laydown		
Denver	$ 22.67	8.72
Douglas	$ 23.67	8.47
Asphalt Paver		
Denver	$ 24.97	6.13
Douglas	$ 25.44	3.50
Asphalt Roller		
Denver	$ 23.13	7.55
Douglas	$ 23.63	6.43
Asphalt Spreader	$ 22.67	8.72
Backhoe/Trackhoe		
Douglas	$ 23.82	6.00
Bobcat/Skid Loader	$ 15.37	4.28
Boom	$ 22.67	8.72
Broom/Sweeper		
Denver	$ 22.47	8.72
Douglas	$ 22.96	8.22
Bulldozer	$ 26.90	5.59
Concrete Pump	$ 21.60	5.21
Drill		
Denver	$ 20.48	4.71
Douglas	$ 20.71	2.66
Forklift	$ 15.91	4.68
Grader/Blade		
Denver	$ 22.67	8.72
Guardrail/Post Driver	$ 16.07	4.41
Loader (Front End)		

Douglas	$ 21.67	8.22
Mechanic		
Denver	$ 22.89	8.72
Douglas	$ 23.88	8.22
Oiler		
Denver	$ 23.73	8.41
Douglas	$ 24.90	7.67
Roller/Compactor (Dirt and Grade Compaction)		
Denver	$ 20.30	5.51
Douglas	$ 22.78	4.86
Rotomill	$ 16.22	4.41
Screed		
Denver	$ 22.67	8.38
Douglas	$ 29.99	1.40
Tractor	$ 13.13	2.95
TRAFFIC SIGNALIZATION:		
Groundsman		
Denver	$ 17.90	3.41
Douglas	$ 18.67	7.17
TRUCK DRIVER		
Distributor		
Denver	$ 17.81	5.82
Douglas	$ 16.98	5.27
Dump Truck		
Denver	$ 15.27	5.27
Douglas	$ 16.39	5.27
Lowboy Truck	$ 17.25	5.27
Mechanic	$ 26.48	3.50
Multi-Purpose Specialty & Hoisting Truck		
Denver	$ 17.49	3.17
Douglas	$ 20.05	2.88
Pickup and Pilot Car		
Denver	$ 14.24	3.77
Douglas	$ 16.43	3.68
Semi/Trailer Truck	$ 18.39	4.13
Truck Mounted Attenuator	$ 12.43	3.22
Water Truck		
Denver	$ 26.27	5.27
Douglas	$ 19.46	2.58

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

CITY AND COUNTY OF DENVER

STATE OF COLORADO

DEPARTMENT OF PUBLIC WORKS

Addenda

Contract Number: 201840154

Federal Blvd Reconstruction

5th Ave to Howard Place

February 13, 2018

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS

CONTRACT NO: 201840154
PROJECT NAME: Federal Blvd Reconstruction, 5th Ave to Howard Place

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:

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

TECHNICAL SPECIFICATIONS:

Replace pages PSP-ii, PSP-iii, PSP-6 and PSP-8 with the attached pages.

QUESTIONS AND ANSWERS:

Q1. Can I ask the name of the Designer working on this project? (Architect or Engineer)

A1. Per Special Contract Condition SC-3 found on Page BDP-46 of the Bid Documents, the Design Consultant is Randal Lapsley of Tsiouvaras Simmons Holderness, telephone (303) 771-6200.

Q2. On page 65 of the bid doc package it states that section 1801 and 1802 regarding warranties and guarantees has been removed. Does this mean there is no warranty on this project?

A2. Per the provisions of Special Contract Condition SC-1 found on Page BDP-45 of the Bid Documents, General Contract Conditions 1801 and 1802 concerning warranties and guarantees are hereby deleted in their entirety. This is required as a condition of utilizing Federal Funds on the Project.

Q3. I can't find anywhere in the specs for this project where it lists working days or a job completion date. If it is there can you direct me to it or let me know what the time frame for the job is if it isn't in the specs?

A3. In the Bid Documents Package, Item No. 3 in the Contract Form on Page BDP-36 gives the Terms of Performance. The Contractor agrees to fully complete the Work within 600 (Six Hundred) consecutive calendar days from the effective date of the Notice to Proceed.

Q4. Can provide me with a work schedule for the Federal Blvd Reconstruction, 5th Ave to Howard Place project please?

A4. Per Section 306 .2(B) of the General Contract Conditions, "Within ten (10) Days of the issuance of Notice to Proceed, or as otherwise set forth in the technical specifications, the Contractor shall submit a construction schedule which shall provide for the expeditious and practicable execution of the Work." Also, in the Bid Documents Package, Item No. 3 in the Contract Form on Page BDP-36 gives the Terms of Performance. The Contractor agrees to fully complete the Work within 600 (Six Hundred) consecutive calendar days from the effective date of the Notice to Proceed.

Q5. On the Tabulation of Surfacing Items, plan sheet #29, it appears there is an error in the total for the S (100) (PG 64-22). I'm coming up with 529 tons for the bottom lifts and 668 for middle lifts, however, the bid item on the bid form is only for 668 total tons leaving a shortage of 529 tons in your calculations.

A5. The total of 668 tons for Grading S 100 (PG 64-22) reflects 529 tons for the bottom lift and 138 tons for the middle lift. We do not believe there is an error in the quantity.

Q6. On page PSP105, "Revision of Sections 401 & 403 Hot Bituminous Pavement", third paragraph. If contract elects to substitute the grading SX (PG76-28) with the Grading SX (PG 64-22), under what item would that be paid for?

A6. Bidders shall bid the Bid Items and Bid Quantities that are shown on the Bid Form. If the Contractor wishes to make the substitution that is mentioned in the Project Special Provisions, and if approved by the Engineer, a Change Order will be issued to reflect the price reduction.

Q7. Are all 3 public meetings planned to have the same/similar content but offered at different times to meet the needs of the widest variety of stakeholders or will there be different topics?

A7. As discussed in the Project Special Provisions, Revision of Section 626, Public Information Services (Tier II), Item (8), the Public Information Manager (PIM) shall host up to three public meetings. The content and timing of the meetings has not been determined and may be dependent on the Contractor's phasing and progress, as well as the nature of any problems, issues, or circumstances as they may arise through the construction period. It is possible that the meetings will be at different times and cover different topics during the course of the project.

Q8. What is your required coverage area for residents and for businesses (e.g. 2 blocks, ½ mile radius, etc.)?

A8. See Project Special Provisions, Revision of Section 626, Public Information Services (Tier II). See Item (13) for the coverage area for fliers and see Item (7) for paid advertisement requirements. In addition, per Item (3), the Contractor shall submit a Public Information Plan with details of the proposed outreach.

Q9. Publicizing public meetings was left very open ended in the specs. Please provide specifics about your requirements (e.g. mail oversize postcard 2 weeks before meeting, send press release to media, draft social media posts, draft email blast to be sent by City).

A9. This information shall be as specified in the Project Special Provisions, Revision of Section 626, Public Information Services (Tier II), and shall be included in the Public Information Plan. Drafting of press and social media posts is to be included in the Contractor's scope. Mailing lists from previous public meetings held during design shall be provided by the City, but updating and adding to the list shall be included in the Contractor's scope. The Public Information Manager shall also reach out to local Registered Neighborhood Organizations, City Council Offices, and the Federal Business Improvement District. Registered Neighborhood Organizations shall include, but not be limited to, Sun Valley, Villa Park, West Colfax, Barnum and Barnum West. Also, the West Colfax Business Improvement District as well as City Council Districts 1, 2, 3 and 7 shall be notified of the meetings and of all matters regarding the project. Note that since many of the businesses are not operated by the building owners, the PIM will be responsible for knocking on doors along the corridor to ensure businesses/tenants know what's coming, and to make sure that they have a project contact if issues arise. This will also give the Contractor and PIM a contact when coordination is needed with the occupant. Translation shall be provided by the PIM as needed, including but not limited to Spanish and Vietnamese as may be needed.

Q10. What papers do you want the quarter page ad to run in?

A10. As stated in the Project Special Provisions, Revision of Section 626, Public Information Services (Tier II), Item (7), selection of local papers shall be as approved, but should include the Denver Post, Westword, El Semanario, and La Voz. Also, notifications shall be sent to City Council District Offices 1, 2, 3, and 7 for inclusion in the Council District's Newsletters.

Q11. How frequent do you anticipate the stakeholder meetings will be?

A11. The frequency and number of Stakeholder Meetings is not known. However, for the purposes of bidding, six Stakeholder Meetings can be assumed.

Q12. How frequent do you anticipate the tours and events will be?

A12. The frequency and number of Tours and Special Events is not known. However, for the purposes of bidding, four tours and special events can be assumed.

Q13. Census data shows the project zip code area to be 17% LEP. Please confirm all materials need to be produced bilingually.

A13. This issue is covered in the Project Special Provisions, Revision of Section 626, Public Information Services (Tier II), Item (13).

Q14. Please give specifics on outreach collateral items and frequency in order for all bidders to be able to provide equivalent bids (quarterly newsletter, monthly social media updates, etc.).

A14. Public Information Collateral shall be as described throughout Revision of Section 626, Public Information Services (Tier II), including the provisions of Item (14). Collateral shall include, but not be limited to, newsletters, fact sheets, flyers, social media updates, e-mail updates, and draft press releases. In addition to the requirements contained in the Specification, quarterly newsletters will be required. All collateral items and specifics shall be addressed in the Public Information Plan.

Q15. Will water be provided by the owner?

A15. The Contractor will be responsible for obtaining and providing all water needed to complete the Work, except for the water used to flush, disinfect, fill and test Denver Water's water lines. Water used to flush, disinfect, fill and test Denver Water's water lines will be provided by Denver Water in accordance with Denver Water's standards and requirements. All the Contractor's costs of whatsoever nature required to obtain and provide the water that the Contractor is responsible for obtaining and providing shall be included in the Work, and no additional payment will be made for obtaining and providing the required water.

Q16. There is no quality control testing bid item. Does this mean that QC testing will be provided by the owner? If not, where should this be priced?

A16. The Contractor is responsible for all Quality Control testing that is required by the Contract Documents. All the Contractor's costs of whatsoever nature required to perform the specified Quality Control Testing and associated requirements shall be included in the Work, and no additional payment will be made for satisfying the Quality Control requirements. The City of Denver will not provide the Quality Control testing that is required of the Contractor. The City of Denver will provide Quality Assurance testing to satisfy City requirements and requirements set by CDOT because Federal Funds will be utilized."

Lesley B. Thomas
City Engineer

3.8.18
Date

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

_____
Contractor

ADDENDUM NO. 1 DATE: _____

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

PROJECT SPECIAL PROVISIONS
FEDERAL BOULEVARD RECONSTRUCTION
5TH AVENUE TO HOWARD PLACE

STANDARD SPECIFICATIONS FOR CONSTRUCTION

STANDARD SPECIFICATIONS FOR CONSTRUCTION

The Standard Specifications for Construction used for this Project shall be the Colorado Department of Transportation "Standard Specifications for Road and Bridge Construction," adopted in 2011 and as hereinafter modified.

STANDARD CONSTRUCTION DETAILS

Applicable City and County of Denver standard details are required to be used by the Contractor. For other applicable details, except as modified or altered by the general notes on the Contract Drawings or by the revisions to Technical Specifications and Contract Documents, it is the intent of the City to use the Colorado Department of Transportation M & S Standards, most recent edition. Drainage and sanitary related appurtenances shall be constructed as shown in the most recent edition of the City and County of Denver (City), Department of Public Works documents listed under Manuals and Regulations for Wastewater. These documents can be found at the following web address:

Manuals and Regulations for Wastewater

CONSTRUCTION SPECIFICATIONS

The Standard Specifications for Construction for this Project shall consist of the applicable sections and subsections, numbered Section 200 through Section 700, of the 2011 "Colorado Department of Transportation Standard Specifications for Road and Bridge Construction."

The Colorado Department of Transportation General Provisions consists of Sections 100 through 109 of the above mentioned specifications. With the exception of General Provision Sections 101, 105.02 and 106 as required in the Special Contract Conditions, portions of Section 107 as modified or as added hereinafter, 109.01, and other applicable portions of the Colorado Department of Transportation General Provisions as noted in the Contract Documents, all other General Provisions are not applicable to this Project and are hereby deleted. In place of the deleted sections, the City and County of Denver "Standard Specifications for Construction, General Contract Conditions," 2011 Edition, shall apply to this contract. Supplements or amendments to the Standard Specifications for Construction, General Contract Conditions are listed in the Special Contract Conditions.

The following Project Special Provisions take precedence over Specifications or Plans and supplement or amend the referenced" Standard Specifications for Road and Bridge Construction" adopted in 2011 by the Colorado Department of Transportation, which is to be used to control construction of this Project.

FEDERAL BOULEVARD RECONSTRUCTION – 5TH AVENUE TO HOWARD PLACE

CITY AND COUNTY OF DENVER MASTER PROJECT NO. 2011-PROJMSTR-0000364
COLORADO DEPARTMENT OF TRANSPORTATION
PROJECT NO. NHPP 2873-172
SUB-ACCOUNT NO. 19957

PROJECT SPECIAL PROVISIONS

END OF SECTION REVISION

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REVISION OF SECTION 106
BUY AMERICA REQUIREMENTS

Section 106 of the Standard Special Provisions is hereby revised for this project as follows:

Subsection 106.01 shall include the following:

The Contractor shall maintain a document summarizing the date and quantity of all steel and iron material delivered to the project. The document shall show the pay item, quantity of material delivered to the project, along with the quantity of material installed by the cutoff date for the monthly progress payment. The summary shall also reconcile the pay item quantities to the submitted Buy America certifications. The Contractor shall also maintain documentation of the project delivered cost of all foreign steel or iron permanently incorporated into the project. Both documental shall be submitted to the Engineer within five days of the cutoff date for the monthly progress payment. A monthly summary shall be required even if no steel or iron products are incorporated into the project during the month. The summary documents does not relieve he Contractor of providing the necessary Buy America certifications of steel and or iron prior to permanent incorporation into the project.

The above requirements are in addition to all other requirements within the Contract Documents, including those found in revision of Section 626, Mobilization. The above requriements in no way relieve the contractor of satisfying all other requirements contained in the Contract Documents.

All the Contractor's costs of whatsoever nature required to satisfy all the requirements herein shall be included in the work, and no additional payment will be made.

END OF SECTION REVISION

CITY AND COUNTY OF DENVER

STATE OF COLORADO

DEPARTMENT OF PUBLIC WORKS

Technical Specifications

Contract Number: 201840154

Federal Blvd Reconstruction

5th Ave to Howard Place

February 13, 2018

Final Specifications

January 2, 2018

CITY AND COUNTY OF DENVER
Master Project Number 2011-PROJMSTR-0000364
COLORADO DEPARTMENT OF TRANSPORTATION
PROJECT NO. NHPP 2873-172
SUB-ACCOUNT NO. 19957

Federal Boulevard Reconstruction – 5th Ave to Howard Place

CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

PROJECT SPECIAL PROVISIONS
FEDERAL BOULEVARD RECONSTRUCTION
5TH AVENUE TO HOWARD PLACE

STANDARD SPECIFICATIONS FOR CONSTRUCTION

STANDARD SPECIFICATIONS FOR CONSTRUCTION

The Standard Specifications for Construction used for this Project shall be the Colorado Department of Transportation "Standard Specifications for Road and Bridge Construction," adopted in 2011 and as hereinafter modified.

STANDARD CONSTRUCTION DETAILS

Applicable City and County of Denver standard details are required to be used by the Contractor. For other applicable details, except as modified or altered by the general notes on the Contract Drawings or by the revisions to Technical Specifications and Contract Documents, it is the intent of the City to use the Colorado Department of Transportation M & S Standards, most recent edition. Drainage and sanitary related appurtenances shall be constructed as shown in the most recent edition of the City and County of Denver (City), Department of Public Works documents listed under Manuals and Regulations for Wastewater. These documents can be found at the following web address:

Manuals and Regulations for Wastewater

CONSTRUCTION SPECIFICATIONS

The Standard Specifications for Construction for this Project shall consist of the applicable sections and subsections, numbered Section 200 through Section 700, of the 2011 "Colorado Department of Transportation Standard Specifications for Road and Bridge Construction."

The Colorado Department of Transportation General Provisions consists of Sections 100 through 109 of the above mentioned specifications. With the exception of General Provision Sections 101, 104.04, 105.02 as modified herein, 105.11, 108.05, portions of Sections 106, 107 and 109 as noted herein, and other applicable portions of the Colorado Department of Transportation General Provisions as noted in the Contract Documents, all other General Provisions are not applicable to this Project and are hereby deleted. In place of the deleted sections, the City and County of Denver “Standard Specifications for Construction, General Contract Conditions,” 2011 Edition, shall apply to this contract. Supplements or amendments to the Standard Specifications for Construction, General Contract Conditions are listed in the Special Contract Conditions.

The following Project Special Provisions take precedence over Specifications or Plans and supplement or amend the referenced” Standard Specifications for Road and Bridge Construction” adopted in 2011 by the Colorado Department of Transportation, which is to be used to control construction of this Project.

FEDERAL BOULEVARD RECONSTRUCTION – 5TH AVENUE TO HOWARD PLACE

CITY AND COUNTY OF DENVER MASTER PROJECT NO. 2011-PROJMSTR-0000364
COLORADO DEPARTMENT OF TRANSPORTATION
PROJECT NO. NHPP 2873-172
SUB-ACCOUNT NO. 19957

PROJECT SPECIAL PROVISIONS

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Appendix Documents –

A - Materials Management Plan
B - Predig Check List
C - Survey Requirements - Range Points and Monuments
D - Revised Final Pavement Design and Geotechnical Engineering Report
E - Final Geotechnical Engineering Report 8th Avenue Retaining Wall at Weir Gulch
F - Geotechnical Data Report
G - Tunnel Feasibility Report
H- Special Notice to Contractors
I- Permits

J- Standard Special Provisions

FEDERAL BOULEVARD RECONSTRUCTION – 5TH Ave to HOWARD Place
CITY AND COUNTY OF DENVER MASTER PROJECT NO. 2011-PROJMSTR-0000364
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COLORADO
DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS

STANDARD SPECIAL PROVISIONS

Name	Date	No. of Pages
Revision of Section 101 and 630 – Construction Zone Traffic Control	(April 30, 2015)	2
Revision of Section 106 – Certificates of Compliance and Certified Test Reports	(February 3, 2011)	1
Revision of Section 106 – Hot Mix Asphalt – Verification Testing	(July 29, 2011)	2
Revision of Section 106 – Material Sources	(October 31, 2013)	1
Revision of Section 106 – Modified Epoxy Pavement Marking Acceptance and Pay Factors	(May 12, 2016)	1
Revision of Sections 106 and 412 – Surface Texture of Portland Cement Concrete Pavement	(October 29, 2015)	3
Revision of Sections 106, 627 and 713 - Glass Beads for Pavement Marking	(February 23, 2017)	1
Revision of Section 107 – Warning Lights for Work Vehicles and Equipment	(January 30, 2014)	1
Revision of Section 109 – Measurement of Quantities	(February 3, 2011)	1
Revision of Section 109 – Scales	(October 29, 2015)	1
Revision of Section 201 – Clearing and Grubbing	(Nov. 10, 2016)	1
Revision of Section 203 – Excavation and Embankment	(Nov. 10, 2016)	11
Revision of Sections 202, 627 and 708 - Pavement Marking Paint	(May 12, 2016)	3
Revision of Section 203 – Excavation and Embankment	(Nov. 10, 2016)	11
Revision of Section 203 – Imported Material for Embankment	(February 3, 2011)	2
Revision of Section 206– Imported Material for Structure Backfill	(July 19, 2012)	2
Revision of Section 206 – Shoring	(July 20, 2017)	3
Revision of Section 206 – Structure Backfill (Flow-Fill)	(March 23, 2017)	2
Revision of Sections 206, 304, and 613 – Compaction	(Nov. 10, 2016)	1
Revision of Section 206 and 601– Maturity Meters and Concrete Form	(December 18, 2015)	3
Revision of Section 212 – Seed	(April 26, 2012)	1
Revision of Section 213 – Mulching	(January 31, 2013)	4
Revision of Section 216 – Soil Retention Covering	(July 16, 2015)	6
Revision of Section 250 – Environmental, Health and Safety Management	(March 23, 2017)	14
Revision of Section 401 – Compaction of Hot Mix Asphalt	(April 26, 2012)	1
Revision of Section 401 – Compaction Pavement Test Section (CTS)	(July 19, 2012)	1
Revision of Section 401 – Composition of Mixtures – Voids Acceptance	(February 3, 2011)	1
Revision of Section 401 – Plant Mix Pavements	(February 3, 2011)	1
Revision of Section 401 – Reclaimed Asphalt Pavement	(May 2, 2013)	2
Revision of Section 401 – Temperature Segregation	(February 3, 2011)	1
Revision of Section 401 – Tolerances for Hot Mix Asphalt (Voids Acceptance)	(January 6, 2012)	1
Revision of Section 412 – Portland Cement Concrete Pavement Finishing	(February 3, 2011)	1
Revision of Sections 412, 601, and 711 - Liquid Membrane-Forming Compounds for Curing Concrete	(May 5, 2011)	1
Revision of Sections 412 and 705 – Preformed Compression Seals	(February 3, 2011)	2

Project Special Provisions

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ON THE JOB TRAINING CONTRACT GOAL

This training special provision is an implementation of 23 U.S.C. 140 (a). The Contractor shall meet the requirements of the FHWA 1273 for all apprentices and trainees.

As part of the Contractor's Equal Employment Opportunity Affirmative Action Program, training shall be provided on projects as follows:

1. The Contractor shall provide on the job training aimed at developing full journey workers in the skilled craft identified in the approved training plan. The Contractor shall provide at a minimum, required training hours listed in the Project Special Provisions for each project.

2. The primary objective of this specification is to train and upgrade women and minority candidates to full journey worker status. The Contractor shall make every reasonable effort to enroll and train minority and women workers. This training commitment shall not be used to discriminate against any applicant for training whether or not the applicant is a woman or minority.

3. The Contractor may employ temporary workers from CDOT supportive services providers to meet OJT requirements. Information pertaining to supportive services providers may be obtained by calling the CDOT OJT Coordinator at the number shown on the link http://www.coloradodot.info/business/equal-opportunity/training.html

4. An employee shall not be employed or utilized as a trainee in a skilled craft in which the employee has achieved journey status.

5. The minimum length and type of training for each skilled craft shall be as established in the training program selected by the Contractor and approved by the Department and the Colorado Division of the Federal Highway Administration (FHWA), or the U. S Department of Labor (DOL), Office of Apprenticeship or recognized state apprenticeship agency. To obtain assistance or program approval contact:

   CDOT Center for Equal Opportunity
   4201 East Arkansas Avenue
   Denver, CO 80222
   eo@dot.state.co.us
   1-800-925-3427

6. The Contractor shall pay the training program wage rates and the correct fringe benefits to each approved trainee employed on the project and enrolled in an approved program. The minimum trainee wage shall be no less than the wage for the Guardrail Laborer classification as indicated in the wage decision for the project.

7. The CDOT Regional Civil Rights Manager must approve all proposed apprentices and trainees for the participation to be counted toward the project goal and reimbursement. Approval must occur before training begins. Approval for the apprentice or trainee to begin work on a CDOT project will be based on:

   A. Evidence of the registration of the trainee or apprentice into the approved training program.
   B. The completed Form 838 for each trainee or apprentice as submitted to the Engineer.

8. Before training begins, the Contractor shall provide each trainee with a copy of the approved training program, pay scale, pension and retirement benefits, health and disability benefits, promotional opportunities, and company policies and complaint procedures.

ON THE JOB TRAINING CONTRACT GOAL

9. Before training begins, the Contractor shall submit a copy of the approved training program and CDOT Form 1337 to the Engineer. Progress payments may be withheld until this is submitted and approved and may be withheld if the approved program is not followed.

10. On a monthly basis, the Contractor shall provide to the Engineer a completed On the Job Training Progress Report (Form 832) for each approved trainee or apprentice on the project. The Form 832 will be reviewed and approved by the Engineer before reimbursement will be made. The Contractor will be reimbursed for no more than the OJT Force Account budget. At the discretion of the Engineer and if funds are available, the Engineer may increase the force account budget and the number of reimbursable training hours through a Change Order. The request to increase the force account must be approved by the Engineer prior to the training.

11. Upon completion of training, transfer to another project, termination of the trainee or notification of final acceptance of the project, the Contractor shall submit to the Engineer a "final" completed Form 832 for each approved apprentice or trainee.

12. All forms are available from the CDOT Center for Equal Opportunity, through the CDOT Regional Civil Rights Manager, or on CDOT's website at http://www.coloradodot.info/business/bidding/Bidding%20Forms/Bid%20Winner%20Forms

13. Forms 838 and 832 shall be completed in full by the Contractor. Reimbursement for training is based on the number of hours of on the job training documented on the Form 832 and approved by the Engineer. The Contractor shall explain discrepancies between the hours documented on Form 832 and the corresponding certified payrolls.

14. The OJT goal (# of training hours required) for the project will be included in the Project Special Provisions and will be determined by the Regional Civil Rights Manager after considering:

    A. Availability of minorities, women, and disadvantaged for training;
    B. The potential for effective training;
    C. Duration of the Contract;
    D. Dollar value of the Contract;
    E. Total normal work force that the average bidder could be expected to use;
    F. Geographic location;
    G. Type of work; and
    H. The need for additional journey workers in the area
    I. The general guidelines for minimum total training hours are as follows:

ON THE JOB TRAINING CONTRACT GOAL

Contract dollar value	Minimum total training hours to be provided on the project
Up to 1 million	0
>1 - 2 million	320
>2 - 4 million	640
>4 - 6 million	1280
>6 - 8 million	1600
>8 - 12 million	1920
>12 - 16 million	2240
>16 - 20 million	2560
For each increment of $5 million, over $20 million	1280

15. The number of training hours for the trainees to be employed on the project shall be as shown in the Contract. The trainees or apprentices employed under the Contract shall be registered with the Department using Form 838, and must be approved by the Regional Civil Rights Manager before training begins for the participation to be counted toward the OJT project goal. The goal will be met by an approved trainee or apprentice working on that project; or, if a Contractor's apprentice is enrolled in a DOL approved apprenticeship program and registered with CDOT using Form 838 and working for the Contractor on a non-CDOT project. The hours worked on the non-CDOT project may be counted toward the project goal with approved documentation on Form 832. Training hours will be counted toward one project goal.

16. Subcontractor trainees who are enrolled in an approved Program may be used by the Contractor to satisfy the requirements of this specification.

17. The Contractor will be reimbursed $2.00per hour worked for each apprentice or trainee working on a CDOT project and whose participation toward the OJT project goal has been approved. No additional payment will be made to the Contractor to satisfy all OJT requirements as specified herein.

18. The Contractor shall have fulfilled its responsibilities under this specification if the CDOT Regional Civil Rights Manager has determined that it has provided acceptable number of training hours.

19. Failure to provide the required training will result in the following disincentives: A sum representing the number of training hours specified in the Contract, minus the number of training hours worked as certified on Form 832, multiplied by the journey worker hourly wages plus fringe benefits [(A hours – B hours worked) x (C dollar per hour + D fringe benefits)] = Disincentives Assessed. Wage rate will be determined by averaging the wages for the crafts listed on Form 1337. The Engineer will provide the Contractor with a written notice at Final Acceptance of the project informing the Contractor of the noncompliance with this specification which will include a calculation of the disincentives to be assessed.

END OF SECTION REVISION

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REVISION OF SECTION 101
DEFINITION AND TERMS

Technical Specifications related to construction materials and methods for the work embraced under this Contract shall consist of the "Colorado Department of Transportation, Standard Specifications for Road and Bridge Construction" dated 2011 along with the City and County of Denver specifications, as indicated.

Certain terms utilized in the CDOT Specifications referred to in the paragraph above shall be interpreted to have different meanings within the scope of the Contract. A summary of redefinitions follows:

101.27 Department. City and County of Denver

101.28 Engineer. The City and County of Denver Project Manager or designated representative.

101.36 Laboratory. City and County of Denver or their designated representative.

101.47 Project Engineer. The Project Manager, City and County of Denver or designated representative.

101.70 State. City and County of Denver (where applicable)

END OF SECTION REVISION

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REVISION OF SECTION 105
CONTROL OF WORK

Section 105 of the Standard Specifications is hereby revised for this project as follows:

105.02: Plans, Shop Drawings, Working Drawings, Other submittals, and Construction Drawings.

Delete the following sentences:

"The time required for the Engineer's review of each submittal will not exceed four weeks after a complete submittal of shop drawings is received by the Engineer."

"If additional submittals are required by the Engineer's actions or if shop drawing review is delayed by the Engineer, the Contractor may request an extension of time as provided in subsection 108.08."

END OF SECTION REVISION

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REVISION OF SECTION 106
SUPPLIER LIST

Section 106 of the Standard Special Provisions is hereby revised for this project as follows:

Subsection 106.01 shall include the following:

Prior to beginning any work the Contractor shall submit to the Engineer a completed Form 1425, Supplier List. During the performance of the Contract, the Contractor shall submit an updated Form 1425 when requested by the Engineer.

Failure to comply with the requirements of this subsection shall be grounds for withholding of progress payments. All of the Contractor's costs of whatsoever nature required to satisfy all of the requirements herein shall be included in the work, and no additional payment will be made.

END OF SECTION REVISION

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REVISION OF SECTION 106
BUY AMERICA REQUIREMENTS

Section 106 of the Standard Special Provisions is hereby revised for this project as follows:

Subsection 106.01 shall include the following:

The Contractor shall maintain a document summarizing the date and quantity of all steel and iron material delivered to the project. The document shall show the pay item, quantity of material delivered to the project, along with the quantity of material installed by the cutoff date for the monthly progress payment. The summary shall also reconcile the pay item quantities to the submitted Buy America certifications. The Contractor shall also maintain documentation of the project delivered cost of all foreign steel or iron permanently incorporated into the project. Both documental shall be submitted to the Engineer within five days of the cutoff date for the monthly progress payment. A monthly summary shall be required even if no steel or iron products are incorporated into the project during the month. The summary documents does not relieve he Contractor of providing the necessary Buy America certifications of steel and or iron prior to permanent incorporation into the project.

All the Contractor's costs of whatsoever nature required to satisfy all the requirements herein shall be included in the work, and no additional payment will be made.

END OF SECTION REVISION

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REVISION OF SECTION 106
CONFORMITY TO CONTRACT HOT MIX ASPHALT

Section 106 of the Standard Special Provisions is hereby revised for this project as follows:

Subsection 106.05 shall include the following:

For this Project, Contractor process control testing of hot mix asphalt is mandatory. Quality control procedures of WMA shall be per current MGPEC and City and County of Denver Standard Specifications.

END OF SECTION REVISION

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REVISION OF SECTION 107
PERMITS AND LICENCES

Section 107 of the Standard Special Provisions is hereby revised for this project as follows:
Subsection 107.02 shall include the following:
Unless otherwise specified, the Contractor shall procure all permits and licenses; pay all charges, fees, and taxes, including permits procured for this project by others; and give all notices necessary and incidental to the due and lawful prosecution of the work. The costs of these permits will not be paid for separately, but shall be included in the work.

Prior to beginning work, the Contractor shall furnish the Engineer with a written list of all permits required for the proper completion of the contract. The list shall clearly identify the types of permits that must be obtained before work on any particular phase or phases of work can be started. Copies of the fully executed permits shall be furnished to the Engineer upon request. The contractor shall obtain and comply with the provisions of all required permits and variances, including those listed below, at no additional cost to the project. Additional permits not specifically listed here may be required and procurement of and compliance with such permits is the responsibility of the Contractor at no additional cost to the project.

Permits, Clearances, Etc.	**Required by**	**Responsible**	**Notes**
Section 404 – Nationwide Permit 7	USACE	Contractor	For work near Weir Gulch. Permit obtained by CCD. Contractor shall comply with permit requirements.
SB 40 Permit -	CPW	Contractor	For work near Weir Gulch. Permit obtained by CCD. Contractor shall comply with permit requirements.
Floodplain Development Permit	CCD	Contractor	For work near Weir Gulch. Permit obtained by CCD. Contractor shall comply with permit requirements.
Construction Activities Stormwater Discharge Permit (CASDP)	CCD	Owner	Permit obtained by Owner and transferred to Contractor. Contractor shall comply with permit requirements
CDPS General Permit Stormwater Discharges Associated with Construction Activity	CDPHE	Contractor	Permit obtained by Contractor. Contractor shall comply with permit requirements.
CCD Construction Permit	CCD	Contractor	Pre-Construction Meeting with CCD Construction Engineering required prior to start of work.
APEN (Air Pollution Emissions Notice) Permit	CDPHE	Contractor	
CDPHE Groundwater Dewatering Permit	CDPHE	Contractor	
Noise Variance	CCD	Contractor	
Revocable Street Occupancy Permits	CCD	Contractor	
Method of Handling Traffic	CCD	Contractor	
Tree Removal Permit	CCD	Contractor	Contact Denver Forestry at 720-913-0651

END OF SECTION REVISION

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REVISION OF SECTION 107
PROTECTION OF EXISTING VEGETATION

Section 107 of the Standard Specifications is hereby revised for this project as follows:

Subsection 107.12 shall include the following:
The Contractor shall save all existing vegetation (including trees, shrubs, ground covers, grasses, wetlands & riparian) in this area, except for that vegetation, which must be removed to accommodate construction of the project, per the plans. Specific areas of vegetation to be protected shall be as directed by the Engineer and shall be protected by using orange construction fencing, wire fencing with metal posts or silt fence. Fencing for trees shall be installed at the drip line of the tree or as approved by the Engineer. Equipment shall not be installed or stockpile material within 15 feet of existing trees to remain.

The Contractor shall perform all the work in such a manner that the least environmental damage will result. All questionable areas or items shall be brought to the attention of the Engineer for approval prior to removal or any damaging activity.

The Contractor shall promptly report any vegetation damaged or scarred during construction to the Engineer for assessment of damages. Damaged or destroyed fenced vegetation, shall be replaced at the expense of the Contractor. Vegetation of replaceable size shall be replaced at the Contractor's expense. When trees, shrubs beyond replaceable size or wetlands have been damaged or destroyed, the Contractor shall be liable for the appraised value based upon the official current publications. For trees and shrubs use the International Society of Arboriculture, Guide for Plant Appraisals. The Contractor shall pay any fines or jail time should a wetland be damaged, at no cost to the project. The value of disturbed vegetation shall be calculated according to the following formula:

(Vegetation size) x (Species) x (Location) x (Condition) x (Arborist or Wetland Specialist) = Vegetation value

A consulting Arborist retained by the Department will determine the value of the trees and shrubs. A consulting Wetland Specialist shall determine the value of the wetland or wetland species. This value will be deducted from any money due to the Contractor.

The determination as to whether a plant is of replacement size or beyond will be made by the Department's Landscape Architect or Wetland Specialist.

If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is repaired to the Engineer's satisfaction at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

All the Contractor’s costs of whatsoever nature required to satisfy all the requirements herein shall be included in the work, and no additional payment will be made.

END OF SECTION REVISION

REVISION OF SECTION 107
PERFORMANCE OF SAFETY CRITICAL WORK

Section 107 of the Standard Specifications is hereby revised as follows:

Add subsection 107.061 immediately following subsection 107.06 as follows:

107.061 Performance of Safety Critical Work. The following work elements are considered safety critical work for this project:

(1) Overhead structure construction or repair
(2) Work requiring the use of cranes or other lifting equipment

The Contractor shall submit, for record purposes only, an initial detailed construction plan that addresses safe construction of each of the safety critical elements. When the specifications already require an erection plan or a bridge removal plan, it shall be included as a part of this plan. The detailed construction plan shall be submitted two weeks prior to the safety critical element conference described below. The construction plan shall be stamped "Approved for Construction" and signed by the Contractor. The construction plan will not be approved by the Engineer.

The Construction Plan shall include the following:

(1) Safety Critical Element for which the plan is being prepared and submitted.
(2) Contractor or subcontractor responsible for the plan preparation and the work.
(3) Schedule, procedures, equipment, and sequence of operations, that comply with the working hour limitations
(4) Temporary works required: falsework, bracing, shoring, etc.
(5) Additional actions that will be taken to ensure that the work will be performed safely.
(6) Names and qualifications of workers who will be in responsible charge of the work:
    A. Years of experience performing similar work
    B. Training taken in performing similar work
    C. Certifications earned in performing similar work
(7) Names and qualifications of workers operating cranes or other lifting equipment
    A. Years of experience performing similar work
    B. Training taken in performing similar work
    C. Certifications earned in performing similar work
(8) The construction plan shall address how the Contractor will handle contingencies such as:
    A. Unplanned events (storms, traffic accidents, etc.)
    B. Structural elements that don't fit or line up
    C. Work that cannot be completed in time for the roadway to be reopened to traffic
    D. Replacement of workers who don't perform the work safely
    E. Equipment failure
    F. Other potential difficulties inherent in the type of work being performed
(9) Name and qualifications of Contractor's person designated to determine and notify the Engineer in writing when it is safe to open a route to traffic after it has been closed for safety critical work.
(10) Erection plan or bridge removal plan when submitted as required elsewhere by the specifications. Plan requirements that overlap with above requirements may be submitted only once.

REVISION OF SECTION 107
PERFORMANCE OF SAFETY CRITICAL WORK

A safety critical element conference shall be held two weeks prior to beginning construction on each safety critical element. The Engineer, the Contractor, the safety critical element subcontractors, and the Contractor's Engineer shall attend the conference. Required pre-erection conferences or bridge removal conferences may be included as a part of this conference.

After the safety critical element conference, and prior to beginning work on the safety critical element, the Contractor shall submit a final construction plan to the Engineer for record purposes only. The final construction plan shall be stamped "Approved for Construction" and signed by the Contractor.

The Contractor's Engineer shall be on site to inspect and provide written approval of safety critical work for which he provided stamped construction details. The Contractor's Engineer shall be present to conduct inspection for written approval of the safety critical work.

When ordered by the Engineer, the Contractor shall immediately stop safety critical work that is being performed in an unsafe manner or will result in an unsafe situation for the traveling public. Prior to stopping work, the Contractor shall make the situation safe for work stoppage. The Contractor shall submit an acceptable plan to correct the unsafe process before the Engineer will authorize resumption of the work.

The Contractor shall remove workers from the project that are performing the safety critical work in a manner that creates an unsafe situation for the public. This shall be done in accordance with subsection 108.05 when applicable, and at any time when ordered by the Engineer.

Should an unplanned event occur or the safety critical operation deviate from the submitted plan, the Contractor shall immediately cease operations on the safety critical element, except for performing any work necessary to ensure worksite safety, and provide proper protection of the work and the traveling public. If the Contractor intends to modify the submitted plan, he shall submit a revised plan to the Engineer prior to resuming operations.

All costs associated with the preparation and implementation of each safety critical element construction plan will not be measured and paid for separately, but shall be included in the work.

Nothing in the section shall be construed to relieve the Contractor from ultimate liability for unsafe or negligent acts or to be a waiver of the Colorado Governmental Immunity Act on behalf of the Department.

END OF SECTION REVISION

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REVISION OF SECTION 201
CLEARING AND GRUBBING

Section 201 of the Standard Specifications is hereby revised for this project as follows:

Subsection 201.02, paragraph 2, shall be deleted and replaced with the following:

Removals shall be completed to the proposed subgrade elevation for the work, or as designated by the Engineer.

Removal of trees with less than a 6-inch diameter, when measured 24 inches above the existing grade, will not be measured and paid for separately. These tree removals will be included in the clearing and grubbing work.

Subsection 201.02, paragraph 8, shall be deleted and replaced with the following:

Branches on trees or shrubs shall be removed in according with section 202 Removal and Trimming of Trees.

END OF SECTION REVISION

REVISION OF SECTION 202
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Section 202 of the Standard Specifications is hereby revised as follows:

Subsection 202.01 shall include the following:

Materials removed from this Project shall be recycled or reused in accordance with Special Conditions Section "Greenprint Denver Requirements". Final disposal of materials not recycled or reused is included in the work, and shall be disposed of at the Denver Arapahoe Disposal Site (DADS), 3500 South Gun Club Road, Aurora, Colorado. No disposal fees will be paid to the Contractor for any materials of any nature that the Contractor disposes of at the Denver-Arapahoe Disposal Site ("DADS"). Disposal fees at DADS will be paid by the City directly to DADS. This Work shall be done in strict accordance with all of the Special Contract Conditions.

After removal, the exposed subgrade surface shall be finished to a smooth and uniform surface conforming to the typical approved plan specified grade.

All references to curb and gutter shall be construed to include concrete curb and gutter, asphalt mat overlying concrete gutter pan, and concrete gutter pan (no matter the width).

This work will include removal and disposal of sewer stone inlets, manholes, pipe, and curb and gutter as required.

This work shall also include the removal of guard rail, guard posts, traffic signal equipment and all other items designated in the plans to be removed on the project.

Subsection 202.02 shall include the following:

The Contractor shall mark the limits of removals in the field and shall arrange for same to be verified by the Project Manager or his representative. Removed materials shall be recycled or reused where possible. Final disposal of remaining materials will be made at DADS.

Removed concrete and asphalt material may not be used to construct embankments.
Storm drain inlet protection devices shall be installed prior to the commencement of removal activities.

Removal of Water Lines, Fire Hydrants, Water Valves, and Water Meters shall be coordinated with and conform to the requirements of the Denver Water Department.

Where manholes or other structures are to be left in place and plugged, the top three (3) feet of the structure shall be removed and the remainder of the structure to the invert shall be filled with suitable material.

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REVISION OF SECTION 202
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Subsection 202.03 shall be deleted and replaced with the following:

All materials, as shown on the plans to be salvaged, shall be removed, without unnecessary damage, in sections or pieces that may be readily transported, and delivered by the Contractor to the location noted on the plans, or as directed by the Project Manager. The Contractor shall be held responsible for the safekeeping of all salvable materials during the period of the Contract until they are delivered to the City. The Contractor shall make good or replace at his own expense any such materials damaged, stolen or otherwise lost prior to receipt by the City. All salvable materials, as designated on the plans, shall remain the property of the City.

Subsection 202.05 shall include the following:

Pavement marking used for temporary traffic control on pavement to remain shall be removed in a manner that does not damage the pavement surface. Sandblasting, grinding, or hydro blasting will not be allowed.

Subsection 202.07 shall be deleted and replaced with the following:

All materials, as shown on the plans to be salvaged, shall be removed, without unnecessary damage, in sections or pieces that may be readily transported, and delivered by the Contractor to the location noted on the plans, or as directed by the Project Manager. The Contractor shall be held responsible for the safekeeping of all salvable materials during the period of the Contract until they are delivered to the City. The Contractor shall make good or replace at his own expense any such materials damaged, stolen or otherwise lost prior to receipt by the City. All salvable materials, as designated on the plans, shall remain the property of the City.

All concrete pavement, sidewalks, driveways, brick pavers, structures, curbs, gutters, thrust walls, asphalt pavement, etc., designated for removal, shall be broken into pieces and disposed of outside the limits of the project, unless otherwise designated on the plans, or as directed by the Engineer. The Contractor shall document the existing conditions adjacent to buildings prior to any removals, and shall take special care in the removal of pavements directly adjacent to buildings and/or building foundations.

Old concrete construction which abuts new construction, edges of pavement, sidewalks, curbs, etc., to be left in place shall be saw cut to true line with a vertical face.

Where old asphalt construction abuts new construction, edges of asphalt pavement, patching, etc., asphalt to be left in place shall be wheel cut or sawcut to a neat vertical face with minimal jagged edges to the satisfaction of the Engineer. Asphalt pavement may require sawcutting at the Engineer's discretion.

Subsection 202.08 shall include the following:

This work will include removal of the existing walls, wall foundations, timber walls, and benches. This includes the wall and foundation between 724 Federal Blvd and 730 Federal Blvd to the Right of Way, timber retaining wall at 900 Federal, and retaining wall at 1000 Federal. Walls and foundations will be removed as necessary to construct proposed improvements or as directed by the Engineer.

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REVISION OF SECTION 202
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Subsection 202.11 shall include the following:

Removal of Pipe will be measured by the linear foot and shall include pipe of any material and at any depth with a diameter of 6" or larger.

Removal of concrete paving, brick pavers, crosspans, curb ramps, driveways and sidewalks will be measured by the area in square yards, regardless of thickness.

Removal of stairs will be included in the cost of Removal of Sidewalk.

Removal of Asphalt mat will be measured by the area in square yards regardless of the thickness and shall include full-depth asphalt mats, asphalt overlays and the removal of concrete pavement under the asphalt mat.

Removal of Concrete Pavement will be measured by the area in square yards regardless of the thickness.

Removal of Power Outlet measured by each outlet removed and shall include pole, foundation and electrical wiring. The Contractor shall coordinate with Denver Public Schools on the location of wiring termination and removal.

Removal of Sign (Special) shall include removal of sign panel, pole, foundation and disposal. Work shall include electrical disconnect if needed.

Subsection 202.12 shall be deleted and replaced with the following:

The accepted quantities will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule. Payment shall be full compensation for saw cutting, scraping, and blasting, removing, hauling and disposal of such items, excavation and subsequent backfill (with moisture/density control per the Revision of Subsection 203.07) to proposed subgrade elevation. The price shall also include salvageable materials removed, their custody, preservation, storage, haul and disposal as provided herein.

Payment for the removal of items that are identified to be recycled on Greenprint Denver Sustainability and Closeout Form will not be made until the Contractor provides load tickets to the Project Manager for those items.

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REVISION OF SECTION 202
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Payment will be made under:

Pay Item	**Pay Unit**
Removal of Structures and Obstructions	LS
Removal of Bollard	Each
Removal of Power Outlet	Each
Removal of Wheel Stop	Each
Removal of Inlet	Each
Removal of Manhole	Each
Removal of Gabion	Cubic Yard
Removal of Pipe	Linear Foot
Removal of Fire Hydrant	Each
Removal of Water Service Line	Each
Removal of Water Meter	Each
Removal of Sidewalk	Square Yard
Removal of Curb and Gutter	Linear Foot
Removal of Curb	Linear Foot
Removal of Concrete Pavement	Square Yard
Removal of Asphalt Mat	Square Yard
Removal of Pavement Marking	Square Foot
Removal of Light Standard	Each
Removal of Light Standard Foundation	Each
Removal of Ground Sign	Each
Removal of Sign Panel	Each
Removal of Sign (Special)	Each
Removal of Fence	Linear Foot
Removal of Guardrail Type 3	Linear Foot
Removal of Tree	Each
Removal of Wall	Linear Foot
Removal of Traffic Signal Equipment	LS
Abandon Water Service	Each
Clean Valve Box	Each
Pug Pipe	Each

When the Contract does not include a specific pay item for a removal, the removal will not be paid for separately but shall be included in the cost of the work.

END OF SECTION REVISION

-1-

REVISION OF SECTION 202
REMOVAL AND TRIMMING OF TREES

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.01 shall include the following:

This work includes the removal and disposal of trees 6 inches or greater in diameter, as measured 24 inches above the existing ground as shown on the plans and as directed by the Engineer. This work also includes the removal and the disposal of the waste of the trees as shown on the plans and directed by the Engineer. This work includes the preservation from injury or defacement of all vegetation and objects designated to remain. Branches of trees extending over the roadway shall be trimmed to give a clear height of 16feet above the roadway surface.

The Engineer will establish environmental limits. All trees, shrubs, plants, grasses, and other vegetative materials shall remain, except as designated by the Engineer. If it appears that the completion of construction may cause damage to the branches of any tree to remain, the Contractor shall prune trees to facilitate construction.

Subsection 202.02 shall include the following:

Prior to beginning any wall bridge or road construction or removal of encroaching vegetation, the Contractor shall be responsible to schedule and participate in a walk through of the site with the Contractor, the Engineer and the City's Landscape Architect to mark/tag trees, to be removed, protected and or pruned. Trees to be transplanted and vegetation to be protected will also be marked during this walk through.

The Contractor shall submit for approval, a proposal including methods, materials, construction pruning, 12-month and 24-month tree maintenance programs, subsequent tree fertilization and schedule, to the Engineer.

After all directed clearing, trimming, and pruning is completed and accepted, no additional clearing, trimming, cutting, or pruning will be allowed unless approved, in writing, by the Engineer.

All pruning and removal work is to be accomplished using the American National Standard Institute standards (ANSI a 300-1995 section 5.3.3.2). This work shall be done by a Contractor or subcontractor who is a qualified tree surgeon and who is a member of the National Arborist Association and is licensed by the City and County of Denver through the City Forester's Office.. The firm's or individual's name and qualifications shall be submitted at the pre-construction conference for the Engineer's approval. A list of references and other clients shall be included with the qualifications statement. The Contractor shall provide a written description of work methods and time schedules to be approved in writing by the Engineer prior to work commencing.

Access for the removal or pruning of trees will be extremely limited. The Contractor shall obtain any local permits necessary for pruning or removal of all trees not in the right-of-way. Trees shall be felled at the risk of the Contractor. Strict limits of disturbance are defined in the plans and shall be adhered to. If damage or destruction occurs outside of the pre-established limits, the provisions of "Revision of Section 107-Protection of Existing Vegetation" will be enforced.

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REVISION OF SECTION 202
REMOVAL AND TRIMMING OF TREES

Where construction brings about a need to sever roots, roots shall be pruned by above described qualified tree surgeon. If tree roots larger than two (2) inches in diameter of trees scheduled only for trimming are encountered with digging or trenching, they should be tunneled under. The Contractor shall physically inspect and hand excavate around root zones to determine damage and health of tree. The Contractor shall not tear the roots out. Removal of two (2) inches or larger diameter roots encountered during construction will not be allowed. If damage or destruction occurs on trees scheduled only for pruning, the provisions of "Revision of Section 107-Protection of Existing Vegetation" will be enforced.

Branches on trees or shrubs shall be removed as directed by the Engineer. All pruning shall be described in advance by contractor and performed by qualified nurserymen/arborists/horticulturalists only. All work shall be done according to the following requirements:

1. Trimming and pruning shall be done with proper, sharp, clean tools in such a manner as to preserve the natural character of the tree.

2. All final cuts shall leave no projections on or off the branch and shall not be cut so close as to eliminate the branch collar.

3. To avoid bark stripping, all branches 2 inches in diameter and larger shall be cut using the 3-cut method. These branches shall be lowered to the ground by the proper rope method.

4. Tools used on trees known or found to be diseased shall be disinfected with alcohol before they are used on other trees.

5. Branches which are weak or dead shall be removed. Structural weaknesses, decayed trunk or branches, or split crotches shall be reported to the Engineer.

6. When trimming, cutting back or topping trees, the Contractor shall use the drop-crotch method and avoid trimming or cutting back to small suckers. Smaller limbs and twigs shall be removed in such a manner so as to leave the foliage pattern evenly distributed.

7. When reducing size (cut back or topping) not more than one-third of the total area shall be reduced at a single operation.

8. Climbing spikes will not be allowed when a tree is not scheduled for removal.

9. Remove manmade structures including wires and cables from existing trees.

10. Make smooth cuts on any severed tree roots greater than 2 inches in diameter. Do not rip or tear, by excavation equipment, roots of trees to remain.

11. Fertilizers, insect sprays, or other chemicals shall not be applied before or during root or branch pruning processes.

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REVISION OF SECTION 202
REMOVAL AND TRIMMING OF TREES

All brush, branches, limbs, and foliage smaller than 3 inches in diameter shall be chipped into mulch and removed/hauled away from the site or stockpiled at a designated site. The trunks and limbs 3 inches and larger shall be cut into less than 6 foot lengths and hauled away or stockpiled at a designated site. Stumps shall be left no higher than 1 foot above the ground surface and shall not be removed when within the areas to be excavated. In lawn areas, stumps shall be left at a depth of 12 inches below the proposed finished grade surface. In paved areas, stumps shall be left at a depth of -

36 inches below finish grade. Tree stumps designated on the plans for removal, shall be cut so that they are 1 foot below the ground surface and the majority of the stump removed. When trees being cut off are outside the excavation limits, the stumps shall be removed by grinding to 1 foot below the surface cut so that no more than 3 inches remains above the ground surface. Stump removal areas shall be filled with existing soil. Chemicals which will harm future landscapes, above stumps, may not be applied to aid in stump removal. Removals or mulch shall become the property of the Contractor.

Subsection 202.11 shall include the following:

Removal of trees will be measured by the actual number of trees 6 inches or greater in diameter, as measured 24 inches above the existing ground, removed and disposed of. Removal of trees smaller than 6 inches in diameter shall be included under the clearing and grubbing item.

Subsection 202.12 shall include the following:

Pay Item	**Pay Unit**
Removal of Tree	Each

Chipping and hauling chipping, stockpiling mulch, and hauling and stockpiling trunks and limbs will not be paid for separately but shall be included in the work.

Removal of trees less than 6 inches in diameter will not be paid for separately but shall be paid for as clearing and grubbing.

All trimming and pruning of trees to accommodate construction shall be paid for under clearing and grubbing.

All clearing and grubbing directed by the Engineer will be paid for as lump sum under the clearing and grubbing item.

END OF SECTION REVISION

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REVISION OF SECTION 202
PLUG PIPE

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.02 paragraph eight shall be revised to include the following:

All pipes to be plugged shall be shown in the plans. The Contractor shall submit a plugging plan to the Engineer for approval. The plan shall identify the type of pipe to be plugged and the Contractors methods and materials used to plug the pipe.

Subsection 202.11 shall include the following:

Plug pipe will be measured by the number of pipes plugged as designated on the plans, irrespective of the kind or size involved.

Subsection 202.12 shall include the following:

Pay Item	**Pay Unit**
Plug Pipe	Each

Payment for plug pipe will be full compensation for all labor and materials required to complete the work, including preparing and submitting the plugging plan.

END OF SECTION REVISION

REVISION OF SECTION 202
REMOVAL OF TRAFFIC SIGNAL EQUIPMENT

Section 202 of the Standard Specification is hereby revised for this project as follows:

Subsection 202.03 shall include the following:

The Contractor shall safeguard any salvageable materials designated by Denver Traffic, and shall be responsible for the expense of repairing or replacing damaged or missing material until it is delivered to the City and County of Denver Traffic Maintenance Yard at 5440 Roslyn Street.

Designation of salvageable equipment and times for delivery of such items shall be coordinated with Denver Traffic (contact Chris Lillie at 720-865-4066 or Greg Salazar at 303-591-7146).

Signal operations shall be maintained at each of the project intersections throughout construction.

Subsection 202.04 shall include the following:

Removal of the traffic signal equipment shall include signal poles (without luminaries), pedestal poles, footings, span wire cable, traffic signal controller and cabinet, pedestrian push button, cabinet footings, all attachment hardware, and all incidental equipment, except as noted on plans. All existing foundations and pull boxes shall be removed and back-filled. All wiring shall be removed from existing conduit and the conduit shall be abandoned in place.

Xcel Energy shall remove all signal poles with luminaries attached. Xcel Energy will remove only the signal pole and luminaire, and the Contractor shall remove the remainder of the traffic signal equipment, as noted in the plans. The Contractor shall coordinate with Xcel Energy for these removals and is referred to the Project Special Revision "Utilities" herein.

All "Light Emitting Diode" (LED) signal lenses in existing signal faces shall be removed prior to the removal of the signal face. These LED lenses shall be protected from damage and delivered to 5440 Roslyn Street, Denver. This work shall be included in the cost of Removal of Traffic Signal Equipment and will not be paid for separately.

Times for delivery to the maintenance yard shall be coordinated with Denver Traffic Engineering Services at (720) 865-4000.

Subsection 202.12 shall include the following:

Pay Item	**Pay Unit**
Removal of Traffic Signal Equipment	Lump Sum

Payment includes all labor, equipment, and materials necessary to complete the work.

END OF SECTION REVISION

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REVISION OF SECTION 202
REMOVAL OF PAVEMENT MARKINGS

Section 202 of the Standard Specifications is hereby revised as follows:

Subsection 202.11 replace the second paragraph with:

Removal of pavement marking will be measured in square feet, completed and accepted. Sandblasting of pavement that is to be covered with pavement marking material will not be measured and paid for separately but shall be included in the cost of the work.

END OF SECTION REVISION

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REVISION OF SECTION 202
REMOVAL OF WALL

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.01 shall include the following:

This work shall include removal of existing wingwall and foundation along the edge of Weir Gulch and concrete apron in Weir Gulch. Removal operations shall be conducted so that there is minimal damage to the adjacent concrete that is to remain.

Subsection 202.02 shall include the following:

At least 10 days before beginning removal, the Contractor shall submit to the Engineer details of the removal operations showing the methods and sequence of removal and equipment to be used.

The Engineer shall approve all methods and equipment used to accomplish this item.

Subsection 202.08 shall include the following:

The Contractor shall full-depth saw cut the existing wall with a vertical, straight line not deviating more than ¼ inch in 10 feet.

Subsection 202.11 shall include the following:

Removal of Wall will be measured on a linear foot basis and shall include removal of wall and foundation to two feet below finished grade. It shall also include removal of concrete apron in front wall as shown in plans

Subsection 202.12 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Removal of Wall	LF

END OF SECTION REVISION

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REVISION OF SECTION 202
CLEAN VALVE BOX

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.01 shall include the following:

This work shall include cleaning of valve boxes. This work will include removal of all debris, sediment and other foreign material found with valve boxes from top of valve box to its base. The Contractor shall take care while cleaning to avoid damage to facilities the box is intended to protect.

Subsection 202.11 shall include the following:

Clean valve box will be measured by each valve box clean and accepted by the Engineer.

Subsection 202.12 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Clean Valve Box	Each

END OF SECTION REVISION

REVISION OF SECTION 203
EXCAVATION AND EMBANKMENT

Section 203 of the Standard Specifications is hereby revised for this project as follows:

Subsection 203.04 shall include the following:

The Contractor shall protect and promptly dewater and recondition all excavations from water regardless of source.

Subsection 203.05 (c), first paragraph, shall include the following:

Approved backfill material shall be Aggregate Base Course (Class 6) or other material approved by the Engineer.

Subsection 203.07 shall include the following:

Unless otherwise indicated on the plans, the density requirements for embankment material shall be 95% of the maximum density determined in accordance with AASHTO T-180.

Proof Rolling. Proof rolling of the subgrade shall be required. Proof rolling shall be done after specified compaction has been obtained. Proof rolling shall be conducted with a double tandem ten wheel end-dump truck, loaded to a minimum gross weight of 45,000 pounds, or other equipment as approved by the Engineer. Areas found to be weak and those areas which failed shall be ripped, scarified, dried or wetted as necessary and recompacted to the requirements for density and moisture at the Contractor's expense. Where unsuitable material is encountered below proposed subgrade, the Engineer may require the Contractor to remove the unsuitable materials as muck excavation and backfill to the finished grade with Class 6 aggregate base course, or other approved material. The Engineer may designate as unsuitable those soils that are detrimental to the finished roadway. All unsuitable material shall be disposed of as directed.

Subsection 203.12 shall include the following:

Muck excavation, as designated by the Engineer, will be measured in the field.

Subsection 203.13 (d) shall be deleted and replaced with the following:

Proof rolling, blading, wetting, drying, and dozing, will not be measured and paid for separately, but shall be included in the cost of the work.

Subsection 203.13 shall include the following:

Haul and disposal will not be measured and paid for separately but shall be included in the cost of the work.

Subsection 203.14 shall include the following:

Proof Rolling will not be pay for separately but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 206
STRUCTURE BACKFILL (FLOW-FILL)

Section 206 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 206.02 (a) and replace with the following:

(a) *Structure Backfill.* Class 1 and Class 2 structure backfill shall be composed of non-organic mineral aggregates and soil from excavations, borrow pits, or other sources. Material shall conform to the requirements of subsection 703.08. Class of material shall be as specified in the Contract or as designated.

Structure backfill (Flow-Fill) meeting the following requirements shall be used to backfill bridge abutments. The Contractor may substitute structure backfill (Flow-Fill) for structure backfill (Class 1) or structure backfill (Class 2) to backfill culverts and sewer pipes.

Flow-Fill is a self-leveling low strength concrete material composed of cement, fly ash, aggregates, water, chemical admixtures and/or cellular foam for air-entrainment. Flow-fill shall have a slump of 7 to 10 inches, when tested in accordance with ASTM C143 or a minimum flow consistency of 6 inches when tested in accordance with ASTM D6103. Flow-Fill shall have a minimum compressive strength of 50 psi at 28 days, when tested in accordance with ASTM D4832. Flash fill is a rapid setting Flow-Fill that may be used when approved by the Engineer and will be tested, accepted, and paid for as Flow-Fill.

Flow-Fill placed in areas that require future excavation, such as utility backfill shall have a Removability Modulus (RM) of 1.5 or less.

Removability Modulus, RM, is calculated as follows:

$$RM = \frac{W^{1.5} \times 104 \times C^{0.5}}{10^6}$$

where: W = unit weight (pcf)
C = 28-day compressive strength (psi)

Materials for structure backfill (Flow-Fill) shall meet the requirements specified in the following subsections:

Fine Aggregate[1, 4]	703.01
Coarse Aggregate[2, 4]	703.02
Portland Cement	701.01
Fly Ash[3, 4]	701.02
Water	712.01
Air Entraining Admixture	711.02
Chemical Admixtures	711.03

[1] Fine aggregate not meeting the requirements of subsection 703.01 may be used if testing indicates acceptable results for strength and air content.
[2] Coarse aggregate not meeting the requirements of subsection 703.02 may be used if testing indicates acceptable results for strength and air content.

[3] Fly ash not meeting the requirements of subsection 701.02 may be used if testing indicates acceptable results for strength and air content.
[4] Industrial by-product aggregates (foundry sand, bottom ash, etc..) and fly ash not meeting the requirements of subsection 701.02 shall submit a report from the supplier documenting the results of testing in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) described in 40 CFR 261. The report shall include the results of TCLP testing for heavy metals and other contaminants. Materials shall not exceed the TCLP limits of 40 CFR 261.24 for heavy metals

Cellular foam shall conform to ASTM C869 and ASTM C796

Recycled broken glass (glass cullet) is acceptable as part or all of the aggregate. Aggregate including glass must conform to the required gradations. All containers used to produce the cullet shall be empty prior to processing. Chemical, pharmaceutical, insecticide, pesticide, or other glass containers containing or having contained toxic or hazardous substances shall not be allowed and shall be grounds for rejecting the glass cullet. The maximum debris level in the cullet shall be 10 percent. Debris is defined as any deleterious material which impacts the performance of the structure backfill (Flow-Fill) including all non-glass constituents.

The Contractor may use aggregate which does not meet the above specifications if the aggregate conforms to the following gradation:

Sieve Size	**Percent Passing**
25.0 mm (1 inch)	100
75 μm (No. 200)	0-10[1]

[1] The amount of material passing the 75 μm (No. 200) screen may exceed 10 percent if testing indicates acceptable results for strength and air content.

The Contractor shall submit a structure backfill (Flow-Fill) mix design for approval prior to placement. The mix design shall include the following laboratory test data:

(1) ASTM C231, Air content
(2) ASTM D6023, Unit Weight
(3) ASTM C143, Slump or ASTM D6103 flow consistency
(4) ASTM D4832 28-day Compressive Strength
(5) Removability Modulus (RM)

The Contractor shall submit a Process Control (PC) Plan with the mix design to the Engineer. The PC plan shall address the batching, mixing, testing and placement of the structure backfill (Flow-Fill).

In subsection 206.03, delete the thirteenth through fifteenth paragraphs and replace with the following:

Compaction of structure backfill (Flow-Fill) shall not be performed.

The maximum layer thickness for structure backfill (Flow-Fill) shall be 3 feet unless otherwise approved by the Engineer. The Contractor shall not place structure backfill (Flow-Fill) in layers that are too thick to cause damage to culverts, pipes and other structures, or that will cause formwork or soil failures during placement. Structure backfill (Flow-Fill) shall have an indention diameter less than 3 inches and the indention shall be free of visible water when tested in accordance with ASTM D6024 by the Contractor prior to placing additional layers of structure backfill (Flow-Fill).Testing structure backfill (Flow-Fill) in accordance with ASTM D6024 will be witnessed by the Engineer. Damage resulting from placing structure backfill (Flow-Fill) in layers that are too thick or from not allowing sufficient time between placements of layers shall be repaired at the Contractor's expense.

The Contractor shall secure culverts, pipes and other structures to prevent floating and displacement of these items during the placement of the structure backfill (Flow-Fill).

When Flash Fill is used, it shall be batched with a volumetric mixing truck. Volumetric mixing trucks to produce Flow-Fill and Flash Fill shall have a computer batching system, capable of producing the approved mix design and printing tickets. For Flash Fill, the batch weights of cement and/or fly ash per cubic yard shall be with 2% of the mix design batch weights and the batch weight of water per cubic yard shall be within 2% of the mix design batch weight.

Prior to the placement of structure backfill (Flow-Fill), the Contractor shall sample the structure backfill (Flow-Fill) in accordance with ASTM D5971. The Contractor shall test the structure backfill (Flow-Fill) unit weight in accordance with ASTM D6023. For Flash Fill, the measured unit weight shall be within 5.0% or 5.0 pcf, whichever is larger, of the approved mix design unit weight. The Contractor shall test the structure backfill (Flow-Fill) for slump in accordance with ASTM C143 or flow consistency according to ASTM D6103.

The Contractor shall sample and test the first three loads of structure backfill (Flow-Fill) for each placement and then randomly once every 50 cubic yards. Sampling and testing will be witnessed by the Engineer

When structure backfill (Flow-Fill) is placed in areas that require future excavation, the unit weight of the placed structure backfill (Flow-Fill) shall not exceed the unit weight of the approved mix design by more than 2.0 pcf.

Structure backfill (Flow-Fill) shall not be allowed to freeze during placement and until it has set sufficiently according to ASTM D6024. Frozen structure backfill (Flow-Fill) shall be removed and replaced at the Contractor's expense.

When the Contractor substitutes Structure Backfill (Flow-Fill) for Structure Backfill (Class 1) or (Class 2), the trench width may be reduced to provide a minimum 6 inch clearance between the outside diameter of the culvert and the trench wall.

END OF SECTION REVISION

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REVISION OF SECTION 206
SHORING

Section 206 of the Standard Specifications is hereby revised for this project as follows:

Subsection 206.08 shall include the following:
This work consists of providing shoring to protect adjacent roadways, buildings, bridges, box culverts, vaults, utilities and structures from impacts associated with utility or wall installation. Work also includes providing shoring for construction of jacking and receiving pits for tunneling.

Subsection 206.09 shall include the following:

Shoring is defined as any temporary construction used to support the earth adjacent to any excavation or embankment.

This work shall consist of shoring at various structure locations throughout the project site.

The locations and dimensions of jacking and receiving pits shown on the Construction Drawings are provided for information only. The Contractor shall locate and size pits as required to perform the work, subject to right-of-way, utility, and other project requirements and/or limitations.

The Contractor shall locate, size, design, and construct shoring which provides all necessary rigidity, and supports the loads imposed to facilitate construction as shown on the plans.

When the height of shoring exceeds five feet above the base of the excavation, shoring drawings shall be provided by the Contractor to the Engineer for information only. The drawings shall be prepared by, and contain the seal and signature of, a Professional Engineer registered in the State of Colorado. These drawings shall be approved and signed by the Contractor and provided to the Engineer at least ten days prior to construction.

Shoring shall be constructed in conformity with the shoring drawings provided to the Engineer. Prior to placing construction or traffic loads on the supported earth, the Contractor's Professional Engineer shall certify in writing that shoring materials and construction have been inspected and that all shoring, materials, and construction are in conformity with the shoring drawings. The Contractor shall supply a copy of the certification on a form supplied by the Department to the Engineer for record purposes.

If embankment, construction, traffic, or other surcharge in excess of the original shoring design are to be placed adjacent to any shoring, the Contractor shall provide a signed letter from the Contractor's Professional Engineer prior to the load placement stating that the shoring will support the additional load.

No gasoline-powered equipment shall be permitted in jacking and receiving pits. Diesel, electrical, hydraulic, and air powered equipment is acceptable, subject to applicable City, State, and Federal regulations.

Locations of utilities shown on Construction Drawings shall be considered approximate. Field locate each utility potentially impacted by the jacking and receiving pit excavations and shoring to verify location prior to beginning underground construction at each location. Coordinate with each utility agency as necessary prior to relocation, hanging or upgrade of utilities in the vicinity of pit excavations. All utilities shall be preserved without interruption.

REVISION OF SECTION 206
SHORING

Shoring drawings shall include the following information:

- The size and grade of all structural materials.
- Design notes, including design assumptions, and construction details.
- Where applicable, restrictions on heavy equipment placement at specific locations adjacent to the shoring.
- Areas determined by the Contractor's Professional Engineer where de-watering of the shored excavation will be required, and a description of the requirements (i.e., head added by the pump, flow rate, minimum pump size, etc.) and methods to be used for de-watering.
- All other information determined by the Contractor's Engineer to be pertinent to the design and successful construction of the shoring.
- The plans shall detail a daily monitoring method for all shoring. The monitoring method shall include both lateral and vertical movements. The plans shall detail each monitoring location required to protect all surrounding structures.
- Instrumentation and monitoring requirements for shoring at jacking and receiving pits for tunneling provided in Section 603.

Prior to construction activities the contractor shall perform a complete site investigation of all buildings (including basements foundations), structures and bridges. The investigation shall document all existing conditions and any known distress or damage. The documentation shall include detailed pictures and video. The investigation shall be conducted by a professional engineer with expertise in building structures.

Subsection 206.10 shall include the following:

Shoring for the Jacking pit will be measured and paid for by Shoring (Jacking Pit) on a lump sum basis and will include all work and material association with construction of the Jacking pit. Shoring for the Receiving pit will be measured and paid for by Shoring (Receiving Pit) on lump sum basis and will include all work and material association with construction of the Receiving pit. Excavation, backfill and compaction of earthwork for shoring pits will not be measured separately but is to be include in the cost of the each respective pit. Shoring required to construct other elements of the project including but not limited to walls, inlets, manholes, storm sewer pipe, water lines, foundations and other any other below ground facilities will not be measured separately, but will be paid for as Shoring on a lump sum basis.

Subsection 206.11 shall include the following:

Pay Item	**Pay Unit**
Shoring	Lump Sum
Shoring (Jacking Pit)	Lump Sum
Shoring (Receiving Pit)	Lump Sum

Payment for shoring will be full compensation for all work and materials required to design, construct, dewater, maintain the excavation, remove the shoring, backfill and compact backfill.

END OF SECTION REVISION

REVISION OF SECTION 207
TOPSOIL

Section 207 of the Standard Specifications is hereby revised for this project as follows:

MATERIALS

Subsection 207.02 shall include the following:

PART 1 - GENERAL

1.1 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Fertilizer: A substance that is added to soil to help the growth of plants.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. 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.

F. Planting Area: Areas to be planted.

G. 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.

H. Soil Amendment: Any substance which is intended to improve the physical, chemical, or other characteristics of the soil.

I. Soil Conditioner: Combination of slow-release fertilizer, hummate, and Mycorrhiza.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.

J. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

K. 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.

REVISION OF SECTION 207
TOPSOIL

1.2 SUBMITTALS

A. Soil Analysis Report: As indicated in Article 1.4 "Quality Control", below.

B. 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.
      b. State, Federal and other inspection certificates shall accompany invoice for materials showing source or origin.

C. 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.

D. Soil Analysis Report: As indicated in Article 1.4 "Quality Control", below.

1.3 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.

1.4 QUALITY CONTROL

A. Testing Agency: 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 the 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.
   2. Multiple Laboratories: Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

B. Preconstruction Testing
   1. Engage the approved testing agency to perform preconstruction soil analyses on existing on-site soil, imported topsoil, and pre-amended imported soil.

   2. Notify Project Manager seventy-two (72) hours in advance of the dates and times when laboratory samples will be taken.

C. Soil Sampling Requirements
   1. Sample Collection and Labeling: Have samples taken and labeled by the Contractor in the presence of the Project Manager and under the direction of the testing agency.
   2. 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 site plan of the sampling locations to the Project Manager for approval, prior to sampling.
   3. Procedures and Depth of Samples: Collect samples to a depth of six inches (6") and combine in a clean plastic container.
   4. Mixing of Samples: Mix samples together thoroughly, removing plant debris and breaking up clods.
   5. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

D. Testing Requirements
   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.
   2. Fertility Testing: Soil-fertility analysis shall, include the following:
      a. Percentage of organic matter.
      b. CEC, calcium percent of CEC, and magnesium percent of CEC.
      c. Soil reaction (acidity/alkalinity pH value).
      d. Buffered acidity or alkalinity.
      e. Lime estimate.
      f. Soil texture estimate.
      g. Nitrogen ppm.
      h. Phosphorous ppm.
      i. Potassium ppm.
      j. Manganese ppm.
      k. Zinc ppm.
      l. Iron ppm.
      m. Boron ppm.
      n. Copper ppm.
      o. Sodium ppm**,** and sodium absorption ratio.
      p. Soluble-salts ppm.
      q. 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.

   3. Other deleterious materials, including their characteristics and content of each.

E. Recommendations: Based on the test results, provide recommendations for soil treatments, amendments, and conditioners to be incorporated to produce a soil suitable for healthy viable plant growth for the species indicated in the Contract Documents. 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.

F. Existing On-Site Topsoil:
1. The Contractor shall furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of existing parent material soil excavated from tree pits.
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), and shall include additive recommendations.
3. A minimum of five (5) sample locations per acre are required, with individual tests completed for each sample.
4. 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.
5. Follow instructions from soil testing laboratory when collecting samples.
6. Testing will be at the expense of the Contractor.
7. Submit a one (1) quart sample along with analysis results.
8. The Contractor shall perform soil tests 45 days prior to mobilizing for landscape construction.
9. Testing facility shall provide interpretation of results and recommendation to produce optimum growing topsoil. Soil shall be tested for soluble salts and nutrient levels, and porosity. Test shall state recommended quantities of nitrogen, phosphorus, and potash nutrients, soil amendments or any other elements.
10. Deficient nutrients shall be corrected with the addition of appropriate fertilizer and amendment materials.
11. Testing agency shall state percentage of parent material (existing soil) to imported amended topsoil as recommended by the results of the existing soil testing.
12. If the percentage of existing parent material soil falls below 50% of the composition of the proposed topsoil mix the Project Manager shall be notified immediately and the proposed topsoil mix will be reviewed with the Landscape Architect and the City Forester.

G. 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.

H. 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.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and 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.

C. Notify Project Manager of delivery schedule in advance so material can be inspected upon arrival at the project site. Immediately remove unacceptable material from the project site

D. Do not deliver or place topsoil in a frozen, wet, or muddy condition.

E. 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.

1.6 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.

1.7 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.

PART 2 - PRODUCTS

2.1 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. Failure will result in the rejection of this topsoil. The imported topsoil is subject to approval by the Project Manager before use. A Certificate of Compliance from the testing agency shall be provided to the Project Manager to verify the composition of the delivered topsoil.

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.

H. Topsoil shall contain the following minimum ammonium DTPA (chelate) extractable nutrients:

Nitrogen	5ppm Air Dried Basis
Phosphorus	5 ppm
Potassium	30 ppm
Iron (Fe)	5 ppm

Topsoil shall not include any minerals or elements detrimental to plant growth.

2.2 SOIL AMENDMENTS AND CONDITIONERS

A. Soil Amendments:
1. In general, turf and planting areas shall receive Soil Amendments unless otherwise noted or specified by the Project Manager. 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.

B. Soil Conditioners:
1. In general, native seed areas shall receive Soil Conditioners unless otherwise noted or specified by the Project Manager. For the purpose of bidding the contractor shall assume the products listed below will be applied at the rate specified by the manufacturer for each planting type identified in the Construction Documents. Once soils tests have been received and a determination is made on the proper amount to be added to 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.

2.3 FERTILIZER

A. General: 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: 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: Fertilizer shall only be applied as specified in Soil Conditioners.

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TOPSOIL

2.4 PESTICIDE

A. Post Emergent Pesticide: Roundup (Glyphosate) as manufactured by Monsanto Company, or approved equal.

CONSTRUCTION REQUIREMENTS

Subsection 207.03 shall include the following:

Topsoil shall be placed in all median planting areas to an approximate depth of 3'-0". Final depth of placed topsoil shall coordinate with intended final application of where soil is placed.

PART 1 - EXECUTION

1.1 EXAMINATION

A. General: Verify that existing site conditions are as specified and indicated on the Contract Drawings before beginning work under this Section.

B. Grades: Inspect to verify rough grading is within +/-one tenth of one foot (0.1') of grades indicated and specified.

C. 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.

D. Unsatisfactory Conditions: The General Contractor shall notify the Project Manager in writing of any known unsatisfactory site conditions. If the soil is found to be unfit to support planting as described above, it is to be removed and replaced with clean soil from a source approved by the Project Manager.

E. Beginning of soil preparation work means acceptance of existing conditions by the installer.

1.2 PREPARATION

A. Locate all utilities (sewer, water, irrigation, gas, electric, phone, and other conduits and subsurface equipment) prior to commencing work.

B. Contractor shall be responsible for the protection of all new and existing infrastructure, and repair of any damages caused by work under this section, at no cost to the Owner.

C. Weed Seed Eradication: Perform pesticide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire pesticide treatment process (germinate/terminate) before proceeding with planting.

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. Notify Project Manager forty-eight (48) hours in advance of each pesticide treatment.
4. Apply pesticide in accordance with manufacturer's recommendations.
5. Water surface one half (1/2") inch.
6. Fourteen (14) days after the first pesticide application, review surface for evidence of plant growth.
7. If there is no evidence of plant growth, obtain Project Manager approval of surface conditions to proceed with Soil Preparation.
8. If more than 10% of the area to be planted contains new plant growth, the pesticide and watering application shall be repeated until new plant growth is satisfactorily eradicated.
9. Remove plant debris from treated area.
    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. 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.
    c. Obtain Project Manager approval of surface conditions fourteen (14) days after last pesticide application.
    d. 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.
    e. Remove plant debris from treated area.
    f. 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.

D. 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 construction staging, a parking area, and/or subjected to heavy use will require ripping to prepare the soil for planting. Scarify compacted soil to an eight-inch (8") minimum depth.

E. Areas of Disturbed Topsoil: Areas disturbed but not severely compacted, as determined by the Project Manager, shall be deep tine aerated or shattered to prepare the soil for revegetation.

F. Areas of Undisturbed Natural Topsoil: Undisturbed sites that are or were supporting healthy plant growth need only surface seedbed preparation prior to sowing seed.

1.3 INSTALLATION

A. Timing: Perform soil preparation just prior to planting operations and in accordance with final planting schedule. Coordinate with irrigation system installation to avoid damage

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. 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.
c. 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.

3. Take soil samples, in similar locations to pre-construction testing, and test amended soil to ensure the final product meets the laboratory recommendations prior to planting.

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.
4. Take soil samples, in similar locations to pre-construction testing, and test amended soil to ensure the final product meets the laboratory recommendations prior to planting.

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. 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.
6. 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").

7. Native Seed Areas: Area shall not be graded smooth but left in a rough condition after tilling. Tilling shall 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.

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1.4 CLEANING

A. Protect areas adjacent to soil preparation and planting 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.

1.5 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 the 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 prepared soil or subgrade is disturbed or contaminated prior to planting, the Contractor shall restore or replace the planting soil as directed by Project Manager at no cost to the Owner.

1.6 ACCEPTANCE

A. Inspection: Provide notice to the Project Manager requesting inspection at least seventy-two (72) hours prior to anticipated date of completion.

B. 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 landscape plantings.

1.7 Deficiencies: The Project Manager will specify deficiencies to the Contractor who shall make satisfactory adjustments and shall again notify Project Manager for final inspection.

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TOPSOIL

PART 2 - EXECUTION

2.1 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.

2.2 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.

C. Utilize manufactured topsoil as the top layer, placing over scarified subgrade to a depth of six-inches (6").

2.3 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.

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TOPSOIL

METHOD OF MEASUREMENT

Subsection 207.04 shall include the following:

The addition of soil amendments needed to bring the topsoil into conformance with the specifications will not be measured and paid for separately, but shall be included in the cost of the work.

Soil testing will not be measured and paid for separately, but shall be included in the work.

Planter Soil Mix shall contain 25% ¼" diameter pea gravel (by volume) equally distributed throughout mix as approved by Project Manager.

BASIS OF PAYMENT

Subsection 207.05 shall include the following:

Pay Item	**Pay Unit**
Stockpile Topsoil	Cubic Yard
Topsoil	Cubic Yard
Planter Soil Mix	Cubic Yard

END OF SECTION REVISION

REVISION OF SECTION 208
EROSION CONTROL

Section 208 of the Standard Construction Specifications is hereby removed, with the exception of Section 208.02, and replaced with the following:

PART I: DEFINITIONS

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.

Definitions used for this Section hereby incorporate those identified within the City and County of Denver Construction Activities Stormwater Manual (CASM**)**.

Additional Definitions applicable to this Section are listed heretofore:

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."

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).

Colorado Department of Health and Environment (CDPHE): State of Colorado, Water Quality Control Division responsible for issuance of State Construction Stormwater Permit.

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).

Construction Activities Stormwater Manual (CASM): City and County of Denver Construction Activities Stormwater Manual (CASM), 2010 edition.

Colorado Department of Transportation (CDOT): State agency that has published standards for Erosion Control with accompanying Erosion Control Supervisor certification courses.

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.

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.

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.

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.

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).

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.

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.

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EROSION CONTROL

State Construction Stormwater Permit: Colorado Revised Statues 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

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.

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.

Stormwater Management Plan (SWMP): The Stormwater Management Plan contains the requirements necessary to accomplish all the following:

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.

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.

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 II: DESCRIPTION

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.

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

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.

PART III: MATERIALS

The materials to be used for BMPs shall conform to Colorado Department of Transportation (CDOT) Materials specification section 208.02. The following is a summary of stormwater BMP nomenclature that may be used interchangeably.

CDOT BMP Name	SWMP Site Map and City Specifications
Concrete Washout Structure	Concrete Washout Area
Vehicle Tracking Pad	Vehicle Tracking Control
Erosion Control Log	Sediment Control Log / Erosion Log
Aggregate Bags	Rock Sock / Gravel Bags
Soil Retention Blankets	Erosion Control Blanket

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EROSION CONTROL

PART IV: EROSION CONTROL PERMIT STATUS

The current SWMP status for the Project is as follows:

An approved SWMP has been prepared and CASDP obtained by the City prior to bidding of the Project and as such must be properly transferred to the Contractor prior to the start of construction. The SWMP has been provided within the Bid Documents and shall be made a part of the Contract. The Contractor shall coordinate with the Project Manager and Permit Authority to perform the necessary transfer of CASDP from City to Contractor prior to the start of construction. The CASDP transfer form can be obtained at: https://www.denvergov.org/Portals/711/documents/CASDP%20TRANSFER%20FORM.pdf. The Permit transfer will be performed at no cost to the Contractor.

Prior to transfer of CASDP, additional elements shall be completed by the Contractor before the CASDP will be transferred from City to Contractor:

(i) Complete Sections B&E (Permittee & Site Supervisor) of the CASDP "Narrative Report Information Worksheet".

(ii) Prepare a complete SWMP including any required adjustments for proposed construction phasing, staging areas, or additional items necessary to address applicable project specific Permit requirements. This will require the Contractor to provide or retain a Professional Engineer or subcontract with the original Professional Engineer that prepared the Bid Documents.

(iii) Complete the "Construction Scheduling" section of the "Narrative Report Information Worksheet".

(iv) Include specific methods and/or BMPs that the Contractor will implement to address hazardous spill prevention/ containment response.

(v) Provide any "Additional Documentation and Correspondence" applicable to the Contractor as stated in the CASM. This will require the Contractor to provide or retain a Professional Engineer or subcontract with the original Professional Engineer that prepared the Bid Documents.

If deemed necessary, the Contractor may propose modifications to the approved SWMP once the CASDP has been transferred to the Contractor. Per CASDP requirements, the Contractor shall obtain the endorsement of a Professional Engineer licensed in the State of Colorado for any proposed Major or Minor SWMP Amendments. This may 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.

Per definition, a Major SWMP Modification requires the submission of revised SWMP elements to the Permit Authority for review and approval.

Prior to construction, the Contractor shall obtain the required State Construction Stormwater Permit(s) as applicable. If the City has already obtained the State Construction Stormwater Permit, it shall be transferred to the contractor in the same way as the CASDP. The State Stormwater Permit Tranfer form can be obtained at: https://www.colorado.gov/pacific/sites/default/files/notice%20of%20transfer%20form.pdf

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PART V: CONSTRUCTION REQUIREMENTS

A) 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.

B) 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.

C) 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.

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.

D) 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.

E) 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).

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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:
   - (i) Construction boundaries (may require Major SWMP Modification)
   - (ii) Areas of disturbance (may require Major SWMP Modification)
   - (iii) Areas used for storage of construction materials, equipment, soils, or wastes.
   - (iv) Location of any dedicated asphalt or concrete batch plants.
   - (v) Location of construction offices and staging areas.
   - (vi) Location of work access routes during construction.
   - (vii) Location of borrow and waste.
   - (viii) Location of temporary and permanent stabilization

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:
   - (i) A change in design, construction, operation, or maintenance of the site which would require the implementation of new or revised BMPs; or
   - (ii) Changes when the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity.

(iii) 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.

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:

(i) Noncompliance which may endanger health or environment.

(ii) Spills or discharge of hazardous substance or oil which may cause pollution of the City MS4 or State Waters.

(iii) 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:

(i) 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.

(ii) 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.

(iii) 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.

(iv) 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.

F) 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.

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.

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EROSION CONTROL

G) 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.

H) 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:

(i) 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.
(ii) All inspection sediment removal, and BMP maintenance activities to comply with all Federal, State & Local erosion control permit requirements until Final Stabilization is reached.
(iii) 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.
(iv) All required mechanical and/ or manual street sweeping.
(v) Discretionary changes required of any regulatory enforcement officer.

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.

I) 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.

J) 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:

(i) Make required revisions to comply with changing Federal or State rulemaking if it occurs within timeframe of the Project
(ii) Make required revisions due to unforeseen or unplanned conditions leading to deficient Drawings/ SWMP (hazardous materials encountered, landfills, expansion of work limits, etc.)

(iii) Prepare revised SWMP elements endorsed by a Professional Engineer licensed in the State of Colorado.

K) 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".

L) 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:

(i) The Contractor shall file Inactivation Request for Construction Activities Stormwater Discharge Permit (available within CASDP guidance documents) with the Permit Enforcement Authority.
(ii) The Contractor shall coordinate with the Permit Enforcement Authority to hold a Final Inactivation Inspection.
(iii) If passing, the Permit Enforcement Authority transmits a letter of approval for Final Stabilization.
(iv) If not passing, the Permit Enforcement Authority transmits a letter of denial for Final Stabilization with associated inspection report to Contractor.

(v) 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.
When Final Stabilization has been reached, the Permit Enforcement Authority shall issue a "Certificate of Final Stabilization".

(vi) Once the Inactivation request is approved by the City and County of Denver, the contractor can apply to close the State Stormwater Permit.

M) 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.

PART VI: 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 VII: METHOD OF MEASUREMENT

Erosion Control Supervisor (ECS) (paid under the item Erosion Control Management (ECM)) will be measured by the total number of hours the ECS is required to be on the Project performing the duties (including supervision by a Professional Engineer licensed in the State of Colorado) as outlined in this Specification. The Contractor shall record the tasks that were performed by the ECS and the hours that were required to complete each task. The records for the payment period shall be submitted to the Project Manager after completion of work, at the time of monthly pay request, for approval and acceptance.

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.

Concrete Washout Structure will not be measured separately but will be paid for on a lump sum basis.

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.

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.

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.

PART VIII: BASIS OF PAYMENT

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.

Payment will be made under in accordance with CDOT Standard specifications 203.14, 207.05, 213.05, 214.06, 216.05, 217.05, and 607.05.

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 Contactor's expense.

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.

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.

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.

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.

Erosion Control Supervisor will be by paid for by the item Erosion Control Management (ECM) and shall 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 ECM 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.

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REVISION OF SECTION 208
EROSION CONTROL

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.

The Lump sum payment for Concrete Washout Structure, whether constructed or prefabricated, regardless of material, and no matter the number used, will be full compensation for all work and materials required to install, maintain, and remove the item regardless of the number washout structures placed, materials used, or liners used. This includes, but is not limited to: excavation, embankment, liner, erosion bales, fencing, signing, containment and disposal of concrete washout and all other associated waste materials including replacement and removal of liners, regardless of the number of liners of any type of material used or number of washout structures placed.

Silt berm spikes and dike staples will not be measured and paid for separately, but shall be included in the work.

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.

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.

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.

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.

Surveying of permanent BMPs will not be measured and paid for separately, but shall be included in the work.

Payment for work under this section will be made as amended above and by other contract special provisions. For this project, the following pay items are tabulated in the plans:

Pay Item	**Pay Unit**
EROSION LOG TYPE 1 (12 INCH)	Linear Foot
SILT FENCE	Linear Foot
SILT FENCE (REINFORCED)	Linear Foot
AGGREGATE BAG	Linear Foot
CONCRETE WASHOUT STRUCTURE	Lump Sum
STORM DRAIN INLET PROTECTION (TYPE I)	Linear Foot
STORM DRAIN INLET PROTECTION (TYPE II)	Linear Foot
STORM DRAIN INLET PROTECTION (TYPE III)	Each
VEHICLE TRACKING PAD	Each
REMOVAL AND DISPOSAL OF SEDIMENT (LABOR)	Hour

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Pay Item	**Pay Unit**
REMOVAL AND DISPOSAL OF SEDIMENT (EQUIPMENT)	Hour
SWEEPING (SEDIMENT REMOVAL)	Hour
REMOVAL OF TRASH	Hour
EROSION CONTROL MANAGEMENT (ECM)	DAY

END OF SECTION REVISION

REVISION OF SECTION 209
WATERING AND DUST PALLIATIVES

Section 209 of the Standard Specifications is hereby revised for this project as follows:

Subsection 209.07 paragraph 1 shall be deleted and replaced with the following:

Water for moisture-density control, landscaping, pre-wetting, and for dust palliatives will not be measured and paid for separately but shall be included in the cost of the work.

Subsection 209.08 paragraph 1 shall be deleted.

END OF SECTION REVISION

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REVISION OF SECTION 210
RESET STRUCTURES

Section 210 of the Standard Specifications is hereby revised for this project as follows:

Subsection 210.01 shall include the following:

This work shall also include modifying manholes.

Subsection 210.02 shall include the following:

Reset Water Meter and Meter Pit and Reset Water Meter and Meter Vault shall conform to the details and requirements of the Denver Water Department.

Reset Water Meter Pit shall conform to the details and requirements of the Denver Water Department.

Modify manhole shall conform to the details and requirements of the Denver Wastewater Department.

Resetting traffic signal equipment shall be done in accordance with City of Denver traffic standard requirements.

Subsection 210.08 shall include the following:

Reset Structure (Sign #) shall include all work, hardware, and material to reset the existing sign to a new location on the project. The new location shall be agreed to with the Engineer prior to resetting. This work shall include disassembling the existing sign structure carefully to avoid damage and resetting it on a new foundation. If the sign is lit, the contractor shall provide all electrical wiring labor and material to light the sign in the new location in the cost of this item. The Contractor shall take care when resetting the sign to avoid damaging the sign and may be required to replace the sign if the sign is damaged during resetting.

Subsection 210.10 shall include the following:

All manholes, water meter pits, and valve boxes shall be adjusted in accordance with the applicable standards of the utility owner. The Contractor shall be responsible for determining the proper utility owner and coordinating these adjustments and inspections of the work.

Subsection 210.12 shall include the following:

The quantity to be measured where items are reset, adjusted or restored on a square foot basis shall be the actual number of square feet of the items completed and accepted.

Water Meters and Vaults will be measured by each reset and accepted. Adjustments, additional pipe, fittings, thrust blocks and all other appurtenances required to reset the item will not be measured for payment but shall be included in the cost of the rest.

REVISION OF SECTION 210
RESET STRUCTURES

Subsection 210.13 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Reset Ground Sign	Each
Reset Structure (Sign #)	Each
Reset Wheel Stop	Each
Reset Fire Hydrant	Each
Reset Light Standard	Each
Reset Ground Sign	Each
Reset Sign Panel	Each
Reset Variable Message Sign	Each
Reset Traffic Signal Head	Each
Reset Traffic Signal Controller and Cabinet	Each
Reset Traffic Signal Pole	Each
Reset Pedestal Pole	Each
Reset Gate	Each
Reset Chain Link Fence	Linear Foot
Reset Tree Grate	Each
Modify Manhole	Each
Adjust Valve Box	Each
Adjust Manhole	Each

END OF SECTION REVISION

REVISION OF SECTION 210
ADJUST VALVE BOX AND MANHOLE

Section 210 of the Standard Specifications is hereby revised for this project as follows:

Subsection 210.10 shall include the following:

The Contractor shall notify each utility company (Owner) prior to any construction that will involve the adjustment of its valve boxes or manholes.

Each Owner will mark all of its valve boxes and manholes that will be involved in the specified construction area.

Prior to commencing construction, the Contractor shall coordinate and conduct, with the Engineer and each Owner, an inspection of all impacted manholes and valve boxes. The purpose of this inspection will be to account for all valve boxes and manholes involved in the construction and determine their accessibility and condition. The Contractor shall provide traffic control for this inspection and for the final inspection. The Contractor shall coordinate construction with the Owner to allow sufficient time for the Owner to make all necessary repairs to valve boxes and manholes before construction begins in the area of the valve boxes and manholes. All parties shall agree on the condition of each valve box and manhole prior to construction.

The Contractor shall replace all valve box sections damaged or misplaced during construction with new valve box sections complying with the requirements of the Owner's specifications. The Contractor shall set each valve box to be adjusted so that it is ¼ inch to ½ inch below the finished grade of the paved surface, or to the satisfaction of the Owner, and so that it is plumb over the operating nut of the valve.

The Contractor shall adjust all manholes that require adjustment with materials conforming to the owner's specifications. Some adjustments may require the addition, removal, or replacement of a manhole or cone section. If manhole adjustment requires a manhole cone or barrel section to be added, removed, or replaced, this work will not be considered as "Adjust Manhole", but shall be performed in accordance with the Section 210 requirements for the item "Modify Manhole".

The Contractor shall prevent tools, concrete, dirt, or debris of any kind from falling into the channel of the existing manhole. The Contractor shall clean or remove debris from downstream sewer that enters as a result of the Contractor's work.

When the project includes planing prior to resurfacing, the Contractor shall first lower all valve boxes and manholes below the surface to be planed and then adjust them up to final grade after the paving operation is complete.

Prior to the final inspection the Contractor shall thoroughly clean all valve boxes designated for cleaning. This work shall be performed in accordance with the Section 202 requirements for the item "Clean Valve Box".

The Contractor shall coordinate and conduct, with the Engineer and each Owner, a final inspection upon completion of construction. This inspection shall assure that all valve boxes and manholes are in compliance with these requirements. The Engineer will obtain the Owner's written approval before accepting the work.

REVISION OF SECTION 210
ADJUST VALVE BOX AND MANHOLE

Subsection 210.12 shall include the following:

The Contractor will be paid separately for each valve box or manhole adjustment completed down and for each adjustment completed up.

Subsection 210.13 shall include the following:

Pay Item	**Pay Unit**
Adjust Valve Box	Each
Adjust Manhole	Each

END OF SECTION REVISION

REVISION OF SECTION 210
MODIFY MANHOLE

Section 210 of the Standard Specifications is hereby revised for this project as follows:

Subsection 210.10 shall include the following:

The Contractor shall modify existing manhole as shown in the plans. The existing storm manhole shall be modified to connect the proposed storm sewer pipe to the existing manhole. This is anticipated to include core drilling the existing manhole, connecting the new pipe, grouting and sealing the new pipe to the existing manhole make a water tight connection. This work will be done accordance with Denver Wastewater standards.

Subsection 210.12 shall include the following:

The Contractor will be paid separately for each modified manhole. Payment will be full compensation for all labor and material needed to modify the manhole.

Subsection 210.13 shall include the following:

Pay Item	**Pay Unit**
Modify Manhole	Each

END OF SECTION REVISION

REVISION OF SECTION 211
GROUNDWATER CONTROL

Section 211 is hereby added for this project.

DESCRIPTION and CONSTRUCTION REQUIREMENTS

211.01

This work consists of providing groundwater control for the project. For all excavations and caisson drilling operations the Contractor shall provide suitable equipment and labor to remove water, and shall keep the excavation dewatered so that construction can be carried on under dewatered conditions. Water control shall be accomplished such that no damage is done to adjacent channel banks or structures. The Contractor is responsible for investigating and becoming familiar with all site conditions that may affect the work including surface water, potential flooding conditions, level of groundwater and the time of year the work is to be done. All excavations made as part of dewatering operations shall be backfilled with the same type material as was removed and compacted to ninety-five percent (95%) of Maximum Standard Proctor Density (ASTM D698) except where replacement by other materials and/or methods are required.

The contractor shall conduct operations in such a manner that storm or other waters may proceed uninterrupted along their existing drainage courses.

By submitting a bid, Contractor acknowledges that Contractor has investigated the risk arising from such waters and has prepared his bid accordingly, and assumes all of said risk.

At no time during construction shall contractor affect existing surface or subsurface drainage patterns of adjacent property. Any damage to adjacent property resulting from Contractor's alteration of surface or subsurface drainage patterns shall be repaired by Contractor at no additional cost to the City.

The Contractor shall remove all temporary water control facilities when they are no longer needed or at the completion of the project.

Pumps and generators used for dewatering and water control shall be quiet equipment enclosed in sound deadening devices.

The Contractor shall install adequate measures to maintain the level of groundwater below the foundation subgrade or the bottom of the utility trench elevation and maintain sufficient bearing capacity for all structures, pipelines, utilities, earthwork, and rock work. The Contractor shall also take adequate measures to remove groundwater from caisson holes during the drilling operation as required in section 503 of the Standard Specifications.

Such measures may include, but are not limited to, installation of perimeter subdrains, pumping from drilled holes or by pumping from sumps excavated below the subgrade elevation. Dewatering from within the foundation excavations shall not be allowed. The foundation bearing surfaces are to be kept dewatered and stable until the structures or other types of work are complete and backfilled.

REVISION OF SECTION 211
GROUNDWATER CONTROL

Disturbance of foundation subgrade by contractor operations shall not be considered as originally unsuitable foundation subgrade and shall be repaired at Contractor's expense. Any temporary dewatering trenches, settlement ponds or well points shall be restored following dewatering operations to reduce permeability in those areas as approved by the Engineer.

In areas outside the right-of-way that are used by the Contractor and which include, but are not limited to, borrow pits, haul roads, storage and disposal areas, maintenance, batching areas, etc., erosion and sediment control work shall be performed by the Contractor at the Contractor's expense.

Modifications to existing erosion and sediment control measures or the addition of new erosion and sediment control measures will depend on the Contractor's construction procedures, construction sequencing and phasing, and general approach to the project. Multiple mobilizations, and periodic removal, replacement or modifications of erosion and sediment control measures may be required to match the Contractor's work progress.

MEATHOD OF MEASUREMENT

211.02 Groundwater Control will be measured by the lump sum item. All materials, equipment and labor required to control surface water and dewater all excavations during the course of the project will not be measured and paid for separately, but shall be included in this lump sum item.

BASIS OF PAYMENT

211.03 Payment for work under this section will be as identified in 208.08, as amended above and by other contract special provisions. For this project, the following pay item is tabulated in the plans:

Pay Item	**Pay Unit**
Water Control	Lump Sum

Payment for Water Control shall be made at the contract unit price and shall include full compensation for all labor, equipment, tools, and materials necessary to control surface water and provide dewatering operations in accordance with the plans specifications and conforming to the Colorado Department of Public Health and Environment permits.

Payment for installed items shall include maintenance of the device for the entire time it is in place during construction at a given location. Replacement of the device as required to maintain its function, is included in the cost of the item.

END OF SECTION REVISION

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REVISION OF SECTION 212
LANDSCAPE RESTORATION

Section 212 of the Standard Specifications is hereby revised for this project as follows:

Subsection 212.01 shall include the following:

The Contractor shall meet and coordinate with all private property owners adjacent to the project area where existing plant materials, trees, shrubs, ground covers and irrigated turf /plant material will be removed or affected by the work. The Contractor shall be responsible for coordinating the transplanting of existing materials or providing new stock for "in-kind" replacement. If existing plant material is approved for removal, the Contractor shall coordinate the schedule and access to private property for all removal operations with the property owner, as well as installations of new plant material.

Additionally, the Contractor's work shall also include all adjustments, relocations, and repairs of any existing irrigation systems. Existing irrigation systems impacted by the project will be repaired, modified, and resorted to a fully functioning state to provide irrigation to landscaped areas impacted by the project. All negotiation and coordination efforts with property owners shall be documented in writing, signed by the Contractor and property owner and submitted to the Engineer, as requested.

The Contractor shall identify all existing plant material in the permanent right-of-way and easements that will be removed or transplanted. The Contractor shall prepare and submit drawings designating all existing plant material scheduled for transplanting and proposed locations for transplanted plant material.

All materials scheduled for transplanting shall be dug, protected, and stored per standards outlined by American Standards for Nursery Stock. Type of materials and placement of landscaping shall be approved by local jurisdictions prior to placement.

The Contractor shall perform all work in such a manner that the least environmental damage shall result. The Contractor shall avoid and protect all existing vegetation (trees, shrubs, ground cover, and irrigated lawn) adjacent to the project. All construction operations shall be performed in such a manner that will avoid these areas.

Subsection 212.07 shall include the following:

The quantity of Landscape Restoration to be measured will paid lump sum described above, completed and accepted. Restoration of landscaping beyond limits outlined on the plans and/or as marked in the field by the Engineer will not be paid for.

Subsection 212.08 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Landscape Restoration	Lump Sum
Soil Conditioning	Acre

Payment Landscape Restoration shall be full compensation for all coordination with property owners and restoration of landscape and irrigation materials as specified herein.

END OF SECTION REVISION

REVISION OF SECTION 212

SEEDING (NATIVE)

Section 212 of the Standard Specifications is hereby revised for this project as follows:

Subsection 212.03 shall be modified to include the following:

Seeding Seasons. Warm season grasses (Blue Grama Grass, Sideoats Grama Grass) shall be sown during the period of May through June.

Subsection 212.06(c) shall include the following:

Seeding. Broadcast seeding will be accomplished immediately after the surface has been roughened by raking or harrowing. Perform fine grading as required to maintain positive drainage, prevent ponding, and to provide a smooth well-contoured surface.

Warm Season Native Grama Seed Mix:
The seeding application rate for broadcasting shall be 0.3 lbs/1000 SF of native seed mix (80% Vaughn Sideoats Grama, 20% Lovington Blue Grama); if drilled the rate will be 0.15 lb/1000 SF.

Cool Season & Cover Seed Mix:
The seeding application rate for broadcasting shall be as shown in the following table; if drilled the rate will be ½ of the rate shown in the table.

Species	**Common Name**	**% of Mix**	**Sd/sf**	**lb PLS/ 1000 sf**	**lb PLS/ acre**
Sporobolus airoides	Alkali Sacaton	10	5	0.003	1.12
Distichlis stricta	Inland Saltgrass	10	5	0.010	0.42
Puccinellia distans	Alkaligrass	10	5	0.004	0.18
Elymus lanceolatus ssp. Psammophilus	Streambank Wheatgrass	30	15	0.096	4.19
Pascopyrun smithii	Western Wheatgrass	15	7.5	0.068	2.97
Lolium multiflorum	Annual Rye	25	12.5	0.055	2.40
TOTAL		***100***	***50***	***0.236***	***10.28***

The two mixes shall be applied at a ratio of 50/50

Subsection 212.08 Basis of Payment shall be modified to include the following:

Pay Item	**Pay Unit**
Seeding (Native)	Acre

Providing and installing barriers as directed by the Project Manager to protect seeded areas from damage from both pedestrian and vehicular traffic will not be paid for separately but shall be included in the work. Temporary seeding shall use the above Cool Season & Cover Seed Mix at the rates noted above and shall be paid for under F/A Erosion Control at the Item 212 – Seeding (Native) contract price.

END OF SECTION REVISION

REVISION OF SECTION 213
MULCHING

Section 213 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

Subsection 213.01 shall include the following:

This work consists of supplying and placing wood mulch in all median planting areas.

MATERIALS

Subsection 213.02 shall include the following:

Materials for mulching shall be double shredded cedar mulch, free from deleterious materials and suitable for top dressing of trees, shrubs and ground covers. Mulch shall be of a long fibrous nature capable of matting together and interlocking when moistened and settled. Submit sample to Landscape Architect for acceptance prior to delivery to the site.

CONSTRUCTION REQUIREMENTS

Subsection 213.03 shall include the following:

Mulch shall be placed at a uniform depth of 3". Do not cover shrubs, crown of perennials or branches with mulch or place within 4" of tree trunks.

a. Trees: Create a forty-eight-inch (48") diameter formed soil berm around tree and fill with three-inch (3") deep double shredded cedar wood mulch. Fill entirety of tree grate areas with wood mulch. This mulch will be paid for as Mulching (Wood).

b. Shrubs:
   i. Mulch backfilled surfaces of pits, planting beds areas, and other areas indicated with 1 ½" Mountain Granite rock mulch. This mulch will be paid for as Mulching (Decorative).
   ii. Mulch in shrub bed areas: Apply three-inch (3") thick layer of 1 ½" Mountain Granite rock mulch and finish level with adjacent finished grade. This mulch will be paid for as Mulching(Decorative).

METHOD OF MEASUREMENT

Subsection 213.04 shall include the following:

The quantity of mulch will not be measured but shall be the quantity designated in the plan quantity, except that measurements will be made for revisions requested by the Project Manager, or for discrepancies of plus or minus five percent of the total quantity designated in the Contract.

BASIS OF PAYMENT

Subsection 213.05 shall include the following:

The accepted quantities measured as provided above shall be paid for at the contract unit price bid.

Payment will be made under:

Pay Item	**Pay Unit**
Mulching (Wood)	Cubic Feet
Mulching (Decorative)	Cubic Feet
Mulching (Weed Free Hay)	Acre
Landscape Boulder	Each

END OF SECTION REVISION

REVISION OF SECTION 213
TREE PLANTER (GRATES)

Section 213 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

Subsection 213.01 shall include the following:

This work consists of supplying and tree planter grates and concrete curb as show in the plans and Tree Plater (Grates) detail.

METHOD OF MEASUREMENT

Subsection 213.04 shall include the following:

Tree Planter (Grates) will be measured by each tree plater location installed and accepted. Tree Planter (Grates) will be measured by each location and will include multiple cast iron tree grates, grate frames and concrete curb at each tree planter location. The excavation, uncompacted backfill, tree, mulch and irrigation will be paid for separately.

BASIS OF PAYMENT

Subsection 213.05 shall include the following:

The accepted quantities measured as provided above shall be paid for at the contract unit price bid.

Payment will be made under:

Pay Item	**Pay Unit**
Tree Planter (Grates)	Each

END OF SECTION REVISION

REVISION OF SECTION 213
METAL EDGER

Section 213 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

Subsection 213.01 shall include the following:

This work consists of supplying metal edging as show in the plans and Metal Edger detail.

METHOD OF MEASUREMENT

Subsection 213.04 shall include the following:

Metal Edger will be measured by the linear foot of installed and accepted material. Metal Edger will include all metal stakes and metal edger in each location.

BASIS OF PAYMENT

Subsection 213.05 shall include the following:

The accepted quantities measured as provided above shall be paid for at the contract unit price bid.

Payment will be made under:

Pay Item	**Pay Unit**
Metal Edger	Linear Foot

END OF SECTION REVISION

REVISION OF SECTION 214
PLANTING

Section 214 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

Subsection 214.01 shall include the following:

This work shall also consist of perennial plantings, ornamental grasses, groundcovers, and bulb plantings.

MATERIALS

Subsection 214.02 shall include the following:

EXECUTION

2.4 SUBMITTALS

A. Delivery tickets for all bulk materials with the Project Manager's approval or acknowledgment that materials were received in satisfactory condition.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products, where applicable.

C. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Planting schedule indicating anticipated dates and locations for each type of planting.

E. Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.

2. Pruning to be done by a Licensed Tree Contractor to standards established in ANSI 300.

3. Firms shall demonstrate their capabilities and experience on similar projects. Include lists of completed projects with address and, names and addresses of Landscape Architects and Owners.

F. Establishment Reports: Submit detailed maintenance quarterly reports and schedules for the Maintenance and Establishment Period for review and approval by the Project Manager, Denver City Forester, and Denver City Naturalist.

G. 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.

H. 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.

I. 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.

J. Product Data: For each type of product.
   1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

K. 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.

L. Pesticides: Product label, Safety Data Sheet (SDS) labels and manufacturer's application instructions specific to Project.

M. 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).

N. 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.

O. 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.

P. Analysis of existing soil shall be per Division 32 Sections "Topsoil" and "Soil Preparation".

REVISION OF SECTION 214
PLANTING

Q. 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.

R. Scheduling / Progress Reports:

1. Scheduling: Prior to the beginning of the Maintenance 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.

S. 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.

PRODUCTS

2. 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.

3. 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.

i. 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.
ii. 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.

iii. 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.
iv. The attachment of the largest scaffold branches shall be free of included bark.
v. 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).
   i. 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.
   ii. 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.
   i. 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.
   ii. 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.
   iii. Roots on the periphery and bottom of the root-ball shall be less than one-eighth-inch (1/8") diameter.
   iv. 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.

v. 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.

vi. 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.

vii. 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.

SHRUBS

i. 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.

j. Container size shall be by container classification (i.e., not by container volume) as set forth in the ANSI Z60.1 Container Class Table.

k. In all cases, container grown nursery stock shall meet the following general requirement:

i. 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.

l. The container shall be sufficiently rigid to hold the ball shape and to protect the root mass during shipping.

m. Minimum shrub sizes shall conform to the following standards:
   i. 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")

ii. 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")

iii. 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")

iv. 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")

PERENNIALS, GRASSES, GROUNDCOVERS, AND VINES

n. 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.

TREE-STABILIZATION MATERIALS

o. Trunk-Stabilization Materials:
   i. 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.
   ii. Evergreen Tree Stakes: Two-foot (2') steel T-posts; green color.
   iii. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, #14 galvanized-steel wire, two-strand, twisted.
   iv. Tree-Tie Webbing: UV-resistant nylon webbing with brass grommets, size as indicated.
   v. Safety signals for guy and staking wire: one-half-inch (1/2") diameter PVC pipe, length as indicated.

p. Tree-Wrap:
   i. Two layers of crinkled paper cemented together with bituminous material, four-inches (4") wide minimum, with stretch factor of thirty-three percent (33%).
   ii. Tree wrap tape: Tape as approved by the City Forester and or the Project Manager.

MULCH

q. Refer to section 213.

PLANT PIT BACKFILL MATERIAL

r. Unless otherwise directed by the Project Manager, the plant pit backfill material shall consist of the following, thoroughly mixed:
   i. Soil originally excavated from the pit: two thirds (2/3) proportion of total mix.
   ii. Soil Amendment as specified in Division 32 Section "Soil Preparation"; one-third (1/3) proportion of total mix.

s. If imported topsoil is required, it shall meet the requirements specified in Section 207.

WATER

t. 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.

u. 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.

v. Water applied for moisture density control, pre-wetting, and as dust palliative shall be free of debris, organic matter, and other objectionable substances.

w. 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.

x. 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.
   i. The Contractor shall be responsible for providing water to all existing trees to remain/protect and to all installed trees/plantings until maintenance responsibilities have been transferred to the property owner.

   ii. Water shall not contain any substances injurious to plant growth.

y. Water should be available from on-site irrigation system during the irrigation season (generally May through September), but the Contractor must coordinate activation of the system with the property owner. Contractor shall supply adequate amounts of water when system is not charged (10 gallons per caliper inch)

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. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration 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.

CONSTRUCTION REQUIREMENTS

Subsection 214.03 (a) shall include the following:

2.5 TREE, SHRUB, AND PLANT CARE

A. 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.

B. 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 most not promote or cause erosion or displacement of mulch or erosion control items.

2.6 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.

2.7 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.

E. The Project Manager, Landscape Architect, and/or City Forester may inspect plants either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, cultivar, size, and quality.

F. The Project Manager, Landscape Architect, or City Forester reserves the right to reject at any time or place prior to final acceptance of all plant materials, which in the Project Manager's, Landscape Architect's, and/or City Forester's opinion fail to meet specifications. 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 24 hours.

G. The Contractor shall schedule inspection of the plants, at either the supplier or on-site, to be completed in one (1) local visit. Any further inspection required due to plants being unavailable or rejected as not meeting specifications shall be charged to the Contractor at the current hourly rate for the personnel performing the inspection.

H. Contractor shall organize an Initial Installation Conference where planting of the first tree will be reviewed by the Project Manager, Landscape Architect, and City Forester. Details from the drawing set as well as comments by the City Forester will be discussed at this time to give the Contractor a clear direction for planting the trees on the project. A minimum of one weeks' notice is required for this Conference.

2.8 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 Section 207.

2.9 WEED CONTROL

A. Do not proceed with landscape work until weed growth has been controlled and eliminated, per Section 207.

B. See Section 207 for detailed weed control measures.

C. Use pesticides only with the written approval of Project Manager, and in strict accordance with manufacturer's instructions.

2.10 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.

2.11 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.
   4. Set balled stock on ground and cover ball with wood chips, or other acceptable material

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.
   5. Do not remove container-grown stock from containers before time of planting

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 maintenance period.

F. Coordinate installation of planting materials during normal planting seasons for each type of plant material required. Trees should be planted between April 15-June 15 and September 1 until planting is no longer possible due to frozen ground. Plant trees after final grades have been accepted and prior to planting shrubs unless otherwise authorized by the Project Manager and/or Landscape Architect. The Contractor shall obtain all permits associated with planting in public rights-of-way and/or storage of materials.

2.12 PRUNING OF PLANTS

A. Prune only damaged or dead branches as directed by the City Forester and or the Project Manager.

2.13 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.

2.14 MULCHING

A. Refer to Section 213.

2.15 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. Antidessicant to be supplied and applied by Contractor at no additional cost to the City.

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2.16 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.

2.17 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.

2.18 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.

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2.19 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.

Determine location of above grade and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain grade stakes until their removal is utually agreed upon by parties concerned. Contractor shall be responsible for utility locating, repair of utilities damaged by Contractor, and establishment of grade controls. Notify Project Manager, Landscape Architect, and City Forester immediately if tree planting locations change by any distance as identified in the drawings.

2.20 EXCAVATION

A. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Project Manager before planting.

Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site.

Contractor shall perform a percolation test on each median planting area. Upon excavation of existing soil from the planting area the Contractor shall dig or auger a hole 24" deep by 12" wide. Contractor shall take care to avoid existing utilities while excavating the trench and digging the percolation hole. The hole shall then be filled with water and allowed to drain completely. Upon drainage, the hole shall then be filled again with water and the amount of time to completely drain shall be recorded. Contractor shall document each percolation test drainage time in increments of 4 hours. Contractor to notify Project Manager and Landscape Architect of results of percolation test a minimum of three (3) days prior to tree planting.

If the hole drains in 24 hours the trench is suitable for planting of most trees. If the hole takes substantially more than 24 hours to drain a subsurface drainage solution must be proposed by the Contractor. Contractor shall note if the drainage takes only 12 hours- irrigation requirements may need to be increased on the proposed species in that trench

2.21 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

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2.22 WATER 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 maintenance 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.

Subsection 214.03(b) shall be deleted:

Subsection 214.04 shall include the following:

1.18 ESTABLISHMENT REQUIREMENTS:

A. Once the Contractor has requested and the City has issued "Notice of Substantial Landscape Completion", all plantings will have an establishment period of two years starting in the spring as described in Section 214.04. The "Notice of Substantial Landscape Completion" will not be issued until, in the opinion of the project manager, irrigation systems are fully operational. Fully operational irrigation systems shall be considered a prerequisite of the issuance of the "Notice of Substantial Landscape Establishment". In Section 214.04 all references to a 12-month Landscape Establishment period shall be changed to 24 months. The Contractor shall perform maintenance of all landscaping and plantings from the time they are planted through the end of the establishment period. The Contractor shall also maintain the irrigation system (including winterization of the system) during the entire two year establishment period. After the two-year establishment period has passed, the City, at its sole discretion, shall determine which plantings shall be replaced by the Contractor. The Contractor will not have to replace any planted item more than once. The Contractor's cost to replace any plantings shall be included in the Work. The City will issue only one "Notice of Substantial Landscape Completion" for the entire project.

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METHOD OF MEASUREMENT

Subsection 214.05, shall include the following:

Measurements. Measure trees according to ANSI Z60.1 and the Colorado Nursery Act with branches and trunks in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above ground for larger sizes. Measure main body of tree for height and spread; do not measure branches or roots tip-to-tip.

Landscape Maintenance (24 Months) will not be measured but will be paid for on a Lump Sum Basis.

BASIS OF PAYMENT

Subsection 214.06, shall include the following:

Fertilizer, herbicide application, and soil preparation shall not be measured, but included in the work. Landscape establishment and maintenance performed during construction and replacements done under maintenance will not be measured and paid for separately, but shall be included in the work.

Payment will be made under:

Pay Item	**Pay Unit**
Deciduous Tree (2 Inch Caliper)	Each
Deciduous Tree (3 Inch Caliper)	Each
Deciduous Shrub (5 Gallon container)	Each
Evergreen Shrub (5 Gallon container)	Each
Perennials (1 Gallon container)	Each
Landscape Maintenance (24 months)	Lump Sum

The basis of payment for Landscape Maintenance (24 Months) will be the same as the basis of payment for "Landscape Maintenance" in Section 214.06 except the percent of the lump sum payment in (1) March through October shall be 5% over 16 months and payment for (2) shall be 2.5% for November through February over 8 months, covering the 24 month period of performance.

END OF SECTION REVISION

REVISED SECTION 240
PROTECTION OF MIGRATORY BIRDS
BIOLOGICAL WORK PERFORMED BY THE CONTRACTOR'S BIOLOGIST

Section 240 is hereby added to the Standard Specifications for this project as follows:

DESCRIPTION

240.01 This work consists of protecting migratory birds during construction work on structures.

MATERIALS AND CONSTRUCTION REQUIREMENTS

240.02 The Contractor shall schedule construction activity, including clearing and grubbing operations and work on structures, to avoid taking (pursue, hunt, take, capture, or kill; attempt to take, capture, kill or possess) migratory birds or their nests protected by the Migratory Bird Treaty Act (MBTA). If construction activity is to occur between April 1 and August 31, then the following specifications must be followed and the Contractor shall retain a qualified wildlife biologist to determine where nest removal may occur or will be required during construction. The wildlife biologist shall have a minimum of three years' experience conducting migratory bird surveys and implementing the requirements of the MBTA. The Contractor shall submit documentation of the biologists' education and experience to the Engineer for acceptance. A biologist with less experience may be used by the Contractor subject to the approval of the Engineer based on review of the biologist's qualifications. If all construction activities occur after August 31 and before April 1, then the requirements set forth in this specification are not required.

The wildlife biologist shall record the location of each protected nest, bird species, the protection method used, and the date installed. A copy of these records will be submitted to the Engineer.

(A) Vegetation Removal. When possible, vegetation shall be cleared prior to the time when active nests are present. Vegetation removal activities shall be timed to avoid the migratory bird breeding season which begins on April 1 and runs to August 31. All areas scheduled for clearing and grubbing between April 1 and August 31 shall first be surveyed by the wildlife biologist within 50 feet of the work limits for active migratory bird nests. Contractor personnel shall enter areas outside CDOT right-of-way only if a written, signed document granting permission to enter the property has been obtained from the property owner. The Contractor shall document all denials of permission to enter property. The Contractor shall avoid all migratory bird nests. The Contractor shall avoid the area within 50 feet of the active nests or the area within the distance recommended by the biologist until all nests within that area have become inactive. Inactive nest removal and other necessary measures shall be incorporated into the work as follows.

1. *Tree and Shrub Removal or Trimming.* Tree and shrub removal or trimming shall occur before April 1 or after August 31 if possible. If tree and shrub removal or trimming will occur between April 1 and August 31, a survey for active nests shall be conducted by the wildlife biologist within the seven days immediately prior to the beginning of work in each area of tree and shrub removal or trimming. The survey shall be conducted for each phase of any tree or shrub removal or trimming.

If an active nest containing eggs or young birds is found, the tree or shrub containing the active nest shall remain undisturbed and protected until the nest becomes inactive. The nest shall be protected by placing fence (plastic) a minimum distance of 50 feet from each nest to be undisturbed. This buffer dimension may be changed if determined appropriate by the wildlife biologist and approved by the Engineer. Work shall not proceed within the fenced buffer area until the young have fledged or the nests have become inactive. If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

2. *Grasses and Other Vegetation Management.* Due to the potential for encountering ground nesting birds' habitat, if work occurs between April 1 and August 31, the area shall be surveyed by a wildlife biologist within the seven days immediately prior to ground disturbing activities.

   The undisturbed ground cover to 50 feet beyond the planned disturbance, or to the right-of-way line, whichever is less, shall be maintained at a height of 6 inches or less beginning April 1 and continuing until August 31 or until the end of ground disturbance work, whichever comes first.

   If birds establish a nest within the survey area, an appropriate buffer of 50 feet will be established around the nest by the wildlife biologist. This buffer dimension may be changed if determined appropriate by the wildlife biologist and approved by the Engineer. The Contractor shall install fence (plastic) at the perimeter of the buffer. Work shall not proceed within the buffer until the young have fledged or the nests have become inactive.

   If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

If an active nest becomes established, i.e., there are eggs or young in the nest, all work that could result in abandonment or destruction of the nest shall be avoided until the young have fledged or the nest is unoccupied as determined by the Contractor's biologist and approved by the Engineer. The Contractor shall prevent construction activity from displacing birds after they have laid their eggs and before the young have fledged. If the project continues into the following spring, this cycle shall be repeated. When work on the structure is complete, the Contractor shall remove and properly dispose of netting used on the structure. The taking of a migratory bird shall be reported to the Engineer. The Contractor shall be responsible for all penalties levied by the U. S. Fish and Wildlife Service (USFWS) for the taking of a migratory bird.

REVISED SECTION 240
PROTECTION OF MIGRATORY BIRDS
BIOLOGICAL WORK PERFORMED BY THE CONTRACTOR'S BIOLOGIST

METHOD OF MEASUREMENT

240.03 Wildlife Biologist will be full compensation for all work and materials required to complete the item, including wildlife biologist, wildlife (birds and raptors) surveys, and documentation (record of nest location and protection method).

Clearing and grubbing will be measured and paid for in accordance with Section 201. Mowing will not be measured and paid for separately, but shall be included in the work. Removal and trimming of trees will be measured and paid for in accordance with Section 202.

Fence needed to protect migratory birds and nests will be measured and paid for in accordance with Section 607.

Netting will be measured by the square yard of material placed to keep birds from nesting on the structure. Square yards will be calculated using the length of netting measured where it is attached to the ground and the average height of the netting where it is attached to the structure.

BASIS OF PAYMENT

240.04 The accepted quantities measured as provided above will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule.

Pay Item	**Pay Unit**
Wildlife Biologist	Hour
Removal of Nests	Hour

END OF SECTION REVISION

REVISION OF SECTION 250
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT

Section 250 of the Standard Specifications is hereby deleted and replaced by Standard Special Provision 250. Standard Special Provision 250 is hereby modified as follows:

Subsection 250.03 shall include the following:

The project is located in an urbanized corridor comprised of commercial properties which were identified as having recognized environmental conditions resulting from historical and current land uses. Procedures for the management of hazardous materials during project activities are included in the project-specific Materials Management Plan (MMP), included in the Appendix of the Specifications.

The Contractor shall be responsible for all requirements in the MMP including, but not limited to the following items.

Environmental Health and Safety Management

- The Contractor will prepare a Project Health and Safety Plan and submit three copies of the plan to the project manager.
- The Contractor shall hold an environmental coordination meeting with the City Project Manager and the Denver Division of Environmental Health a minimum of 15 days prior to the start of excavation to review the Contractor's Project Health and Safety Plan and procedures that the Contractor will implement to comply with the MMP.
- The Contractor shall complete and submit to the City Project Manager, the Pre-Dig Checklist for Contractors found in the Appendix, prior to starting soil disturbing activities.
- The Contractor will provide project health and safety orientation training for all field workers on the project.
- The Contractor will provide asbestos awareness training, provided by a certified asbestos building inspector, to field personnel as described in the MMP for Tier 1, Tier 2, and Tier 3 workers.

Project Specific Regulated Asbestos Containing Soil Management Plan

The Contractor will prepare a Project Specific Regulated Asbestos Containing Soil Management Plan (Project Specific RACS Management Plan) and obtain approval of the plan from the CCD and the Colorado Department of Public Health and Environment (CDPHE). The Contractor shall follow CDPHE guidelines for Project Specific RACS Management Plans. The Contractor shall include a minimum of 15 working days in the project schedule for review of the Project Specific Regulated Asbestos Containing Soil Management Plan by CDPHE. The Contractor shall obtain approval of the Plan prior activities that disturb any Regulated Asbestos Containing Soils.

Health and Safety Officer

The Contractor will assign a health and safety officer (HSO) to provide project support in accordance with the requirements in the MMP. The HSO will meet the definition of a HSO as described in CDOT's Specification 250.03, including, but not limited to: "having at least two years of field experience in chemical related health and safety. The HSO shall be either a Certified Industrial Hygienist, Certified Hazardous Material Manager, Professional Engineer, Certified Safety Professional, or Registered Environmental Manager (REM) meeting the criteria set forth in 29 CFR 1926."

Material Management Plan Supervisor

The contractor will provide a Material Management Plan Supervisor (MMP Supervisor) to oversee daily excavation activities in accordance with the MMP. The MMP Supervisor will meet the minimum requirements described in MMP. The MMP supervisor will maintain, on hand, instrumentation required for field screening as described in CDOT's Standard 250.03 Specification. The MMP Supervisor will be responsible for the assembly and transmission of daily logs and waste manifests to the Project Manager based upon soil profiles. The MMP Supervisor will be responsible for determining how many manifests for DADS will be required, and which manifest shall be used for each truck load taken to DADs.

Certified Asbestos Building Inspector (CABI) Support

The Contractor shall provide a CABI who will be required to be onsite during all excavation activities in accordance with all provisions of the MMP, including those found in Section 5.6 of the MMP. Note, if qualified, the MMP supervisor can also be the CABI, which is encouraged by the project owner for cost-saving purposes. Qualifications of the CABI are summarized in the MMP. As described in the MMP, depending on the excavation locations and the materials identified, multiple CABIs may be needed at the same time to cover areas where historical urban fill and debris is discovered. The CABI will also be responsible for implementation of the Project Specific Regulated Asbestos Containing Soil Management Plan.

The Contractor may propose using a Qualified Project Monitor (QPM) as defined in Section 5.5.3.(C) of the Regulation Pertaining to Solid Waste Work Sites and Facilities. However, the proposed use of a QPM will be carefully reviewed by the City, and the use of a QPM will only be allowed if approved in writing by the City. The QPM would work with a CABI. Consideration of any request made by the Contractor to use a QPM will only be made after the Project has been awarded to the successful Bidder, and it is expected that the use of a QPM would result in cost savings to the Project. There is no guarantee that the City will approve the proposed use of a QPM.

Monitoring Technician:

If required, in order to evaluate conditions other than those planned to be monitored by the MMP supervisor, the contractor will notify the City Project Manager and obtain approval to engage a monitoring technician. The qualifications of the Monitoring Technician are described in CDOT's Standard 250.03 Specification

Environmental Consultant:

If required, in order to assess suspect materials, the contractor will notify the City Project Manager and obtain approval to engage an environmental consultant.

Asbestos and Chemistry Analytical Costs:

If required, in order to evaluate chemical characteristics in soil and/or groundwater samples, or for asbestos parameters, soil and/or suspect material samples will be analyzed by a NELAC- (or equivalent) certified laboratory.

Regulated Asbestos Containing Soil (RACS) Air Monitoring Equipment and Controls

If required, in locations where Regulated Asbestos Containing Soils (RACS) are identified, air sampling will be required during excavation work. Costs for air sampling equipment will include air monitoring pumps, sample cartridges, and any additional labor to evaluate asbestos-in-air per CDPHE requirements described in the MMP. In addition to sampling, RACS areas are likely to require the use of additional engineering controls including, but not limited to, the use of water for dust control, covering of stockpiles with plastic, application of a stabilizer to stockpiles for dust control, and/or the installation of geotextile.

Import Material Sampling Event:

Import soil sampling and analysis will be performed in accordance with the MMP. Per the MMP, analytical samples are required for every 2,000 cubic yards of imported soil.

Haul of Non-hazardous Waste for Disposal:

Materials as described in Section 7.4 of the MMP that are not considered hazardous or solid waste, may be transported and disposed as non-hazardous waste. Costs for hauling non-hazardous waste for disposal are unique and separate from solid waste disposal or hazardous waste disposal which are already defined in CDOT's Standard 250.03 Specification.

Subsection 250.09 shall include the following:

METHOD OF MEASUREMENT

Environmental Health and Safety Management

All work associated with the environmental coordination meeting, Pre-Dig Checklist, preparation of the Project Health and Safety Plan, preparation of the, project orientation training, asbestos awareness training, and personal and other items specified in CDOT's Standard 250.03 specification, will be paid under the pay item Environmental Health and Safety Management. Environmental Health and Safety Management will not be measured but will be paid for on a lump sum basis.

Project Specific Regulated Asbestos Containing Soil Management Plan

All work associated with the Project Specific Regulated Asbestos Containing Soil Management Plan including plan preparation, reviews by the City of Denver and CDPHE, plan revisions, communication of plan to workers, and any documentation or reporting will be measured on a lump sum basis and paid for under the pay item Project Specific RACS Management Plan.

Health and Safety Officer

The Health and Safety Officer will be paid under the pay item Health and Safety Officer. The Health and Safety Officer will be measured on an hourly basis.

Material Management Plan Supervisor

The Material Management Plan Supervisor will be paid under the pay item Material Management Plan Supervisor. The quantity to be measured for Material Management Plan Supervisor will be the total hours of work that the Material Management Plan Supervisor is actually used, as authorized, for the work described for the Material Management Plan Supervisor in the MMP.

Certified Asbestos Building Inspector (CABI):

Certified Asbestos Building Inspector (CABI) will be paid under the pay item Certified Asbestos Building Inspector. Depending on the location and status of the project, multiple CABI's may be needed at certain times during the project as described in the MMP. The quantity to be measured for Certified Asbestos Building Inspector (CABI) will be the total number of hours the CABI(s) is actually used, as authorized, for the work described for a CABI in the MMP or Project Specific Regulated Asbestos Containing Soil Management Plan.

Monitoring Technician:

The monitoring technician, if required, will be paid under the pay item through a Force Account.

Environmental Consultant:

The environmental consultant, if required, will be paid under the pay item Environmental Consultant through Force Account.

Asbestos and Chemistry Analytical Costs:

Analytical costs, if required, will be paid under the pay item Asbestos and Chemistry Analytical Costs based on quoted laboratory rates for the required analyses through the force account.

RACS Air Monitoring Equipment and Controls

RACS Air Monitoring Equipment and Controls will be paid under the pay Item RACS Air Monitoring and Equipment Controls through the force account.

Import Material Sampling Event:
Import material sampling will be paid under the pay item Import Material Sampling and will be measured by each sampling event (a sampling event is required for every 2,000 cubic yards of imported material).

Non-hazardous Waste Disposal:

Materials transported and disposed as non-hazardous waste will be paid under the pay item Haul Non-Hazardous Waste disposal. The Contractor shall include all costs associated with non-hazardous waste disposal except for disposal fees in this item. Disposal shall be at the Denver-Arapahoe Disposal Site ("DADS"). No disposal fees will be paid to the Contractor for any materials of any nature that the Contractor disposes of at the Denver-Arapahoe Disposal Site ("DADS"). Disposal fees at DADS will be paid by the City directly to DADS.

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REVISION OF SECTION 250
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT

Subsection 250.10 shall include the following:

The accepted quantities will be paid for at the contract unit prices for each of the pay items listed below that appear on the bid schedule:

BASIS OF PAYMENT

Pay Item	**Pay Unit**
Environmental Health and Safety Management	Lump Sum
Project Specific RACS Management Plan	Lump Sum
Health and Safety Officer	Hour
Material Management Plan Supervisor	Hour
Certified Asbestos Building Inspector	Hour
Import Material Sampling Event	Each
Haul Non-Hazardous Waste	Cubic Yard
Material Handling (Stockpile)	Cubic Yard
Solid Waste Disposal	Cubic Yard

The Contractor shall include all costs associated with Solid Waste Disposal and Non-Hazardous waste disposal in the respective pay items except for disposal fees. No disposal fees will be paid to the Contractor for any materials of any nature that the Contractor disposes of at the Denver-Arapahoe Disposal Site ("DADS"). Disposal fees at DADS will be paid by the City directly to DADS.

The Contractor shall adhere to all provisions and requirements of the Material Management Plan. All of the Contractor's costs to satisfy this requirement that are not included in the Pay Items above shall be include in the Work, and no additional payment will be made.

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REVISION OF SECTION 304
AGGREGATE BASE COURSE

Section 304 of the Standard Specifications is hereby revised for this project as follows:

Subsection 304.02 shall include the following:

Materials for the base course shall be Aggregate Base Course (Class 6) as shown in subsection 703.03

The aggregate base course (Class 6) must meet the gradation requirements and have a resistance value of at least 78 when tested by the Hveem Stabilometer method.

END OF SECTION REVISION

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REVISION OF SECTIONS 401 & 403
HOT BITUMINOUS PAVEMENT

Sections 401 and 403 of the Standard Specifications are hereby deleted, except for measurement and payment, and replaced with the Item 20 "Hot Mix Asphalt Pavement" Specifications from the Metropolitan Government Pavement Engineers Council (MGPEC), Volume 1 Pavement Design Standards and Construction Specifications, latest version, included below.

Contact MGPEC's Administrative Assistant Pam Weimer at 303-979-2190 for MGPEC membership information and to receive full design standards and construction specifications.

The Contractor may substitute Hot Mix Asphalt (Grading SX) (100) (PG 76-28) where called for in the plans with Hot Mix Asphalt (Grading SX) (75) (PG 64-22) on side streets (7th Ave, Severn Pl, Barberry Pl, 9th Ave, 10th Ave, 11th Ave, 12th Ave and Holden Pl). This substitution shall not be allowed on 8th Ave.

Delete subsection 403.05 and replace with the following:

403.05 The accepted quantities of hot mix asphalt will be paid for in accordance with subsection 401.22, at the contract unit price per ton for the bituminous mixture.

Payment will be made under:

Pay Item	**Pay Unit**
Hot Mix Asphalt (Grading SX) (100) (PG 76-28)	Ton
Hot Mix Asphalt (Grading S) (100) (PG 64-22)	Ton
Hot Mix Asphalt (Patching) (Asphalt)	Ton

Aggregate, asphalt recycling agent, additives, hydrated lime, and all other work necessary to complete each hot mix asphalt item will not be paid for separately, but shall be included in the unit price bid. When the pay item includes the PG binder grade, the asphalt cement will not be measured and paid for separately, but shall be included in the work. When the pay item does not include the PG binder grade, asphalt cement will be measured and paid for in accordance with Section 411. Asphalt cement used in Hot Mix Asphalt (Patching) will not be measured and paid for separately, but shall be included in the work.

Excavation, preparation, and tack coat of areas to be patched will not be measured and paid for separately, but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 412
PORTLAND CEMENT CONCRETE PAVEMENT

Section 412 of the Standard Specifications is hereby revised for this project as follows:

Subsection 412.01 and 601.05 shall be revised to include the following:

All mix designs must be submitted for approval by the Engineer and shall be designed for the opening times required by the Traffic Control Plan. Such mix designs shall be submitted in a timely manner so as not to delay the scheduled commencement of the project, taking into account time for testing of the mix by the Contractor's laboratory.

Subsection 412.03, Subsection 601.02, and Subsection 601.04 shall be revised to include the following:

Concrete Class P shall meet the following requirements:

Required Field Compressive Strength (pis):	4500psi at 28 days
Cementitious Material Content (minimum):	660
Air Content % Range (Total):	5.0% to 8.0%
Water/Cementitious Material Ratio:	0.40

All Concrete Class P shall have Class 2 sulfate exposure.

Subsection 412.03 shall be revised to include the following:

Concrete Pavement (Special) shall be Class P concrete and have integral color David Baja Red (160). A mix design shall be submitted for the Concrete Pavement (Special) with integral color.

Subsection 412.04 shall be deleted and replaced with Subsection 601.05, with the following revisions:

Type C or E accelerators may be used under the following conditions:

a) The median daily temperature is less than 55 degrees (Average of previous three days).

b) The date of placement is between September 30th and May 30th.

c) The concrete temperature may not exceed 80 degrees F prior to placement.

Difficulties encountered as a result of use of accelerators, the costs of associated delays, and corrective action costs shall be borne by the Contractor.

Placement of PCCP shall be suspended when air temperatures exceed 96 degrees Fahrenheit and/or sustained wind speeds exceed 25 mph

When High Early Strength is required, a field strength of 3000 psi shall be achieved in 24 hours or less. When directed by the Engineer, a maturity meter similar to the (James Instrument Model No. M-M-3056) shall be used to monitor on-site maturity of pavement concrete. The Contractor shall establish a maturity versus strength relationship for the concrete mixture being used. This correlation may be achieved by casting and curing cylinders on site, monitoring temperature and maturity of cylinders and paving concrete versus time, and testing cylinders at time intervals to establish the correlation.

REVISION OF SECTION 412
PORTLAND CEMENT CONCRETE PAVEMENT

Subsection 412.10 shall include the following:

Bidders are hereby informed that the "Slip Form" paving method shall be used by the Contractor to construct all of the concrete paving work required on the Project. Exceptions to this requirement will be made only if the Contractor requests an Exception, and the Engineer grants it in writing. The Contractors' Request must be in writing, and the Request must state the limits of Work for which Contractors desires to not use the "Slip Form" paving method, and the reasons why. The Slip Form paving method requires the use of a paving machine which is fully energized, self propelled, and designed for the specific purpose of place, consolidating, and finishing the concrete pavement accurately to grade, tolerances, and cross section. Each bidder shall carefully consider all cost, time and other impacts on the Work associated with this requirement and shall fully account for such in their Bids, since no additional payment will be made for such items.

Subsection 412.14 shall include the following:

Contractor shall cure concrete in accordance with MGPEC Section 30.8B and 30.2K.

Allowable curing compound types and specification shall vary depending upon when an expected snow or freeze condition may occur, or when de-icing materials will be soon used.

1. For PCCP placed between April 1 through September 14:
For normal PCCP, related flatwork, sidewalks, and vertical surfaces, white pigmented curing compound conforming to ASTM C-309 Type 2, (white pigmented dye) shall be used unless another method conforming to ACI 308, Section 2, is approved by the AGENCY in writing. For colored concrete, products must meet ASTM C-309 Type 1 (clear) or 1-D (fugitive dye).

2. For PCCP placed between September 15 and March 31:
A combination cure-sealer shall be used for PCCP and other related flatwork, sidewalks, and vertical surfaces placed during these dates, or when the AGENCY predicts an event where they expect to receive snow, freezing conditions and/or the need for use of de-icing materials within 28 days after concrete is placed. Provide adequate texture to surfaces prior to applying the cure-seal, as the solvent based product has a high gloss finish and can pose visual distractions to drivers at night time if applied to smooth concrete surfaces. The combination cure-seal products for PCCP, related flatwork, sidewalks, and vertical surfaces must meet ASTM C-1315 Type II, Class B (pigmented, some yellowing allowed). For colored concrete, products must meet ASTM C-1315 Type I, Class A (clear, non-yellowing). The compound must be an acrylic copolymer type, non-freezing solvent based, with a minimum of 25% solids content. Compound must be VOC compliant in accordance with EPA 40 CFR Part 59. The final gloss appearance will serve as proof of application.
The contractor shall use a sealer that when applied according to manufactures recommendations will not adversely affect the skid resistance of the pavement. The use of cure-Sealer shall not be a substitute for best cold weather curing practices according to ACI 308.

REVISION OF SECTION 412
PORTLAND CEMENT CONCRETE PAVEMENT

Subsection 412.17 shall be revised as follow:

The Contractor shall test the roadway surface smoothness. The finished transverse and longitudinal surface elevation of the pavement shall be measured using a 10-foot straightedge. Areas to be measured will be directed by the Engineer. The Contractor shall furnish an approved 10-foot straightedge, depth gauge and operator to aid the Engineer in testing the pavement surface. Areas showing high spots of more than 3/16 inch in 10 feet shall be marked and diamond ground until the high spot does not exceed 3/16 inch in 10 feet.

Subsection 412.24 shall include the following:

Pay Item	**Pay Unit**
Concrete Pavement (8 inch)	Square Yard
Concrete Pavement (10.5-inch)	Square Yard
Concrete Pavement (10.5-inch) (Fast Track)	Square Yard
Concrete Pavement (11-inch)	Square Yard
Concrete Pavement (11-inch) (Fast Track)	Square Yard
Concrete Pavement (10.5-inch) (Special)	Square Yard

The price per square yard of Concrete Pavement (10.5-inch) (Patterned) shall include all work necessary to pattern the concrete as shown in the plans.

The price per square yard of Concrete Pavement (10.5-inch) (Special) shall include all work and materials including coloring agent necessary to color the concrete as shown in the plans.

Smoothness testing and grinding to correct areas not meeting the smoothness requirements will not be measured or payed for separately, but shall be included in the price paid for the applicable Concrete Pavement item (Item 412).

END OF SECTION REVISION

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REVISION OF SECTION 412
TIE BAR INSPECTION

Section 412 of the Standard Specifications is hereby revised for this project as follows:

Subsection 412.13(b) 1 shall include the following:

If tie bars are inserted into plastic concrete with a tie bar insertion machine, tie bar location and concrete consolidation shall be subject to the following additional requirements:

They first 250 to 500 linear feet of longitudinal weakened plane joint resulting from the procedure shall have one random location cored where the core intercepts an inserted tie bar. The core shall be six-inch diameter taken in the presence of the Engineer. After this coring shall occur at 1000ft intervals or when directed by the Engineer.

If non-consolidated concrete is evident above the inserted tie bar, the Contractor shall cease paving operations and submit a corrective action plan in writing for approval. Correction of the joint and further paving shall take place only after written approval of the corrective action plan has been provided by the Engineer. Additional coring may be required, as directed by the Engineer. Coring operations, including patching, shall be at the Contractor's expense.

Further failure to consolidate the concrete over the tie-bars will be justification to preclude the use of automatic tie-bar insertion for the remainder of the project.

END OF SECTION REVISION

REVISION OF SECTION 503
DRILLED CAISSIONS

503.01 DESCRIPTION

Subsection 503.01 is hereby revised to include the following:

Unless otherwise specified in the plans, the drilled caissons for lighting and traffic signal foundations shall conform to the requirements of the City and County of Denver - Traffic Engineering Services - Project Specials included in the plan set.

END OF SECTION REVISION

REVISION OF SECTION 504
RETAINING WALL (BOULDER)

Subsection 504.01 shall include the following:

This work shall consist of installing stacked grouted boulders constructed at the storm sewer outfall at Weir Gulch.

Subsection 504.02 shall include the following:

A. Boulders:
   1. Boulders used shall be the type designated in the Plans and shall conform to Table 1.

Table 1: Boulder Properties

Boulder Classification	Nominal Size (inches)	Range in Smallest Dimension of Individual Rock Boulders (inches)	Maximum Ratio of Largest to Smallest Rock Dimension of Individual Boulders
B24	24	22 - 26	1.50

   2. The specific gravity of the boulders shall be two and one-half (2.5) or greater.
      s
   3. Boulder specific gravity shall be according to the bulk-saturated, surface-dry basis, in accordance with AASHTO T85.

   4. The bulk density for the boulder shall be 1.3 ton/cy or greater.

   5. The boulders shall have a percentage loss of not more than forty percent (40%) after five hundred (500) revolutions when tested in accordance with AASHTO T96.

   6. The boulders shall have a percentage loss of not more than ten percent (10%) after five (5) cycles when tested in accordance with AASHTO T104 for ledge rock using sodium sulfate.

   7. The boulders shall have a percentage loss of not more than ten percent (10%) after twelve (12) cycles of freezing and thawing when tested in accordance with AASHTO T103 for ledge rock, procedure A.

   8. Rock shall be free of calcite intrusions.

   9. Color:
      a. The color of the boulders shall be gray with gray/blue hues or other acceptable colors approved by Engineer prior to delivery to the Project site.
      b. Color shall be consistent on the entire Project and shall match the color of rock to be used for all other portions of the Work.

10. Rhyolite Rock shall not be used for any grouted boulders.
11. Gradation:
    a. Boulders for a boulder edge shall have a maximum ratio of largest to smallest rock dimension shall be 1.5 or as shown on the Plans.

    b. Control of gradation will be by visual inspection.

    1) In the event Engineer determines the boulders to be unacceptable, Engineer will pick two random truckloads to be dumped and checked for gradation.

    2) Mechanical equipment and labor needed to assist in checking gradation shall be provided by Contractor at no additional cost to the City if the boulders do not meet the specified gradation.

    3) If the boulders do meet the gradation specified, the City will pay for the equipment and labor required for checking.

B. Grout:

1. Grout shall be an approved batch meeting the following requirements:
    a. All grout shall have a minimum 28-day compressive strength equal to 3,200 psi.

    b. One cubic yard of grout shall contain a minimum of six (6) sacks of Type II Portland cement.

    c. A maximum of 25% Type F Fly Ash may be substituted for the Portland cement.

    d. Aggregate for the grout shall consist of 70% natural sand (fines) and 30% 3/8-inch rock (coarse).

    e. Slump shall be four (4) inches to six (6) inches.

    f. Air entrainment shall be 5.5% - 7.5%. g. Grout shall contain one and one-half (1-1/2) pounds of Fibermesh, or approved equivalent, per cubic yard of grout.

    g. Grout shall contain one and one-half (1-1/2) pounds of Fibermesh, or approved equivalent, per cubic yard of grout.

    h. Color Additive in required amounts shall be used when so specified by contract.

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REVISION OF SECTION 504
RETAINING WALL (BOULDER)

Subsection 504.03 shall include the following:

A. Grouted boulder retaining wall shall be placed at the locations as shown in the Plans and installed with the following requirements:

1. Subgrade
    a. The bottom subgrade to receive each boulder shall be constructed as shown in the Plans.

    b. Subgrade shall be excavated a minimum of 6" to a maximum of 12" behind boulders.

    c. Backfill behind boulders shall be compacted to ninety five percent (95%) Maximum Standard Proctor Density (ASTM D698). Care shall be taken during compaction to avoid disturbing and/or damaging the integrity of the boulder channel edge.

    d. Finished grades and subgrade for boulders shall be determined from the height of each boulder used.
2. Boulders
    a. The top of all boulders shall be as indicated in the Plans.

    b. The boulders shall be carefully picked and arranged so that adjacent rock surfaces match within two (2) inches in top elevation and two (2) inches along the vertical exposed face or channel side of rock.

    c. Boulders shall be placed such that adjacent boulders “touch” each other and voids do not exceed four (4) inches. It is the intent of construction to minimize voids and grout placed between boulders.

    d. Contractor shall, if deemed necessary, support the boulders from falling over before and during the placement of grout, backfill, and completing compaction Work on either side of the boulder.

    e. Smaller rocks shall be “chinked in” to fill all voids behind the boulders. Smaller rocks shall also be used to "chink in gaps larger than four (4) inches. Placement shall be approved by Engineer prior to grouting.

REVISION OF SECTION 504
RETAINING WALL (BOULDER)

3. Grouting:
    a. Prior to placing the grout, any type of debris, fines, smaller rock, or silt shall be removed from around or under and on the boulders.

    b. Dewatering shall be implemented to guarantee that the grout will not be placed in water and for a period of twenty-four (24) hours after the grout has been placed.

    c. Keep boulders receiving grout wet at all times prior to receiving grout.

    d. The concrete grout shall be placed by injection methods by pumping under low pressure, through a two- (2") inch maximum diameter hose to ensure complete penetration of the grout into the void area as detailed on the Plans. The grout mix shall be stiffened and other measures taken to retain the grout between the boulders.

    e. Grout placement shall begin at the bottom of the lowest boulder and proceed upward to ensure no air voids exist between the grout, subbase, and boulders.

    f. Grout shall be placed up to a height within six (6) inches of the finished grade or as directed by Engineer and shall be placed in the voids and behind the boulders and not on the surface of the rocks.

    g. A “pencil” vibrator shall be used to make sure all voids are filled between the boulders from the subgrade and around the boulders to a depth as shown on the Plans. The “pencil” vibrator may be used to smooth the appearance of the surface, but Contractor shall use a wood float to smooth and grade the grout around the boulders.

    h. Grout between boulders shall be recessed one third (1/3) the diameter of the boulders on the side facing the channel.

    i. Grout should be troweled out and finished to minimize visibility.

    j. Clean and wash any spillage before the grout sets so the visual surfaces of boulders will be free of grout to provide a clean, natural appearance, or if washing does not clean off grout residue, Contractor shall wash off any grout residue with muriatic acid and water, using a brush to scrub off the residue.

    k. Grout shall receive cold or hot weather protection in accordance with Section 601, Structural Concrete.

4. Topsoil:
    a. Shall be placed per Section 207, Topsoil in the location shown in the Plans.

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REVISION OF SECTION 504
RETAINING WALL (BOULDER)

Subsection 504.04 shall be deleted and replaced with the following:

Grouted boulders retaining wall will be measured by the number of square feet of facial area. Except as otherwise indicated on the plans or in the special provisions, all grout, boulders, and top soil will not be paid for separately but shall be included in the work.

Subsection 504.05 shall include the following:

Pay Item	**Pay Unit**
Retaining Wall (Boulder)	Square Foot

END OF SECTION REVISION

REVISION OF SECTION 514
PEDESTRIAN RAILING

Section 514 of the Standard Specifications is hereby revised for this project as follows:

Subsection 514.01 shall include the following:

This work shall consist of furnishing all equipment, labor, fabrication, and materials to do all work necessary to construct the Pedestrian Railing on Wall Segments 1, 2, and 3 as indicated on the Drawings and as specified herein. Pedestrian Railing (Steel) shall be located at Wall Segment 1 and shall be mounted to Bridge Rail Type 10M (Special) as shown in plans. Pedestrian Railing (Steel) (Special) shall be located at Wall Segment 2 and 3 and shall be mounted to the front face of the wall as shown in plans.

Subsection 514.02 shall include the following:

Steel shall conform to the requirements of Section 105 of the CDOT Standard Specifications for Road and Bridge Constructions and the following:

1. Tubes shall conform to the requirements of ASTM A-500 Grade B.
2. Steel plates shall conform to the requirements of ASTM A-36.
3. Bars shall conform to the requirements of ASTM A-709 Grade 36
4. Bolts shall conform to the requirements of ASTM A-325.
5. Welding shall conform to the American Welding Society Structural Welding Code – Steel, D1.1.

All steel shall be galvanized prior to powder coating in accordance with Section 522 Duplex Coating System of the Project Special Provisions.

Subsection 514.06 shall include the following:

Shop Drawings: Submit shop drawings of all metal railing fabrications to the Engineer for approval, showing sizes and thicknesses of all members, types of materials, methods of connection and assembly, complete dimensions, clearances, anchorage, relationship to surrounding work by other trades, shop paint and protective coatings, and other pertinent details of fabrication and installation.

1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, openings, size and type of fasteners, and any accessories.
2. Include erection drawings, elevations, applicable details, and field dimensions.
3. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

Samples: Submit samples of all materials to be furnished under this section, in the full size and form, as requested by the Engineer.

1. Do not order materials or begin fabrication until Engineer's approval of submittals has been obtained.
2. Furnish to the Contractor, with copy to the Engineer, a certified statement that the shop-applied finish conforms to these Specifications, including compliance with application thickness and adhesion.

REVISION OF SECTION 514
PEDESTRIAN RAILING

The Contractor shall submit a one foot by one foot (1' x 1') minimum sample for approval by Engineer of all paint colors.

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 to prevent rusting and the accumulations of foreign matter on the metal work. All such work shall be repaired and cleaned both prior to and after erection.

Work shall be erected square, plumb and true, accurately fitted, and with tight joints and intersections.

Materials shall be new stock, free from defects impairing strength, durability of appearance, and best commercial quality for each intended purpose.

Connections shall be continuous-welded type for rigid construction, with weld ground smooth. Welding shall conform to applicable requirements of AWSW D1.1.

Exposed fastenings shall be of the same material and furnish as the metal to which applied, unless otherwise noted.

Metal surfaces shall be cleaned and free from mill scale, flake, rust and rust pitting, well formed, and finished to shape and size, true to details with straight, sharp lines and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.

The Contractor shall weld all permanent connections. Welds shall be continuous on all exposed surfaces. Exposed welds shall be ground flush and smooth with voids filled with metallic filing compound. Tack-welding will be permitted where specifically called for. Do not use screws or bolts, unless specifically indicated or welding is not possible. Where used, bolt heads shall be countersunk, screwed-up tight and threads nicked to prevent loosening.

Fastening shall be concealed where practical, unless otherwise indicated. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water.

The Contractor shall 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.

Pedestrian rail shall be rigidly braced and secured to surrounding construction, and shall be tight and free of rattle, vibration, or noticeable deflection during construction.

Care shall be taken in welding and grinding, filing and surface sanding to provide truly smooth, clean, neat, and flush construction throughout, free of all surface defects and defacements.

The Contractor shall remove and replace work at no additional cost to the project for work of this section which is improperly located or is not true to line, grade and plumb with tolerances and indicated.

The Contractor shall repair damaged components and finishes as recommended by the manufacturer and as indicated herein at no additional cost to the project.

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REVISION OF SECTION 514
PEDESTRIAN RAILING

Subsection 514.07 shall include the following:

Pedestrian Railing shall be measured and paid for by the linear foot from end to end of metal rail sections, as shown on the plans.

Subsection 514.08 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Pedestrian Railing (Steel)	Linear Feet
Pedestrian Railing (Steel) (Special)	Linear Feet

All labor, materials, fabrication, shop drawing creation and reviews, and other associated work and materials to construct the Pedestrian Railing (Steel) and Pedestrian Railing (Steel) (Special) shall be included in these pay items.

END OF SECTION REVISION

SECTION 522
DUPLEX COATING SYSTEM

Section 522 of the standard specifications is hereby added to the Standard Specifications for this project as follows:

DESCRIPTION

522.01 This work consists of hot dip galvanizing and duplex coating steel structures as shown in the Contract.

MATERIALS AND CONSTRUCTION REQUIREMENTS

522.02

(a) *General*. The Contractor shall provide, install, and repair if necessary, all steel items that are prepared and coated in conformance with this Section. All repair and replacement of the finished coating necessary for final acceptance shall be at the Contractor's expense.

Steel products to be galvanized and coated shall be cleaned of weld spatter and bevel finished at exposed corners, edges and points. Areas having welds, cuts, bores, notches, or grooves shall also be beveled unless otherwise noted in the Contract or directed by the Engineer. Bevel work shall produce a uniform, smooth finish for galvanizing. Bevel size to be used is based on steel thickness and other criteria as follows:

Steel Thickness/Type	Bevel Size (inches)
Less than ½" thick	1/32" to 1/16"
Over ½" thick	1/16" to 1/8"
Bores, notches & grooves	root face of 1/32" to 1/16"

Welds shall be cleaned and finished according to AWS standards.

All coating measurements shall be taken with a Type 2 fixed probe Dry Film Thickness (DFT) gauge. The gauge shall be calibrated, and measurements shall be taken, according to the Society for Protective Coatings (SSPC) Standard PA-2.

(b) *Galvanizing*. Galvanizing shall be done in accordance with the Contract requirements and AASHTO M 111 (ASTM A123) for the type of material being galvanized, except that items shall only be quenched with ambient air. The poles and arms for traffic signals and signs shall be hot dipped galvanized inside and outside. Chromate treatment of any type will not be permitted. Zinc-phosphate pretreatment or acrylic passivation pretreatments shall be as described in (d) below.

The Contractor shall submit a certificate of compliance (COC), conforming to subsection 106.12, confirming that all materials meet or exceed the galvanizing requirements described herein.

All galvanized surfaces shall be free from drips, slag or surface irregularities.

Spot areas not requiring galvanizing shall be marked and cleanly patched with material that prevents galvanization but does not weaken the adjacent spelter coating. Repair of patched areas shall be achieved by metallizing as described in (c) below.

Prior to galvanizing, the Contractor's galvanizer shall notify the Engineer in writing that the galvanized order is chromate free and air quenched. Products not certified chromate free by the Contractor's galvanizer shall be tested prior to galvanizing. The Contractor shall provide the Engineer with certification from an independent ASTM accredited laboratory listing all individual items that test chromate free. Testing shall comply with ASTM D-2092 Appendix X2. Test results shall be provided to the Engineer prior to galvanizing.

(c) *Repair of Galvanized Products*. Uncoated areas or damaged coating exceeding applicable specification limits shall be re-galvanized to meet the original specification requirements. Cuts made after galvanizing shall be ground, beveled, and smoothed before repair. Damaged galvanized areas shall be re-galvanized or metallized.

Re-galvanizing shall conform to ASTM A-780, Annex A1. Metalizing shall conform to ASTM A-780, Annex A3, except that minor repair areas shall be cleaned according to SSPC method SP-3. SSPC Method SP-2 may be used to clean difficult access areas. Thickness of the repair coat shall match adjacent galvanizing, as measured by a calibrated DFT gauge.

Coating imperfections such as burring, runs or drips, high spots, heavy dross, or ash inclusion shall be removed and cleaned at the Contractor's expense. Areas of re-work falling below zinc thickness limits shall be repaired at the Contractor's expense.

Printed Technical Data Sheets (PTDS) shall be provided to the Engineer for repair materials used.

(d) *Preparing Galvanized Surfaces for Coating.* Products shall be inspected for shipping and handling damage before surface preparation begins. Damage shall be reported to the Contractor's galvanizer and to the Engineer prior to repair. The Engineer will determine whether damaged items are to be repaired or replaced. Minor repair of galvanizing shall conform to (c) above, and shall be at the Contractor's expense.

The Contractor shall prepare each surface to be coated so that it has a slightly roughened profile without removing over 1.0 mil of the galvanized coating. Minimum ASTM zinc thickness specifications shall still apply after preparation.

Surfaces of fasteners to be coated shall be lightly brushed or sanded in a manner that will remove the least amount of zinc.

Surfaces that become soiled after pretreatment shall be cleaned prior to coating by low pressure, mild detergent wash and rinse. Stained or oiled surfaces may also be mildly scrubbed with a soft bristle nylon brush. Stubborn stains may be mildly scrubbed with a mix of 1 - 2 percent ammonia solution and thoroughly rinsed. Wash and rinse pressure shall not exceed 100 psi at 185° F temperature.

Surface preparation work shall be done according to one of the following methods:

1. *Zinc-Phosphate Pretreatment.* This treatment may be used only on new galvanizing less than 48 hours of age.

Items shall be immersed in a bath of acidic zinc-phosphate solution for 3 - 6 minutes, rinsed with clean water, and dried. The first epoxy coat shall be applied within 48 hours after immersion treatment.

If treated items are shipped to a different coating facility they shall be rewashed, rinsed and dried to remove surface soiling. The first epoxy coat must still be applied within 48 hours after immersion treatment.

2. *Acrylic Passivation Pretreatment.* This treatment may be used only on fresh hot galvanizing or new galvanizing less than 48 hours of age. Only chrome-free solutions shall be used, applied by a method that ensures complete coverage of all surfaces to be coated. The Contractor shall provide the Engineer with treatment dates for each item and the PTDS for the solutions used.

   The Contractor's galvanizer may apply solution to fresh hot galvanizing that is less than 6 hours of age, still clean, and dry and that has cooled to treatment application temperature guidelines.

   If newly galvanized items are shipped to another treatment facility they shall be washed, rinsed and dried to remove surface soiling. The solution shall then be applied and cured according to the supplier's instructions.

   Fully cured and treated items shall be rewashed, rinsed, and dried again just before coating. Items not coated within 100 days of treatment shall be abrasive blasted in conformance with subsection (d) 3.

3. *Abrasive Blasting.* This treatment may be used on galvanized items of any age if beveling requirements as listed in the third and fourth paragraphs of subsection (a) have been met.

   The Contractor shall notify the Engineer in writing at least five working days before blasting begins. Zinc thickness shall be measured and recorded immediately after blasting and provided to the Engineer within 48 hours of blasting. Thickness limits and measurement frequency shall comply with the original applicable ASTM specification. Blast operations shall reasonably conform to ASTM Standard Practice D-6386, Subsection 5.4.1 except for small areas falling below required zinc thickness. These areas shall be repaired in accordance with subsection (c). No single area shall exceed 2 inches at its largest width or 12 inches at its longest dimension. The total repair area shall not exceed 1 percent of the coatable surface of the item; if limits are exceeded or zinc thickness is below the specification requirement, the item shall be re-galvanized in conformance with the original specification.

   The Contractor shall measure and record the size, location and repair method used for all repairs. This information shall be included on the report of thickness measurements.

The first epoxy coat shall be applied within 24 hours of abrasive blasting. Items shall be cleaned free of blast debris before coating. Compressed air used to clean items shall be free of oil, residue, oil and other harmful contaminants.

Thickness measurement is not required after surface preparation work has been completed.

(e) *Coating and Paint Systems.* Prepared items shall be coated with a two or three coat system described in this subsection. Alternative coating systems shall be pre-approved in writing by the Engineer. Manufacturer's PTDS for each coating type shall state test values for ASTM requirements of this subsection. Prior to product use the coating supplier shall provide the PTDS and certify to the Engineer in writing that all furnished coating materials meet applicable requirements of this subsection.

Faying surfaces shall not be painted unless written approval is given by the Engineer. All shop fabrication, including welds and attachments, shall be completed prior to coating unless otherwise specified in the Contract or directed in writing by the Engineer.

Inorganic zinc coatings shall not be used. Combined DFT of all coats applied over the galvanizing shall range from 6.5 to 10 mils with a topcoat DFT of 3 mils minimum. Dried color of the base coat and topcoat shall be visually contrasting. Finished color shall not vary more than 4 ΔE^*_{ab} units from the specified color determined in accordance with ASTM D 2244.

Volatile Organic Compound (VOC) levels shall not exceed 3.5 pounds per gallon for each applied coat. Dry films shall contain less than 1 percent lead and other toxic heavy metals. The zinc concentration of each epoxy coat shall not exceed 40 percent. Top coats shall have a semi-gloss value of 50-75.

All coatings shall be able to withstand temperatures up to 180° F without sag, blister, or peel damage. Topcoat formulation shall provide weathering, chemical, and ultraviolet (UV) resistance. All coatings shall meet the following ASTM requirements as amended:

(1) Corrosion Weathering. ASTM D-5894, minimum 6-cycles of exposure:
Corrosion rating of 8 or higher according to ASTM D-1654.
Blistering rating of 8 or higher according to ASTM D-714.

(2) Impact Resistance. ASTM D-2794, 30 day test:
Epoxies – Minimum 40 inch-pounds
All Topcoats – Minimum 90 inch-pounds

(3) Adhesion Testing. ASTM D-4541, 30 day test, Minimum 500 psi for either: Method B - flat surface or Method E - curved surface.

(4) Abrasion Resistance. ASTM D-4060, 30 day test: Maximum 90 mg loss after 1000 cycles with a CS10 or CS17 wheel.

(5) Flexibility. ASTM D-522, 30 day test - Method B: Epoxies shall pass a 180 degree bend over a ¾ inch mandrel. All Topcoats shall pass a 180 degree bend over a 3/8 inch mandrel.

Each coat shall be applied uniformly to provide an appearance free of laps, streaks, sags, drips, pinholes, and other discontinuities; all such defects shall be repaired prior to product shipment.

The Contractor's coater shall measure the DFT of each applied coat according to SSPC, Guide PA-2, except that measurements shall be taken with a calibrated Type 2 fixed probe gauge. Thickness records shall be provided to the Engineer prior to project shipment. The following two coating systems do not require pre-approval:

1. Powder Coating. The Contractor's coater shall oven preheat the articles to abate out-gassing potential. The Contractor's coater shall use compatible materials and coating processes to obtain proper coat to coat adhesion.

   The epoxy powder base coat shall measure 2 to 6 mils DFT and be applied by electrostatic or airstatic spray. The powder formulation shall be a non-hybrid epoxy of anti-gassing grade.

   The powder topcoat shall be electrostatic or airstatic spray applied and measure 3 to 6 mils DFT. The powder formulation shall be a non-acrylic, high-build, aliphatic-based, enhanced polyester or urethane polyester of anti-gassing grade.

2. Liquid Coating. The Contractor's coater shall apply coats by conventional or airless spray according to the supplier's guidelines. Minimal striping at difficult work areas is permissible. The Contractor's Coater shall use proper work methods and compatible materials to obtain proper coat adhesion. Thinning of paints shall be done according to the manufacturer's instructions so that thinned products conform to the solids content and VOC limits of this subsection.

   The epoxy base coat shall measure 2 to 6 mils DFT. Paint shall be a low-blush epoxy polyamide, or a low-blush cycloaliphatic bisphenol-A polyamine. Minimum solids by weight of all epoxies used shall be 68 percent.

   The topcoat shall measure 3 to 6 mils DFT. Paint shall be an aliphatic-based urethane polyester or aliphatic-based polyurea urethane. Specially formulated aliphatic-based polyaspartic polyureas may also be used over compatible epoxy bases.

(f) *Repair of Coated Products.* The Contractor shall repair damage from shipment, installation, field welding, or other activity during the construction. Damage shall be reported to the Engineer prior to repair. Repairs shall be as directed by the Engineer.

Significant repair procedures require written submittal of a proposed repair process from the Contractor. The Engineer shall approve the proposal in writing before repairs begin. Significant repairs are classified as:

(1) Any damaged area to the base coat material over 1 square inch
(2) Total repair areas exceeding 5 percent of the coating per item
(3) Any single topcoat repair area over 64 square inches

Minor and touchup repair of topcoats shall be done as follows:

A UV rated, aliphatic-based liquid topcoat paint shall be used. The paint shall be compatible with the existing topcoat material and closely match existing color. The paint shall meet the requirements of subsection (e). The paint supplier shall provide the Engineer with PTDS for the products used.

Single areas smaller than 8 square inches requiring repair shall be scuffed with 220 grit sandpaper or equivalent scuff material. Larger areas up to 64 square inches may be cleaned according to SSPC, Method SP-2. All border areas at the undamaged topcoat shall be scuffed with 220 grit material.

Cleaned, scuffed areas shall be bordered and coated by airless or conventional spray. Work areas shall be adequately shielded to contain errant spray. Fresh repair areas shall be protected as necessary during the initial cure. Repair thickness shall reasonably match the adjacent coating.

The repair coat shall provide an appearance free of sags, runs, streaks, drips, pinholes, or other discontinuities. Spray can paint repair shall not be used**.**

(g) *Conditions for Final Acceptance of Coating.* Within six weeks immediately prior to final project acceptance, the Engineer and a representative of CDOT's Staff Bridge Branch will conduct a final inspection of the coating. The Contractor's Superintendent shall also attend the inspection. Before final project acceptance, the Contractor shall repair the following defects found during the inspection:

a. Peeling on any portion of the coatings.
b. Blistering on any portion of the coatings.
c. Color fading below a 35 gloss rating, in accordance with ASTM D523.
d. Mottling defects that exceed 3 percent of the topcoat surface.
e. Visible cracking of the topcoat material.
f. Visible rusting discoloration on the coating.
g. Sag or other evidence of coating adhesion loss.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Duplex Coating System will not be measured and paid for separately, but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 603
CULVERTS AND SEWERS

Section 603 of the Standard Specifications is hereby revised for this project as follows:

Subsections 603.03 through 603.11 shall be replaced with the City and County of Denver (CCD), Department of Public Works document titled "Storm Drainage and Sanitary Sewer Construction Detail and Technical Specifications" where construction of culverts and sewers is by open trench construction methods. This document can be found at the following web address: http://www.denvergov.org/WMDDesign. Delete reference to measurement and payment.

Where trenching shoring is required on Federal Blvd and the side street, the Contractor shall ensure that the shoring method and design will support all adjacent traffic loads on Federal Blvd or the side street.

Section 5.0.2.5 of the CCD document titled, "Method of Backfill" is hereby revised to include the following: All backfill within the roadway section shall be method B.

Subsection 603.12 shall include the following:

Pay Item	**Pay Unit**
15 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
18 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
24 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
30 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
36 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
42 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
54 Inch Reinforced Concrete Pipe (Complete in Place)	Linear Foot
30x19 inch Reinforced Concrete Pipe Elliptical (Complete in Place)	Linear Foot
34x22 inch Reinforced Concrete Pipe Elliptical (Complete in Place)	Linear Foot
45x29 inch Reinforced Concrete Pipe Elliptical (Complete in Place)	Linear Foot

Structure excavation and structure backfill for Reinforced Concrete Pipe (Complete in Place) will not be measured and paid for separately, but shall be included in the work. Connecting bands for pipe will note be measured or paid for separately but shall be include in the cost of the pipe.

END OF SECTION REVISION

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EVISION OF SECTION 603
CULVERTS AND SEWERS (Tunneling)

Subsections 603.01 through 603.12 shall be replaced with the following where construction of culverts and sewers is by tunneling.

DESCRIPTION

603.01 This work includes construction via tunneling, jacking, and/or boring as shown on the plans. The work includes: excavation of the tunnel; installation of the pipe; contact grouting around the pipe after tunneling; installation and monitoring of geotechnical instrumentation, and disposal of excavated soils. Work shall be in accordance with these specifications and in conformity with the lines and grades shown on the plans. Environmental health and safety management requirements apply to this work, and are addressed under Section 250 and the Material Management Plan.

MATERIALS

603.02 Materials shall meet the requirements shown on the plans, in the following subsections, or as defined below.

Reinforced Concrete Pipe (Jacked): Per subsection 706.02.

Tunnel Shield or Tunnel Boring Machine (TBM): The tunnel shield or TBM shall be designed to sustain ground loads which may be imposed upon it as well as any loads imposed by the thrust jacks, steering mechanisms, and other appurtenances. Tunnel excavation equipment shall be capable of maintaining a stable face in all expected ground conditions. The tunnel shield or TBM shall be steerable and capable of being controlled to the designed line and grade indicated on the plans within the tolerances specified herein. Equip the tunnel shield or TBM with a laser control system to permit continuous and accurate monitoring of line and grade. The tunnel shield or TBM shall have suitable breasting tables, a closeable cutter wheel with flood doors, or such other appropriate provisions, as necessary, to support the tunnel face and minimize loss of ground. Mechanical or hydraulic excavators shall not interfere with breasting system or face support provisions. Excavator shall be capable of operation when fully retracted within the tunnel shield. The tunnel shield or TBM shall have a propulsion system capable of moving the shield or machine forward while maintaining the construction tolerances with respect to line and grade. The propulsion system shall include a thrust ring or other provision that will distribute the jacking forces uniformly against the jacking pipe so the shield or machine can be advanced without damaging or distorting the pipe.

Surface Monitoring Point: A Surface Monitoring Point is a stable non-destructive pin, nail, point or other identifiable element with the locations clearly identified where the ground surface consists of sidewalk, curb, paved surface, or other structure. Where the ground surface consists of soil or vegetation, the Surface Monitoring Point shall consist of a minimum 1-foot long rebar anchor driven flush with the ground; the anchor shall be grouted in place. Each Surface Monitoring Point shall have a tag or marking indicating the identification number, tunnel station, and offset from tunnel centerline. The Surface Monitoring Points determine vertical and/or horizontal displacements that may occur during construction.

Surface Monitoring Point Array: A Surface Monitoring Point Array is a grouping or arrangement of five Surface Monitoring Points placed at 5-foot center-to-center spacing along the proposed tunnel alignment to determine vertical and/or horizontal displacements that may occur during construction.

Utility Monitoring Point: A Utility Monitoring Point is a steel rod embedded in a stiff grout placed onto the existing utility; either an epoxy grout or a cement based grout may be used. The exposed surface of the utility pipe to be monitored shall be cleaned by high pressure air to ensure that the steel rod rests firmly on the utility pipe prior to grouting. A portion of the steel rod is encased to allow the rod to move freely. The Utility Monitoring Points shall be protected by a roadway box. Each Utility Monitoring Point shall include:

- A steel pipe flange, one-inch diameter, ASTM A 403, machined to fit within 3-1/2 in. extra strong steel sleeve.
- A 3-1/2 in extra strong steel sleeve pipe, threaded and coupled, ASTM A 53, Grade B.
- A 1 in. extra strong steel riser pipe, threaded and coupled, ASTM A 53, Grade B.
- PVC centralizers. Centralizers shall consist of a Schedule 40 PVC pipe conforming to ASTM D 1785, sized to provide a tight fit on the riser pipe, and spring-formed to a larger diameter to provide a loose fit in the sleeve pipe.
- A 18 in. x 18 in. x ¼-in. steel plate with 4-¼ in. diameter central hole.
- A steel pipe clamp to fit 3-½-in. extra strong steel pipe. Steel plate and pipe clamp assembly shall be capable of transferring the total weight of the 3 ½-in. extra strong pipe to the soil underlying the steel plate. The assembly shall also be capable of maintaining its position on the 1 in. extra strong steel pipe over time.
- Oakum.
- A 1 in. pipe cap with ¼ in. diameter round head stainless steel bolt set securely in cap.

Contact Grout: A stable colloidal suspension of cement, bentonite, water, fluidifier, and admixtures. Sand may be added, provided the grout is demonstrated to have suitable flow characteristics and to adequately fill the annular space between the pipe and the ground. The grout mix shall be the responsibility of the Contractor. The Contractor shall adjust the water-solids ratio of the grout as necessary to grout effectively and fill all voids within the zone of grout influence; however, at all times the grout shall have a water-solids ratio of between 1:1 and 3:1 by volume, and a bentonite content of no more than two percent. No grout hole shall be completed with a water-solids ratio above 1:1 by weight.

Preconstruction Submittals. The Contractor shall submit the following shop drawings and plans a minimum of 8 weeks prior to mobilization of tunneling equipment:

A detailed work plan including descriptions of methods and equipment to be utilized in completing the work, schedule for tunnel construction, and details of proposed tunnel construction procedures.

A detailed scale drawing showing tunnel layout, pit locations and dimensions, equipment, and staging areas.

A description and drawings of proposed methods and procedures for excavating the tunnel, including details for tunnel shield or TBM, breasting capabilities, method of controlling line and grade of the tunnel, method of measuring excavation quantities versus forward progress during tunneling, and steering provisions for making line-and-grade corrections. Include details of provisions for supporting the face of the tunnel when tunneling operations are interrupted.

Contact grouting plan and procedures including: description of the grout system and grout equipment including grout pumps, mixers, delivery systems, and monitoring systems; number and spacing of grout holes; procedures for monitoring grout placement and controlling pressures; sequence of construction; grout material and properties; grout mix design including fluidizers, accelerators, and other additives; grout material properties including density, viscosity, bleeding, shrinkage, expansion, and set time.

Work plan and shop drawings showing: jacking frame and thrust block design, layout, and details, including reaction transfer calculations. The thrust block backstop shall be normal (square) with the proposed pipe alignment and shall be designed to withstand the maximum jacking pressure to be used with a factor of safety of at least two, without excessive deflection or displacement as determined by the City's Engineer.

Design calculations demonstrating that the pipe is capable of sustaining the maximum stresses to be imposed during jacking with a factor of safety of at least two. The calculations shall take into account: ground loads; live loads and surcharge loads from equipment; traffic loads; and jacking forces. Calculations to be performed by a professional engineer registered in the State of Colorado.

Settlement control plan including: locations of Surface Monitoring Points and Arrays and Utility Monitoring Points; equipment and materials to be used; and installation procedures.

Construction Submittals. The Contractor shall submit the following during construction:

Installation Records. Within five days of installation of each instrument, submit drawings showing the installed location, identification number, instrument type, installation date and time, initial elevations, and offset and stationing.

Written Daily Logs. The Daily Logs shall be recorded for each shift and shall be submitted to the City's Engineer within one working day of excavation at each location. As a minimum, the logs shall include:

- The station of the face of the excavation and advance distance;
- Length of pipe installed
- The date, starting time, and finish time;
- Any unusual conditions, breakdowns, and delays;
- Excavated soil quantity;
- An accounting of volume of spoil in relation to the lineal foot advancement of the tunneling head
- Contact grouting performed;
- Results of pipe joint pressure testing: and
- Results of settlement monitoring.

REVISION OF SECTION 603
CULVERTS AND SEWERS (Tunneling)

CONSTRUCTION REQUIREMENTS

603.03 General Tunneling Requirements. The Contractor shall conduct all operations such that trucks and other construction equipment and vehicles do not create a dust nuisance in the streets and adjacent properties. All work shall be done so as not to disturb roadways, adjacent structures, landscaped areas, or utilities other than as shown on the plans. Any damage shall be immediately repaired to the satisfaction of the property owner, residents, agency or utility having jurisdiction, and the City at no additional cost to the City.

No gasoline-powered equipment shall be permitted. Diesel, electrical, hydraulic, and air powered equipment is acceptable, subject to applicable City, State, and Federal regulations.

There will be no classification for excavated materials and the term "excavation" shall include all materials excavated or removed from the tunnel, regardless of the type, character, composition or condition of the material so excavated.

All soil and other materials removed during tunnel excavation shall be transported and disposed of by the Contractor at the Denver Arapahoe Disposal Site, in accordance with the MMP.

The tunnel shall be excavated to the lines, grades and dimensions indicated on the plans. The tunnel excavation shall begin at the downstream end of the tunnel unless otherwise approved.

Methods of construction for the tunnel shall ensure the safety of the work, the Contractor's employees, the public, and adjacent property, whether public or private. Perform all work in accordance with all current applicable permit conditions, regulations, and codes of federal, state, and local agencies. Comply with all applicable provisions of 29 CFR Part 1926, Subpart S, and Underground Construction by OSHA.

603.04 Commencement of Work. The Contractor shall not begin tunneling until:

1. Required submittals have been reviewed and returned by the Engineer.
2. A pre-construction meeting with the Engineer, City's Engineer, City's Project Management Team, and Contractor has been conducted. The Contractor shall arrange this meeting and inform the City of the time and place of the conference at least two weeks in advance.
3. Pit excavation and shoring have been satisfactorily completed in accordance with Section 206.
4. All instrumentation has been installed and one initial measurement has been obtained.

REVISION OF SECTION 603
CULVERTS AND SEWERS (Tunneling)

603.05 Tunnel Construction. Tunnel excavation shall be performed in a manner that will minimize movement of the ground in front of and surrounding the tunnel, and to minimize loss of ground, surface settlement, heave of the ground surface and movement of utilities and structures above and adjacent to the tunnel. The Contractor shall ensure that movement (settlement or heave) at the ground surface does not exceed 0.25-inch, unless noted otherwise in the Construction Documents.

Support the ground continuously and in a manner that will prevent loss of ground and maintain the stability of the tunnel perimeter and face. Support the tunnel face by positive means during all shut down periods.

Maintain clean working conditions at all times inside the tunnel, and remove all excavated soil (muck), grout spills, and any other material not required for tunneling. All construction debris shall be removed from the site and disposed of daily by the Contractor at the disposal site designated elsewhere in the Construction Documents.

Provide all temporary electrical, water, telephone, and other facilities required to complete the tunnel.

Provide access for Engineer, City's Engineer and City's Project Management Team to inspect and observe the work or to perform independent line and grade surveys.

Perform tunneling work in accordance with the working hours established for the project. In case of emergency or work stoppages likely to endanger the stability of the excavation or adjacent structures, maintain a full work force 24 hours per day, including weekends and holidays, until emergency or hazardous conditions no longer jeopardize stability and safety of the work.

603.06 Tunnel Line and Grade. The longitudinal centerline of the tunnel shall be sufficiently true and accurate to the tunnel profile grade line to stay within the following tolerances during and upon completion of tunneling: invert of the pipe shall be within 1.5 inches horizontally and 1 inch vertically of the plan line and grade. Survey the pipe invert upon every advancement of the pipe to ensure the elevation and alignment is within the tolerances specified above.

Pipe installation shall be invert elevation controlled and reverse grades are prohibited. Deviations from the design tunnel invert shall not exceed the tolerances specified above at any point during construction and corrections shall not exceed a rate of 3 inches per 100 feet or a lesser rate as determined by the structural characteristics of the pipe.

If the Contractor is unable to maintain these tolerances, he shall bear the full responsibility and expense for correction (redesign, easement acquisition, retunneling, etc.). If design tolerances are exceeded and redesign is required, the Contractor shall obtain the services of a professional engineers registered in the State of Colorado for the redesign. Plans showing the changes shall be submitted to the Engineer for review and approval.

603.07 Pipe Jacking. Immediately before joining pipe, the end of the pipe shall be thoroughly cleaned and lubricated with an approved lubricant. The axial forces from the thrust jacks shall be distributed to the pipe uniformly to prevent damage to the ends of the pipe, using pipe cushioning in accordance with approved submittals.

If any part or parts of the pipe becomes unserviceable because the pipe is chipped, gouged, or otherwise damaged before or during installation, it shall be rejected and removed from the site. The City's Construction Project Manager shall make the final determination on rejection and removal of the pipe.

After pipe installation is completed, individual joints shall be pressure tested with a portable hydrostatic tester to 13 psi, in lieu of line infiltration, exfiltration, or air testing.

603.08 Contact Grouting. The annulus between casing pipe and the ground shall be grouted after pipe jacking is completed. Grouting shall be performed over the entire 360˚circumference of the tunnel. The number and location of grout holes in each pipe shall be determined by the Contractor but a minimum of six holes per 20-foot pipe section shall be used. Rings of grout holes shall be spaced at intervals of eight feet or less.

Grout shall consist of Portland cement and water or of Portland cement, sand, and water. Grout mixtures may contain bentonite or fly ash. The grout shall consist of 2 parts Portland cement, 1 part fly ash, and not to exceed 6 parts clean, dry, sand.

Contact grout shall be free of lumps when put into the mixer, and the grout mix shall be constantly agitated. Grout shall flow unimpeded and completely fill all voids. Perform the injection of grout continuously on any one pipe section. Fill spaces and voids until completed, so as to avoid disturbance of grout which has taken an initial set.

The grouting process shall be so operated and controlled that the grout will be delivered uniformly and steadily. If, during the grouting of any pipe, grout is found to flow from adjacent grout pipes, such pipes from which grout is flowing shall be closed with valves or plugged with wooden plugs. Where such closing is not essential, ungrouted pipes shall be left open to facilitate the escape of air and water from the space being grouted.

Grouting shall progress from grout pipe to grout pipe in accordance with approved submittals. In going from lower to higher grout pipes, do not make connections to the higher grout pipes until the grout has completely filled the space below the higher grout pipes. As the grouting proceeds, the escape of grout from the upper pipes in turn shall be permitted as an indication of successive satisfactory filling of voids with grout.

Contact grouting will be considered completed when no more grout of the required mix and consistency can be injected over a 10-minute interval at 100 percent of the maximum grouting pressure of 10 psi. After the grouting of any grout pipe is finished, the pressure shall be maintained by means of a stopcock or other device until the grout has set to the extent that it will be retained.

Protect and preserve the interior surfaces of the pipe from damage. Minimize grout drop and proceed with cleanup immediately after grouting. Any damage to the pipe caused by or occurring during the grouting operations shall be repaired. The interior lining of the pipe shall be smooth and free from defects.

Maintain and submit records of grouting operations for each shift, including the location and a detailed log of each grout hole, time of each change of grouting operations, pressures, rates of pumping, grout mix, and grout take at each grout hole hook-up.

After grouting, holes shall be filled with dry packed cement mortar grout. Threaded plugs shall be installed flush with the inside face and the remaining void shall be filled with a non-shrink grout rated to 4000 psi.

REVISION OF SECTION 603
CULVERTS AND SEWERS (Tunneling)

603.09 Installation of Instrumentation. The Contractor shall install instrumentation at the locations shown on approved shop drawings. Instruments shall be installed in accordance with the approved installation schedule. All instruments shall be clearly marked, labeled, and protected to avoid being obstructed or otherwise damaged by construction operations, vehicular traffic on Federal Boulevard, or the general public.

Locate conduits and underground utilities in all areas where subsurface geotechnical instrumentation is to be drilled and installed. Subsurface geotechnical instrumentation locations shall be modified, as approved by the City's Construction Engineer, to avoid interference with existing conduits, utilities, and foundation elements. Repair damage to existing utilities resulting from instrument installations at no additional cost to the City.

Surface Monitoring Points shall be placed along each side of each pit, a distance of 5 feet and 10 feet from the pit wall; a minimum of 6 points per pit shall be installed.

Surface Monitoring Points Arrays shall be installed over the centerline of the tunnel to determine the lateral and longitudinal extent of ground movement. One array shall be installed along the tunnel in a northbound lane of Federal Boulevard and one array shall be installed along the tunnel in a southbound lane of Federal Boulevard, as allowable based on surface features. The arrays shall be centered across the tunnel.

Utility Monitoring Points shall be installed on the 12-inch I.D. PVC sanitary sewer, the 24-inch I.D. steel water line, the 8-inch I.D cast iron water line and the 36-inch I.D. concrete water line overlying the tunnel. The points shall be installed on each utility where it crosses over the centerline of the tunnel.

Immediately following installation, the location of the top of all instruments shall be surveyed to provide horizontal and vertical coordinates. Data shall be provided to the City's Engineer in accordance with the submittal requirements specified herein. Re-surveying from control points shall be required monthly or more frequently to address potential disturbance or resolve conflicting data.

603.10 Instrumentation and Monitoring Reporting. The Contractor shall take initial readings of all instruments to establish a baseline and provide the City's Engineer with this data, in accordance with the requirements specified herein. The Contractor will read required instrumentation and provide the City's Engineer with these data. Instruments within 50 feet of the working face of the tunnel shall be surveyed daily.

The Contractor will provide data from readings of all instruments to the City's Engineer within one working day of obtaining the information. The data shall include a copy of the data sheets containing a cumulative history of readings, including weather conditions, temperature, and proximity of the excavation to the instrument location itself, at the time of each reading.

Threshold response values for instruments shall be 0.25-inch (vertical). When the threshold response value is reached, the Contractor shall meet with the City's Engineer to discuss his/her means and method to determine what changes, if any, shall be made to better control movement. The shutdown response values shall be 0.5-inch (vertical). When a shutdown response value is reached, the Contractor shall stop all work immediately. The Contractor shall meet with the City's Engineer, and the City's Project Management Team to develop a plan of action before work can be resumed.

Remove all instruments during the cleanup and restoration work or as required by the City's Engineer.

METHOD OF MEASUREMENT

603.11 Jacked pipe will be measured by the linear foot complete in place and accepted. Tunnel excavation, pipe, grout materials, grouting, connecting bands and instrument procurement, installation, monitoring, reporting and removal will not be measured and paid for separately but shall be included in the cost of 54-inch Reinforced Concrete Pipe (Jacked). Shoring for the jacking and receiving pits will be paid for separately.

BASIS OF PAYMENT

603.12 Payment will be made under:

Pay Item	**Pay Unit**
54-inch Reinforced Concrete Pipe (Jacked)	Linear Foot

END OF SECTION REVISION

REVISION OF SECTION 604
MANHOLES, INLETS AND METER VAULTS

Section 604 of the Standard Specifications is hereby revised for this project as follows:

Subsections 604.02 through 604.06 shall be replaced with the City and County of Denver (CCD), Department of Public Works document titled "Storm Drainage and Sanitary Sewer Construction Detail and Technical Specifications". This document can be found at the following web address: http://www.denvergov.org/WMDDesign. Delete all references in this document to measurement and payment and item numbers referencing CCD's Standard Construction Specifications.

Subsection 11.0.2 of the CCD Storm Drainage and Sanitary Sewer Construction Detail and Technical Specifications **is hereby revised to include the following:**

For all connections of proposed manholes to existing brick storm sewers, contractor shall be responsible for verifying that manhole sizes are adequate to accommodate the existing brick storm sewer outside diameter.

Junction (Inlet Connection into Sewer Main) shall include all labor, materials and appurtenances required for the work, including concrete, reinforcing steel, cutting of pipes, non-shrink grout, bedding and backfill as shown in the City and County of Denver, Department of Public Works, Wastewater Management Division, Standard Details 2010, Drawing No. S-450.

For connection to existing manholes (Modify Manhole) pipe openings shall be core drilled to accommodate new pipe. Rubber gaskets shall be furnished and installed on the pipe at the position indicated in manufacturer's instructions, then the opening around gasket shall be grouted to a watertight seal. Inside drops shall have all piping installed so as to discharge as close to existing line as possible. Existing manhole grouted inverts, flow lines, aprons, etc. shall be chipped out and re-grouted to accommodate new pipe.

Grout holes or damage in wall opening with Master Builders MASTERFLOW 713, SONOGROUT, or equal, non-shrink grout mixed to a damp packing or ramming consistency. Temporary backing or forming may be required for ramming the grout material in place around the pipe.

Prior to placing grout, coat entire perimeter contact surface of the pipe hole with Sika Chemical Company SIKADUR HI-MOD, SONOBOND, or equal, moisture insensitive epoxy bonding compound. (Bonding compound eliminates moisture loss from fresh grout. No presoak is required). The epoxy-bonding compound must be tacky at the time grout is placed against it. Brushing over the original coating can restore tackiness.

Grout ring installation, mixing and placing grout and mixing and placing epoxy-bonding compounds shall all be accomplished in accordance with the respective manufacturer's instructions.

REVISION OF SECTION 604
MANHOLES, INLETS AND METER VAULTS

Subsection 604.07 shall include the following:

Payment will be made under:

Pay Item	Pay Unit
Inlet No 14 L12 (5 Foot)	Each
Inlet No 14 L12 (10 Foot)	Each
Inlet No 14 L15 (10 Foot)	Each
Inlet No 14 L15 (15 Foot)	Each
Inlet No 16 L3'-4" Valley (5 Foot)	Each
Manhole Standard (4' ID) (5 Foot)	Each
Manhole Standard (4' ID) (10 Foot)	Each
Manhole Standard (5' ID) (5 Foot)	Each
Manhole Standard (5' ID) (10 Foot)	Each
Manhole Standard (6' ID) (5 Foot)	Each
Manhole Standard (6' ID) (15 Foot)	Each
Manhole Standard Type B (15 Foot)	Each
Manhole Standard Type B (Special) (10 Foot)	Each
Manhole Standard Type B (Special) (15 Foot)	Each
Manhole Standard Type P (20 Foot)	Each

Structure Excavation and Structure Backfill will not be measured separately but shall be included in the work.

Payment for Junction Each shall be full compensation for all work and materials required to complete the item including all labor, materials and appurtenances required for the work, including concrete, reinforcing steel, cutting of pipes, non-shrink grout, bedding and backfill as shown in the City and County of Denver, Department of Public Works, Wastewater Management Division, Standard Details 2010, Drawing No. S-450.

Pay Items above shall conform to the latest version of the City and County of Denver, Department of Public Works, Wastewater Management Division, Standard Details 2010. This document can be found at the following web address: http://www.denvergov.org/WMDDesign.

A resting platform is required for any manholes or other structures that are over 20 feet deep. Resting platforms will not be measured separately but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 607
FENCE (TEMPORARY)

Section 607 of the Standard Specifications is hereby revised for this project as follows:

Subsection 607.01 shall include the following:

This work shall include installing and removing temporary fence as needed to secure properties with existing fences during periods when existing fence is being reset or removed either by the Contractor or the adjacent property owner. Temporary fence shall be chain link (72" high) or other material approved by the City. Resetting the temporary fence multiple times is anticipated.

Subsection 607.04 and 607.05 shall include the following:

Temporary fence will be measured by the linear foot. The temporary fence is expected to be reset on the site multiple times as determined by the Contractor's construction phasing. The quantity of temporary fence to be measured and paid for shall be the longest length of temporary fence used at any one time. Resetting of the fence shall not be paid for separately. Payment for temporary fence shall be full compensation for furnishing, erecting, maintaining, resetting, removing and disposing of all materials required.

END OF SECTION REVISION

REVISION OF SECTION 607
FENCE

Section 607 of the Standard Specifications is hereby revised for this project as follows:

Subsection 607.01 shall include the following:

This work shall include installing rolling gates as called for in the plans.

Subsection 607.05 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
24 Foot Gate Double (Chain Link) (Rolling)	Each
30 Foot Gate Double (Chain Link) (Rolling)	Each
36 Foot Gate Double (Chain Link) (Rolling)	Each

Gates shall be measured by the complete unit of the size and type specified. Gates shall be of the same type and height as the adjacent fence.

END OF SECTION REVISION

REVISION OF SECTION 608
SIDEWALKS, CONCRETE CURB RAMPS, AND DRIVEWAYS

Section 608 of the Standard Specifications is hereby revised for this project as follows:

Subsection 608.01 shall include the following:

This work consists of the construction of concrete sidewalks, curb ramps, and sidewalk drains in accordance with these specifications and in conformity with the lines and grades shown on the plans or established.

Concrete Curb Ramp construction shall conform to the requirements of the City and County of Denver's Standard Details for Curb Ramps.

Concrete Driveway construction shall conform to the requirements of the City and County of Denver's Standard Detail for Standard Commercial Driveway.

Concrete Ramps and Stairs and Concrete Thrust Walls shall be in accordance with the details included in the plans.

Subsection 608.02 shall be deleted in its entirety and replaced with the following:

Materials for Concrete Sidewalk, Concrete Driveway, Curb Ramp, and Sidewalk Chase Drain shall meet the requirements specified in the following subsections:

Concrete, Class P	601.02
Joint Fillers	705.01
Joint Sealants	705.01
Structural Steel Plate	510
Fiber Mesh. Buckeye UltraFiber	500

Or approved equal.

Concrete for sidewalks, curb ramps, and driveways shall be Class "P", as specified in subsections 601.02 and 601.03, except that No. 67 coarse aggregate shall be used.

Concrete shall be cured with a non-pigmented "clear" curing compound.

All concrete used for sidewalks, curb ramps, and driveways shall be reinforced with polypropylene fibers. Polypropylene fibers shall meet requirements of ASTM C1116, Type III. Length of fibers shall be as recommended by the manufacturer. Add 1.5 pounds polypropylene fibers per cubic yard of concrete or as recommended by the manufacture.

Subsection 608.03 (a) shall be revised to include the following:

Excavation. Where excavation to the finished grade elevation results in sub grade of unsuitable soil, the project manager may designate the unsuitable material to be removed and replaced with approved material.

REVISION OF SECTION 608
SIDEWALKS, CONCRETE CURB RAMPS, AND DRIVEWAYS

Removal of unsuitable material shall be paid for as Muck Excavation in accordance with Revision of Section 203.05(c), and backfilled with Aggregate Base Course (Class 6), or other material approved by the Project Manager.

Contractor shall provide a Jointing Layout Plan for review with the Project Manager and Landscape Architect two weeks prior to concrete installation. Joints have typically been called out on drawings and should be used as a starting point for this Jointing Layout Plan. Additional jointing will be necessary for Best Practices of concrete installation and unforeseen field conditions. Contractor shall accommodate this as necessary

Subsection 608.03(c) shall be revised to include the following:

The Contractor shall ensure that new concrete items built under this contract drain properly and, as such, there are no areas of standing water on new concrete items.

Subsection 608.03(d) shall be revised to include the following:

Finishing shall occur only after the disappearance of bleed water. The addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted. Sprinkling of pigment onto the fresh surface will not be permitted.

Sandblast Finish: Apply abrasive-blasted finish to accent areas of exterior concrete slabs as shown on the landscape plans.

A. Mock-Up: A 10'x10' concrete panel shall be provided at a location designated by the Project Manager. The mock-up shall have decorative score joints in a pattern consistent with the drawings and illustrate three intensities of sandblast finish for review and approval by the Project Manager and Landscape Architect.

B. Surface Continuity: Perform abrasive blast finishing in a continuous operation as possible, utilizing the same work crew to maintain continuity of finish on each surface or area of work.

C. Depth of Cut: Use an abrasive grit of the proper type and gradation as required to expose the aggregate and surrounding matrix surfaces to match the approved sample, as follows:

    a. Light cut- approximately 0.063" depth reveal to expose fine aggregate and occasional coarse aggregate.

D. Abrasive Blasting: Abrasive blast corners and edge of patterns carefully, using back-up boards, to maintain a uniform corner or edge line. Determine the type of nozzle, nozzle pressure, and blasting techniques required to match the approved sample.

    a. Use water in combination with abrasives as required to control dust. Comply with environmental controls of authorities having jurisdiction.

E. Acid Cleaning: After abrasive blasting to the required depth is completed, apply a weak acid wash to clean only the abrasive-blasted surfaces to match the Architect's sample. Thoroughly neutralize and flush acid from surfaces. Protect adjacent materials and finishes from acid wash.

F. The Contractor shall insure that new concrete items built under this contract drain properly and, as such, there are no areas of standing water on new concrete items.

G. The Contractor shall protect all new concrete items built under this contract against defacement, or other injury, from any cause. If said damage cannot be adequately repaired to the satisfaction of the Project Manager, the Contractor shall remove and replace the unacceptable items at Contractor's expense.

Under extreme adverse weather conditions, the use of colloidal silica (liquid silica fume) based finishing aids such as Lythic Day 1 or equal, diluted and used according to the manufacture recommendations may be allowed by the City. The Contractor notify and obtain approval from the City project manager prior to use. No additional payment will be may for use of colloidal silica but it shall be included in the cost of the associated concrete item.

Subsection 608.03 (d), third sentence, shall be revised as follows:

All outside edges of the slab shall be edged with a ¼ radius edging tool

Subsection 608.03 (e) shall be revised as follows:

Joints: Expansion joints, at intervals detailed in CCD Transportation Standards and Details, (Detail 11.1 at 100ft to 120ft) and as detailed and shown on plans and approved Jointing Layout Plan provided by the Contractor, shall be filled with 1/2-inch-thick full depth, preformed expansion joint filler. The sidewalk shall be divided into sections with sawn control joints. These control joints shall extend into the concrete for at least 1/3 of the depth and shall be approximately 3/16" inch wide. Control joints shall be spaced at intervals shown on drawings and as approved on the Jointing Layout Plan. Decorative joints shall be ¼" deep as indicated on drawings.

Additional joints not shown on drawings may be necessary to control cracking of unidentified or unforeseen streetscape elements, utility boxes, ramps, etc. Contractor shall score the concrete in means consistent with Best Practices to control cracking where necessary. Contractor to discuss these areas on a case-by-case basis with Landscape Architect prior to modifying joint layout as detailed in the drawings.

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REVISION OF SECTION 608
SIDEWALKS, CONCRETE CURB RAMPS, AND DRIVEWAYS

Subsection 608.03 (f) shall be revised to include the following:

The Contractor shall protect all new concrete items built under this Contract against defacement, or other injury, from any cause. If said damage cannot be adequately repaired to the satisfaction of the Engineer, the Contractor shall remove and replace the unacceptable items at Contractor's expense. The Contractor shall cure in accordance with 412.14.

Subsection 608.05 shall include the following:

Concrete Curb Ramp, Concrete Sidewalk, and Concrete Curb Ramp will be measured by the square yard of finished surface completed and accepted. Truncated domes for ramps will not be measured or paid for separately but shall be included in the cost of the item Concrete Curb Ramp.

Concrete Sidewalk (4 Inch) (Patterned) will be measured by the square foot or finished surface completed and accepted.

Subsection 608.06 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Concrete Curb Ramp	Square Yard
Concrete Sidewalk	Square Yard
Concrete Sidewalk (Special)	Square Yard
Concrete Sidewalk (6 Inch Patterned Concrete)	Square Foot
Concrete Sidewalk (8 Inch) (Special)	Square Yard
Concrete Sidewalk (Amenity Zone)	Square Yard
Concrete Sidewalk (Stairs)	Square Foot

All work necessary and incidental to the construction of Concrete Sidewalk and Curb Ramp, including bed course material, will not be measured and paid for separately but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 608
SIDEWALK CHASE DRAIN

Section 608 of the Standard Specifications is hereby revised for this project as follows:

Subsection 608.01 shall include the following:

Sidewalk Chase Drain construction shall conform to the requirements of the City and County of Denver's Standard Details for Sidewalk Chase Drains (Detail 9.0). Width shall be as noted on the plans.

Subsection 608.02 shall include the following:

Materials for Sidewalk Drain shall meet the requirements specified in the following subsections:

Concrete, Class B	601.02
Steel Cover Plate	509.03
Bed Course Material	703.07

Subsection 608.05 shall include the following:

Sidewalk Drain will be measured by the linear foot of trench drain completed and accepted.

Subsection 608.06 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Sidewalk Chase Drain	Linear Foot

All work necessary and incidental to the construction of Sidewalk Drain, including bed course material, cover plate and anchors will not be measured and paid for separately but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 609
CURB AND GUTTER

Section 609 of the Standard Specifications is hereby revised for this project as follows:

Subsection 609.01 shall include the following:

Concrete Curb and Gutter Type 2 (Section II-B) (Modified) shall be in accordance with the details included in the plans.

Subsection 609.02 shall be revised as follows:

In the first paragraph, reference to Section 703.07, Bed Course Material, shall be deleted.

Subsection 609.03(c) shall be revised to include the following:

The Contractor shall protect all new concrete items built under this Contract against defacement, or other injury, from any cause. If said damage cannot be adequately repaired to the satisfaction of the Engineer, the Contractor shall remove and replace the unacceptable items at Contractor's expense.

Subsection 609.03(d) shall be revised to include the following:

For construction of curb and gutter adjacent to existing concrete pavement, the joint pattern shall match that of the concrete pavement. The joint pattern shall be approved by the Engineer prior to construction.

Subsection 609.03 (f) shall be revised to include the following:

The Contractor shall cure in accordance with 412.14 as required.

Subsection 609.03(i) shall be revised to include the following:

The Contractor shall ensure that new concrete items built under this contract drain properly and, as such, there are no areas of standing water on new concrete items.

Subsection 609.06 shall include the following:

Transitions from Concrete Curb and Gutter Type 2 (Section II-B) (Special) back to the standard curb height will be measured as Concrete Curb and Gutter Type 2 (Section II-B).

REVISION OF SECTION 609
CURB AND GUTTER

Subsection 609.07 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Curb Type 2 (Section B)	Linear Foot
Concrete Curb and Gutter Type 2 (Section I-B)	Linear Foot
Concrete Curb and Gutter Type 2 (Section II-B)	Linear Foot
Concrete Curb and Gutter Type 2 (Section II-B) (Special)	Linear Foot
Concrete Curb and Gutter Type 2 (Section II-M)	Linear Foot
4 Inch Mountable Curb (Outfall)	Linear Foot
Gutter Type 2 (8 Foot)	Linear Foot
Curb Type 4 (Section B)	Linear Foot
Curb (Barrier)	Linear Foot

The 4 Inch Mountable Curb (Outfall) will be constructed as shown in the details in the plans.

END OF SECTION REVISION

REVISION OF SECTION 610
MEDIAN COVER MATERIAL

Subsection 610.01 shall be replaced with the following:

DESCIPTION

The work includes supplying and placing median cover material, both patterned and colored, in the median and in the sidewalk areas as indicated on the drawings.

Section 610.02 shall be replaced with the following:

MATERIALS

Concrete shall meet the requirements for Class P concrete as specified in PSP, Revision of Section 412, Portland Cement Concrete Pavement.

The base material under the concrete shall be Aggerate Base Course (Class 6) road base or approved equal.

Section 610.03 shall be replaced with the following:

CONSTRUCTION REQUIREMENTS

Median cover material shall be installed at a minimum depth of 6" or as indicated on the drawings.

Saw cut joints, tooled joints, or expansion joint shall be sized and located as indicated on the drawings. Median cover material shall be light broom finished perpendicular to the line of pedestrian traffic or as indicated on the drawings.

Class 6 road base shall be a minimum 6" depth and compacted to 95% density.

Section 610.04 shall be replaced with the following:

METHOD OF MEASUREMENT

Median cover material shall be calculated by measuring the square footage of the approved and accepted material in place.

Section 610.05 shall be replaced with the following:

BASIS OF PAYMENT

The accepted quantities measured as provided above shall be paid for at the contract unit price as it appears on the bid schedule.

Payment will be made under:

Pay Item	**Pay Unit**
Median Cover Material (Patterned Concrete)	Square Foot
Median Cover Material (Colored Concrete)	Square Foot

Base installation, forming, grading, compaction, jointing, finishing, coloring agent and protecting shall not be paid for separately but are incidentals to the work.

END OF SECTION REVISION

REVISION OF SECTION 613
ELECTRICAL CONDUIT (PLASTIC)

Section 613 of the Standard Specifications is hereby revised for this project as follows:

Add the following to subsection 613.07:

All conduit bends, including factory-installed bends, shall not have a bend radius less than six times the inside diameter of the conduit.

The excavations required for the installation of conduit or cable shall be performed in such a manner as to avoid unnecessary damage to streets, sidewalks, landscaping, sprinkler systems and other improvements. Trenches shall not be excavated wider than necessary for the installation of the electrical appurtenances. Excavation shall not be performed until immediately before installation of conduits. The material from the excavation shall be placed in a position not to cause damage or obstruction to vehicular or pedestrian traffic or interfere with surface drainage.

Trenches shall be made with a rock-wheel or other machine capable of cutting a narrow trench (4") so as to allow traffic to pass over prior to back filling. The machine shall be equipped with shields to direct the spoil downward and away from passing vehicles, workmen and pedestrians.

Off-street trenches shall be back-filled with the same material that was removed and shall be compacted and shaped to match the surrounding surface. On-street trenches within ALL roadway areas shall be back-filled with CDOT approved Structure Backfill (Flow-Fill) and capped with 6" of Hot Bituminous Pavement (Patching) in accordance with Section 403 and City and County of Denver Street Cut Regulations if applicable.

All surface materials including sprinkler systems, landscaping, shrubs, sod grass, and native growth vegetation which is disturbed by trenching and back-filling operation shall be restored in kind equal to or exceeding the original conditions.

All conduit runs that will not have a copper conductor installed shall have a #14 AWG stranded copper conductor placed inside for locating purposes. Locating conductor and tape will not be measured and paid separately, but shall be included in the unit price for conduit.

Conduit shall always enter a pull box, hand-hole, or any other type structure from the direction of the run only.

All conduit shall be fully compatible with fiber optic cable. Plastic conduit shall be Schedule 80 in the diameters shown on the plans and shall be compliant with Bellcore TW-NWT-000356 requirements. Each conduit shall be equipped with a pull rope or pull tape and each bore shall have a copper tracer wire of at least 14 gauge.

Each conduit shall be equipped with either a pull rope or pull tape, depending on the length of conduit between pull boxes.

Each conduit with a length greater than 400' between pull boxes, shall be equipped with a pull tape. The pull tape shall have a minimum tensile strength of 1250 lbs. and be of a design and manufacture that prevents cutting or burning into the conduit during cable installation.

REVISION OF SECTION 613
ELECTRICAL CONDUIT (PLASTIC)

Each conduit with a length of 400' or less between pull boxes shall be equipped with a pull rope or pull tape. The pull rope shall have a minimum tensile strength of 1250 lbs.

Plastic PVC conduit shall be certified by the manufacturer as meeting ANSI/UL 6 and 651. The manufacturer shall be ISO 9000 compliant.

If the contractor is unable to jack or bore the conduit at the lengths shown on the plans from pull box to pull box, all splice couplings and associated work to splice the conduit shall be included in the cost of this item. This shall include excavation down to the required depth of conduit at the splice location. Also included in the cost of this item is all landscape repairs, which will be required after excavation of conduit at all splice locations. All splice couplings shall be water and air tight and installed at a depth to match the remaining run of conduit. No elevation difference will be allowed. Splices shall be kept to a minimum and all locations shall be approved by the City. Additional pull boxes shall not be substituted for splices.

Conduit plugs for sealing conduit shall also be supplied and installed in all open conduit ends as soon as the conduit is installed. Plugs shall be durable, fabricated from no metallic parts, be of the split design to allow removal and reinstallation around in-place cables and be easily removable and reusable. Plugs shall be capable of being installed by hand without any tools and shall provide a water and air tight seal of at least 100 psi and shall cause no damage to the cable when installed.

At some locations (as illustrated on the Plans or in these specifications, or as directed by the Engineer), new conduits shall be installed in an existing pull box. At these locations, the Contractor shall carefully excavate around the pull box and install the new conduit in the pull box in a manner that meets the requirements of this Special Provision. The Contractor shall not damage the existing pull box. If the existing pull boxes or concrete collars are cracked or damaged during conduit installation, the Contractor shall be required to replace either or both conforming to the requirements of the contract at no additional cost.

Subsection 613.10 shall include the following:

Electrical Conduit will be measured by the linear feet of conduit and installed in accordance with these Special Provisions, the Project Standards or as directed by the City. Electrical Conduit will include groundwork, sweeps, pull cord, copper tracer wire, adapters, fittings, splice couplings, conduit plugs (for conduits both with and without fiber optic cable), equipment, labor, and all other items necessary to complete the work. For traffic signal installation and connection to fiber optic signal interconnect system, the cost of signal and electrical wire will not be measured separately and shall be included in the cost of the work.

Subsection 613.11 shall include the following:

Pay Item	**Pay Unit**
½ Inch Electrical Conduit (Plastic)	Linear Foot
2 Inch Electrical Conduit (Plastic)	Linear Foot
3 Inch Electrical Conduit (Plastic)	Linear Foot
4 Inch Electrical Conduit (Plastic)	Linear Foot

END OF SECTION REVISION

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REVISION OF SECTION 613
PULL BOX

Section 613 of the Standard Specifications is hereby revised for this project as follows:

Subsection 613.01 shall include the following:

At locations shown in the plans, the Contractor shall install one or more pull boxes of the size and type indicated in the following section.

Subsection 613.02 shall include the following:

Traffic signal pull boxes shall be made of fiberglass reinforced polymer concrete and shall be designed to support a minimum service load of 15,000 pounds over a 10" x 10" square. Pull boxes shall be of the type specified in the plans. The pull box shall have a detachable cover that has a skid-resistant surface. Any boxes that are installed to house traffic signal cables shall have the words "TRAFFIC SIGNAL" physically impressed (not painted) on its top. The traffic pull boxes shall have minimum inside dimensions of 30.5" long by 17.5" wide by 24" deep. Electric pull boxes, or Pull Box (Type A), shall have the words "ELECTRIC" physically impressed on their top.

All traffic communication pull boxes shall have the words "TRAFFIC COMM" physically impressed (not painted) on its top. The interconnect pull boxes or Pull Box (Special) shall have minimum inside dimensions of 30.5" long by 17.5" wide by 24" deep. The covers shall be attached to the pull box body by screw-in bolts and shall have two lift slots to aid in the removal of the lid.

At some locations, existing pull boxes and conduits may need to be modified to accommodate minimum bend requirements of interconnect cable and/or splice closures. At the direction of the Engineer or Engineer's designee, the Contractor shall remove existing pull boxes and replace with a pull box large enough to meet the interconnect manufacturer's recommended minimum bend radius or the splice closure requirements.

This work shall be considered as incidental to the cost of the Pull Box (Special) installed and will not be paid for separately.

Subsection 613.11 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Pull Box (Special)	Each
Pull Box (24"x36"x12") = Type B (Traffic)	Each

END OF SECTION REVISION

REVISION OF SECTION 613
ELECTRICAL CONDUCTOR IDENTIFICATION

Section 613 of the Standard Specifications is hereby revised for this project as follows:

Subsection 613.08 shall include the following:

All electrical conductors shall be tagged as follows:

Electrical conductor cable tags shall be located below the termination in the base of the streetlight, in the pull box, in the pedestal, and at the point of termination to existing facilities of the Local Utility Company supplying electrical service. The tags shall be attached with a cable tie. The information written on the tag shall include the direction and approximate length of cable, feeds running from where and to, etc.

Each incoming conductor shall be individually color coded with one (1) tape mark, while outgoing conductors shall have two (2) tape marks.

Example:

FEEDS TO PULL BOX 50’ NORTH & 75’ WEST THEN TO HIGHWAY

FEEDS FROM XFMR 250’ SOUTH & EAST 200’ WEST

Uniform tags are available in a Tag Kit. *The Tag Kit consists of: 100 tags, 3-part yellow with 1 hole, 100 black nylon ties and 1 black Sharpie pen.

Manufacturers	**Catalog Numbers**
Uticom Systems Inc.	U5025Y1
Padhuit	
3M	

Or approved equal

Subsection 613.11 shall include the following:

Electrical conductor tagging will not be paid for separately, but shall be included in the cost of wiring.

END OF SECTION REVISION

REVISION OF SECTION 613
LIGHTING

Section 613 of the Standard Specifications is hereby revised for this project as follows:

Subsection 613.02 shall include the following:

Highway lighting materials and equipment for installation and modifications shall be compatible or interchangeable with standard materials and equipment as stocked by Xcel. Lighting materials and equipment that are compatible with that stocked by Xcel shall be used and shall be in accordance with the details included in the plans.

Contractor shall submit a lighting materials list to Xcel for approval prior to ordering.

Before releasing any materials, the Contractor shall submit to the Engineer for approval three copies of a complete list of all of the equipment and materials that he intends to install. This list shall include, but is not limited to, the following:

Light standards, anchor bolts, luminaire mountings, luminaires, lamps, and ballasts Conduits, conduit bends and splices, and electrical bushings, fuseholders, fuses, and cable disconnect devices, splice boxes and foundations

The list shall include the brand name, any identifying numbers, relevant technical data, and any other information necessary for maintenance forces to procure exact replacements of any and all equipment and material used on the project. All equipment shall be new and first quality.
All like luminaires shall be provided by the same manufacturer. The Contractor shall provide pole, luminaire, and bracket shop drawings that detail methods of assembly and fastening. Shop drawings shall also indicate colors and their locations on each lighting element for review and approval prior to releasing. The Contractor shall also supply manufacturer descriptions of luminaire, pole materials, fabrication, performance, and installation.

The Engineer must approve all shop drawings, submittals, and material descriptions before the Contractor may order from supplier.

Subsection 613.03 shall include the following:

All workmanship shall be first class, and finished work shall present a neat, uncluttered appearance. The Contractor shall coordinate his work with other construction phases and with the work on adjacent projects so as to provide a minimum of interference to the combined operations. Where electric service installation is required, the Contractor shall coordinate with Xcel Energy for power locations.

Subsection 613.04 shall include the following:

The Contractor shall provide the Engineer with stamped drawings for the design and detailing of the pole foundations.

The caged anchor bolt assembly shall be placed in the foundation so that it remains plumb and with the projection set as specified by the pole manufacturer. Anchor bolts shall be "caged" in a manner specified by the manufacturer and approved by the Engineer. The top elevation of the foundation shall be set accurately and leveled.

All soil removed from the foundations and not required for backfill shall be disposed of as directed by the Engineer.

Subsection 613.05 shall include the following:

Light Standard assemblies shall be fabricated and placed in accordance with the details Federal Aid Project Number STU C010-092 March 5, 2010 City and County of Denver Project Number CE95002 and dimensions shown on the plans, or as directed by the Engineer. Welding shall be in accordance with the latest edition of AWS Specification D1.1 and the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

Subsection 613.06 paragraph 1 shall be deleted and replaced with the following:

Luminaires shall be mounted according to the details as shown on the plans and according to manufacturer's instructions.

Subsection 613.06 paragraph 5 shall be deleted.

Subsection 613.08 shall include the following:

At least one grounding electrode shall be installed adjacent to each light standard. Wiring shall be a 120/240 volt or 120/208 volt, 3-wire system with individual luminaries wired for 120 volts.
The entire roadway lighting system shall be a 120-volt system.

REVISION OF SECTION 613
LIGHTING

Subsection 613.11 shall include the following:

Pay Item	**Pay Unit**
Temporary Lighting	Lump Sum
Wiring	Lump Sum
Light Control Center	Each
Concrete Foundation Pad	Each
Light Standard Foundation	Each
Light Standard Metal (35 Foot)	Each
Luminaire (LED) (14,000 Lumens)	Each
4 Inch Electrical Conduit (plastic)	Linear Foot
3 Inch Electrical Conduit (plastic)	Linear Foot
2 Inch Electrical Conduit (plastic)	Linear Foot
1-Inch Electrical Conduit (plastic)	Linear Foot
1-1/4 -Inch Electrical Conduit (plastic)	Linear Foot
¾ Inch Electrical Conduit	Linear Foot
2 Inch Electrical Conduit (Bored)	Linear Foot
3 Inch Electrical Conduit (Bored)	Linear Foot

END OF SECTION REVISION

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REVISION OF SECTION 613
TEMPORARY LIGHTING

Section 613 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of furnishing and installing temporary lighting including poles, luminaires and other related work for illumination of the existing roadway and any construction activities in accordance with these specifications and in conformance with the details, lines, grades and locations shown on the plans. The existing streel lighting is owned and operated by Xcel Energy through a franchise agreement with the City of Denver. The Contractor shall coordinate with Xcel Energy to keep the existing illumination system in operation for the benefit of the traveling public during construction until the permanent street lighting system is operational.

MATERIALS

Temporary lighting materials shall conform to the requirements of Xcel Energy, or Section 715 if not specified by Xcel Energy.

CONSTRUCTION REQUIREMENTS

The Contractor shall provide temporary lighting levels equal to or exceeding 50% of the existing lighting levels and quality by using the same luminaire type as existing until the new lighting system is energized and operational. Lighting system shutdowns are subject to approval by the Engineer.

All circuits to lighting outside of project limits shall stay energized without interruption. If damage is caused by the Contractors' operations, damaged facilities shall be repaired or replaced promptly at no additional compensation.

The Contractor shall install meter housing and pay for power for temporary lighting as required by Xcel Energy.

Where roadways are to remain open to traffic and existing lighting systems are to be modified, the existing systems shall be kept in operation until the final connection to the modified circuit is made. The modified circuit shall be complete and operating by nightfall of the same day the existing system is disconnected.

The Contractor shall keep temporary construction lighting installations in effective operation until they are no longer required for the protection of the traveling public.

Reusable equipment damaged when the Contractor is removing and salvaging existing material shall be replaced or repaired at the Contractor's expense.

Existing installations to be removed shall be kept in operation until the new installations are ready to be turned on or as directed.

Existing materials which interfere with or which are incompatible with new construction shall be removed or salvaged in the order directed, as specified or approved before completion of the new construction. The Contractor shall notify the Engineer at least seven calendar days in advance of removing or salvaging the existing materials. Material damaged by the removal and salvage operations shall be repaired or replaced at the Contractor's expense.

REVISION OF SECTION 613
TEMPORARY LIGHTING

METHOD OF MEASUREMENT

Temporary Lighting, will not be measured but will be paid for on a lump sum basis and shall include all materials, equipment, and other items including the cost of power, if metered, to provide temporary lighting on the project.

BASIS OF PAYMENT

Payment will be made under:

Pay Item	**Pay Unit**
Temporary Lighting	Lump Sum

END OF SECTION REVISION

REVISION OF SECTION 614
CLOSED CIRCUIT TELEVISION CAMERA (TRAFFIC MONITORING)

Section 614 of the Standard Specifications is hereby revised to include the following:

Subsection 614.01 shall include the following:

This work consists of the installation of a closed-circuit television camera at the locations shown on the plans.

Subsection 614.08 shall include the following:

(m) Closed Circuit Television Camera (Traffic Monitoring)

Closed circuit television camera shall be the Panasonic WV-SW598A.

The following accessories shall be provided for each camera:
Panasonic PAPM4 Pole Mount Bracket Black
Panasonic PWM20G Gooseneck Black
Transformer Altronix T2428100 24 VAC.
Veracity VOR-OS Outsource Midspan 15/20W POE 802.3AF Injector – 1 port

Subsection 614.10 shall include the following:

The Contractor shall deliver the camera and accessories to the City and County of Denver's Traffic Operations Department at 5440 Roslyn, Building E, Tech Shop, Denver, Colorado 80216 at least 4 weeks prior to installation for the camera calibration and set up. City of Denver personnel will install and program the camera.

Subsection 614.13 shall include the following:

Closed circuit television cameras will be measured by the actual number of closed circuit television cameras that are installed and accepted. All accessories shall not be measured separately.

Subsection 614.14 shall include the following:

Payment will be under:

Pay Item	**Pay Unit**
Closed Circuit Television Camera	Each

Payment will be full compensation for all labor, materials, accessories, and equipment required to complete the work.

END OF SECTION REVISION

REVISION OF SECTION 614
TRAFFIC SIGNAL CONTROLLER AND CABINET

Section 614 of the Standard Specification is hereby revised for this project as follows:

Subsection 614.01 shall include the following:

This work shall consist of furnishing and installation of a complete Traffic Signal Controller and Cabinet assembly, malfunction management units (MMU), vehicle detector amplifiers, uninterrupted power supply (UPS), other ancillary hardware, and traffic signal cabinet base per City and County of Denver standards.

Delete Subsection 614.08 (b), and replace with the following:

Traffic Signal Controllers - General
This specification sets forth the minimum requirements for a shelf-mounted, two through sixteen phase, fully-actuated, digital, solid-state traffic controller. The controller shall be configurable to meet, as a minimum, all applicable sections of the NEMA Standards Publications for TS2 and NTCIP 1202 and ATC standard 6.10. Where differences occur, these specifications shall govern. Controller versions shall be available to comply with NEMA TS2 Types 1 and 2. Type 2 versions of the controller shall be capable of operating as a Type 1 controller.

The controller shall meet or exceed the specifications of the Econolite's Cobalt 2100-C Fully Actuated controller (http://www. econolite.com/files/4413/9949/2986/controller-cobalt-datasheet.pdf), or an equivalent approved by the City and County of Denver Transportation & Mobility.

Delete Subsection 614.08 (c) and replace with the following:

All new cabinets are the P-type cabinets as per the City & County of Denver Traffic Standards. Each cabinet shall be installed on a newly installed traffic signal controller cabinet base unless otherwise specified on the plan. Contact Chris Lillie at 720-865-0466 for cabinet assembly requirements and all other necessary auxiliary hardware.

Controller cabinet assemblies shall include an integrated uninterrupted power supply (UPS) units that comply with the City and County of Denver standards (see UPS spec).

Subsection 614.09 shall include the following:

The Contractor shall deliver the traffic signal controller, and cabinet assemblies and other auxiliary hardware, to the City and County of Denver Traffic Operations Center at 5440 Roslyn Street, Building E, Denver, Colorado 80216 six (6) weeks before installation for controller programming. The Contractor shall coordinate the pick-up of the controller and cabinet assembly from the City and County of Denver's Traffic Engineering Services and shall install it at the proper location. The Contractor shall coordinate pick-up times with Chris Lillie at (720) 865-4066.

The controller shall be installed in accordance with the details shown in the plans and in accordance with manufacturer's recommendations.

REVISION OF SECTION 614
TRAFFIC SIGNAL CONTROLLER AND CABINET

Subsection 614.10 shall include the following:

The Contractor shall demonstrate successful traffic signal operations at all new controller and cabinet locations to the satisfaction of the Engineer or Engineer's designee prior to acceptance of this item. The Contractor shall contact the Engineer or Engineer's designee 3 days before turning on signal. Work shall include all required programming of controllers and establishing or re-establishing all required wiring connections. Phasing and timing information at each location shall be furnished to the Contractor by the City & County of Denver.

All new wiring shall conform to City & County of Denver and International Municipal Signal Association (IMSA) specifications.

Subsection 614.13 shall include the following:

The unit price for the installation of traffic signal controller cabinets shall include all labor, materials, ancillary hardware, traffic signal cabinet base, wiring and wiring re-connection (including Xcel Energy power feed) required to provide and install a complete system and successful operation of the item. Connection of the controller to the fiber optic interconnect system shall be paid for separately under item 614 "Telemetry (Field)".

Removal and disposal of existing cabinets shall be in accordance with the Project Special Provision for the referenced item.

Subsection 614.14 shall include the following:

Pay Item	**Pay Unit**
Traffic Signal Controller and Cabinet	Each

END OF SECTION REVISION

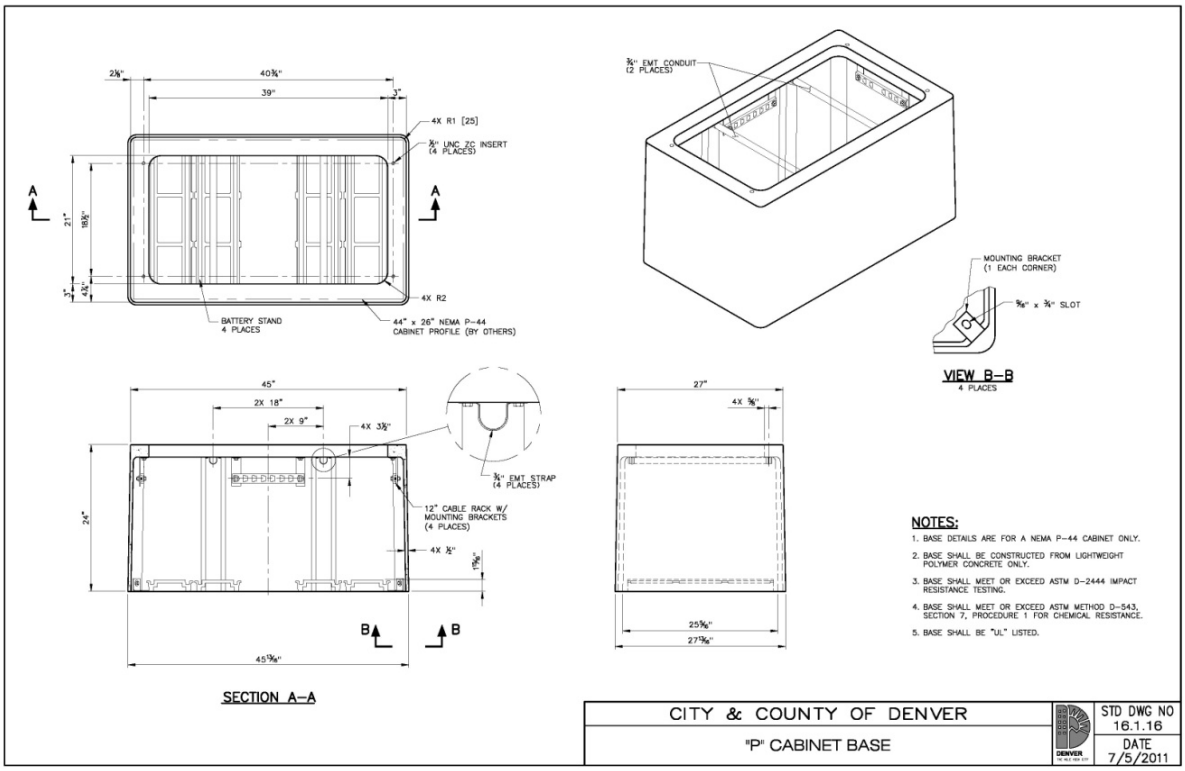
REVISION OF SECTION 614
TRAFFIC SIGNAL CABINET BASE

Section 614 of the Standard Specifications is hereby revised for this project as follows.

Subsection 614.01 shall include the following:

This work shall consist of installing a composite Traffic Signal Controller Cabinet Base as shown in the plans and in accordance with City & County of Denver standard detail 16.1.16. The base shall fit the P-size traffic signal controller cabinet in accordance with the City and County of Denver standard detail 16.1.17.

Dimensions of the traffic signal cabinet base are as shown in the following drawing:



Subsection 614.10 shall include the following:

Prior to starting cabinet base installation, Contractor shall obtain field verification of the location of the cabinet from the Engineer or the Engineer's designee.

Cabinet base installation shall include all labor and materials to completely install a new P-size cabinet base as directed in the plans. The item shall include all excavation, conduit installation and modification work, backfill and restoration of adjacent surface area.

REVISION OF SECTION 614
TRAFFIC SIGNAL CABINET BASE

Subsection 614.13 shall include the following:

Installation of the traffic signal cabinet base shall not be measured and paid for separately, but shall be included in the cost of the Traffic Signal Controller and Cabinet installation.

Subsection 614.14 shall include the following:

Installation of the traffic signal cabinet base will not be paid for separately, but shall be included in the cost of the Traffic Signal Controller and Cabinet installation.

END OF SECTION REVISION

REVISION OF SECTION 614
TRAFFIC SIGNAL CONTROLLER (SOLID STATE) (FULL ACTUATED) (12 PHASE)

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.08 (b) shall be deleted and replaced with the following:

Traffic Signal Controllers – General. This specification sets forth the minimum requirements for a shelf-mountable, two through twelve phase, fully-actuated, digital, solid-state traffic controller. The controller shall meet, as a minimum, all applicable sections of the NEMA Standards Publication No. TS2-1998. Where differences occur, this specification shall govern. Controller versions shall be available to comply with NEMA TS2 Types 1 and 2. Type 2 versions of the controller shall be capable of operating as a Type 1.

The controller shall be Econolite model ASC/3-1000 Fully Actuated Controller, or an equivalent approved by the City and County of Denver Traffic Engineering Services.

Subsection 614.09 shall include the following:

The Contractor shall deliver the controller to the City and County of Denver's Traffic Engineering Services at 5440 Roslyn, Building E, Denver, CO six (6) weeks before installation for controller programming. The Contractor shall pick up the controller from the City and County of Denver's Traffic Engineering Services and shall install it at the proper location. The Contractor shall coordinate pick-up times with Chris Lillie at (720) 865-4066.

The controller shall be installed in accordance with the details shown in the plans and in accordance with manufacturer's recommendations.

Subsection 614.13 shall include the following:

Traffic signal controller (solid state) (full actuated) (12 phase) shall include pedestrian detectors and all auxiliary equipment required on the plans and shall include all work necessary to provide and install a complete system. Connection of the controllers to the fiber optic interconnect system shall be paid for separately under item 614 "Telemetry Field".

Subsection 614.14 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Traffic Signal Controller (Solid State) (Full-Actuated) (12 Phase)	Each

END OF SECTION REVISION

REVISION OF SECTION 614
TRAFFIC SIGNAL POLE - GENERAL

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.08 (g) shall include the following:

TRAFFIC SIGNAL POLES: All traffic signal poles and mast arms shall conform to City and County of Denver Standards and the local utility company's (Xcel Energy) requirements.

Traffic Signal Pedestal Poles shall conform to the requirements of the City and County of Denver's Traffic Signal Standard Detail 16.1.13.

All traffic signal poles shall include 10ft luminaire mast arm and 14,000 Lumens LED luminaires in accordance with the current City and County of Denver Standards. Equipment will be compatible with equipment stocked by the City and County of Denver. Prior to ordering of traffic signal poles, mast arms and luminaires, contractor shall submit material specifications to the City and County of Denver Traffic Engineering Services for approval.

FINISH: All traffic signal mast arm poles shall be finish in accordance with Valmont finish process F540 or equal – galvanized, epoxy primer and powder coated in accordance with the following specifications:

PAINTING: All traffic signal mast arm poles shall be powder coated in accordance with the following specifications:
General:

Super Durable Powder Coating: The super durable powder coating shall consist of a Urethane or Triglycidyl Isocyanurate (TGIC) Polyester Powder, and provide a minimum of 3 times the gloss retention, color retention and ultraviolet light (UV) resistance as standard powder coatings. Color shall be dark olive green, in conformance with Federal Specification No. 14056.

Surface Preparation:
The exterior steel surface shall be blast cleaned to Steel Structures Painting Council Surface Preparation Specification No. 6 (SSPC-SP6) requirements utilizing cast steel abrasives conforming to the Society of Automotive Engineers (SAE) Recommended Practice J827. The blast method is a recirculating, closed cycle centrifugal wheel system with abrasive conforming to SAE Shot Number S280.

Interior Color:
Interior surfaces (pole shafts only) at the base end for a length of approximately 2.0' shall be mechanically cleaned and coated with a zinc rich epoxy powder. The coating shall be electrostatically applied and cured in a gas fired convection oven by heating the steel substrate to a minimum of 350 degrees Fahrenheit and a maximum of 400 degrees Fahrenheit.

Exterior Coating:
All exterior surfaces shall be coated with Urethane or Triglycidyl Isocyanurate (TGIC) Polyester Powder to a minimum film thickness of 2.0 mils (0.002"). The coating shall be electrostatically applied and cured in a gas fired convection oven by heating the steel substrate to a minimum of 350 degrees Fahrenheit and a maximum of 400 degrees Fahrenheit. The thermosetting powder

resin shall provide both intercoat as well as substrate fusion adhesion that meets 5A or 5B classifications of ASTM D3359.

Packaging:

Prior to shipment, small poles shall be wrapped in 0.188" thick Ultraviolet inhibiting plastic backed foam. Larger poles shall be cradled in a 1.0" rubberized foam base.

Handling and Shipment:

Poles shall be handled in a manner that will preserve the overall appearance and prevent damage to the coating. The use of chains or cables for loading, unloading, or installing is prohibited. Only ¾ inch diameter or larger nonabrasive nylon rope or equivalent nylon belting will be used. Adequate hold-downs and appropriate blocking shall be utilized for shipping to prevent load movement and damage to the outer coating in transit. No handling should be allowed until "dry through" condition has been achieved with the coating.

Delivery, Installation, and Acceptance of Poles:

Extra care will be taken not to damage the coating. Upon arrival of the poles at the delivery point, neither chains nor cables will be used to either unloading or installation of poles.

Procedure for Field Touch-Up:

The pole manufacturer will furnish extra paint, both primer and color coat, to satisfy the needs of field touch-up requirements, in the event of minor physical damage to the coating from handling or transit. Damaged area must be clean and dry before repair application. Field touch-up will be at the direction of the pole manufacturer or their authorized representative.

Subsection 614.14 shall include the following:

Pay Item	**Pay Unit**
Traffic Signal Light Pole Steel (1-30 Foot Mast Arm)	Each
Traffic Signal Light Pole Steel (1-40 Foot Mast Arm)	Each
Traffic Signal Light Pole Steel (1-50 Foot Mast Arm)	Each
Traffic Signal Mast Arm Steel (1-55 Foot Mast Arm)	Each
Traffic Signal Mast Arm Steel (1-60 Foot Mast Arm)	Each

END OF SECTION REVISION

REVISION OF SECTION 614
UNINTERRUPTED POWER SUPPLY SYSTEM

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.08 shall include the following:

The double conversion uninterrupted power supply system (UPS) shall provide emergency battery power to the traffic signal controller. The UPS shall conform to the following specifications:

Operation:

The UPS system shall be capable of producing a fully regenerated, conditioned, pure sine wave AC. The online operational mode shall be continuous to all loads. It shall incorporate a high frequency Pulse-Width Modulated technology and shall use an input rectifier, charger, battery and inverter in a single board configuration. The UPS double conversion UPS shall provide a clean, pure AC sine-wave output at all times with a voltage input variation of 85VAC to 145VAC while providing 120VAC to the connected load at all times. The UPS shall be capable of operating in the voltage range of 85VAC to 135VAC without using the batteries and always provide a regulated output to the protected loads.

The Input rectifier shall be rated at 2.5 times the output rating of the inverter.

The Inverter circuit shall be in continuous operation at all times (constant duty). The inverter shall be rated for 100% duty cycle and simultaneously fed from the rectifier and battery to eliminate any switching to battery or transitions during power fluctuations or power interruption. The inverter's output shall be pure clean sine wave with an efficiency of up to 85%.

The constant duty operation shall be rated in total watts. This will enable the traffic UPS to support any combination of signal heads whether Incandescent, LED or Neon, by any manufacturer, regardless of power-factor.

The UPS shall be capable of operating from a generator source without the need for over-sizing the UPS system. During operation from a generator source, the UPS shall operate in a normal fashion and provide filtered and regulated power with or without automatic input/output frequency synchronization. Upon excessive generator frequency drift, the UPS shall compensate through regeneration and supplying both continuous frequency and voltage regulation to the protected load.

The UPS shall be capable of glitch ride through capabilities and provide a seamless output to the connected load during this anomaly without the use of the batteries.

The UPS shall be capable of providing an overload output rating of 120% for 60 seconds, 150% for 10 seconds to any combinations of signal types whether Incandescent, LED or Neon during inrush or overload conditions.

REVISION OF SECTION 614
UNINTERRUPTED POWER SUPPLY SYSTEM

The UPS shall have an internal static bypass that will transfer to line power if over load exceeds 150% for more than 5 sec. This bypass will maintain the load until this overload has cleared.

The UPS shall have a separate Neutral detecting circuit that shall monitor loss of utility neutral and completely disconnect any input source to the UPS system.

The UPS shall have an input back feed relay operating in series with the Neutral monitoring circuit.

Upon loss of utility power, the UPS inverter shall continue to provide seamless pure sine-wave AC from the batteries without switching, transfer or changing its' operating status. The UPS will use the battery mode in '0' ms. This will insure that the UPS provides pure sine wave power under all conditions, at all times without interruption.

The UPS will continue to provide generated AC from the inverter until the batteries are depleted.

When the batteries have been depleted, the UPS will ensure upon the return of Utility Power that the UPS will restart automatically and provide regenerated AC to the protected equipment and allow the equipment to resume normal operation.

The UPS shall be capable of operating in a full regenerated, power-conditioning mode with depleted batteries or failed batteries. The regenerative power conditioning will ensure that there will be regulated and conditioned pure AC power to the equipment. This regenerative mode will provide extended brown-output protection with wide input line regulation, noise filtering and surge protection.

The UPS shall operate in an uninterruptible regenerative on-line mode during flash or normal signal operation.

The UPS shall be rated at Unity Power Factor. The output VA and Watts rating shall be equal on the output at all times.

The UPS shall be capable of COLD starting without AC present and provide AC power to the load.

The UPS shall be capable of self-diagnostics during start up or with the use of the front panel TEST button.

The UPS case shall be constructed from .064 aluminum and carbon steel.

The UPS input and output connections shall be Anderson Power Pole quick lock connector to eliminate exposed terminals or connections.

REVISION OF SECTION 614
UNINTERRUPTED POWER SUPPLY SYSTEM

The UPS to bypass interconnect harness shall be reversible with matching Anderson Power connectors that will prevent risk of shock, or damage to the connected equipment.

The UPS shall be capable of Hot-Swapping the batteries or battery bank, without shutting down the UPS.

The UPS shall be capable of being Hot-Swapped during normal operation when used with the external Hot Swap Bypass. The UPS may also be shut-off with the Hot Swap Bypass in place without loss of AC to the loads.

The UPS shall be capable of providing a replaceable relay card with relay output contacts for AC fail, Inverter ON, Low Battery, Battery Fail, Bypass and Alarms.

The UPS relay card may be replaced with an SNMP card for SNMP communications and information.

The UPS shall provide a programmable Dry Relay output for flash.

The contacts shall be provided in N/O and N/C positions. The delay timer shall be a maximum of 10 hours.

The timer shall be front panel mounted.

The Timer dial shall be 4.7 inches in circumference.
The timer shall have a scale in increments of 1s to 10seconds. This scale can be changed to indicate 1 minute, to 10 minutes or a maximum scale of 1 hour to 10 hours.
The scale shall be controlled by two (2) separate dip switches on the timer face.
The timer shall indicate using a flashing RED LED that the timing function is operating.
The timer shall use a steady RED LED to indicate that the timing is now completed
The timer shall count in a down mode to ‘0’ from the preset time indicated on the scale.

The LED indicators shall provide status for AC line, UPS Battery Mode, Charging, Low Battery, Fault, Bypass, Percentage of Load and Battery Charge.

The Event counter and Hour meter may be rest to ‘0’ using separated buttons.
The UPS shall have a battery changer rated at 200 watts @ 36VDC with an optional of 400 watts.

This charger shall be completely separate from the rectifier/inverter included with the main UPS board.

The UPS chargers may be used in a parallel configuration for increased charger ratings.

The UPS uses a redundant internal 1 amp charger that will continue to charger the batteries if the separate board charger fails.

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REVISION OF SECTION 614
UNINTERRUPTED POWER SUPPLY SYSTEM

The UPS may be used with redundancy in mind with the use of the Dual Hot Swap Option. That will provide a secondary UPS source in less than 20ms. The Secondary UPS may be connected to the alternate input of the Hot Swap Bypass

The Flash programming shall be a simple and field programmable without the use an external connected device such as a laptop or computer.

The Hot swap Bypass shall allow the UPS to be removed or installed at any time during normal load operation.

The UPS shall include standard graphical real time software and connection cable.

The UPS shall be capable of sending programmable system alarms to the Econolite "icons" Traffic Management System.

Physical Description:

The UPS shall consist of 3 major components. The Main board Rectifier/Inverter, charger and control board.

The Main Board shall consist of a True-Sine-Wave constant duty high frequency inverter utilizing High-Frequency Pulse-Width Modulated technology.

The Input Rectifier shall be rated for the total wattage output rating of the UPS including the 150% overload and the charger rating. The inverter shall be a high efficiency constant duty design with and efficiency of 83%. The inverter shall include its' own static bypass which provides an alternate AC path during overload and or Inverter alarm conditions.

The heat-sink shall be a continuous aluminum extrusion design with plenum directed airflow cooling. The 12VDC dual stage cooling fans shall be variable speed controlled by the logic board.

The charger portion shall be a 3 stage Hysterisis .5 amp, 36 or 72VDC charger with temperature compensation. The supplementary charger is a parallel design rated for 200, 500 and 1000 watts.

The Electronic Control board shall monitor the Rectifier and Inverter functions. It shall also provide the overall control of all the UPS functions and or operational capabilities.

Mounting Configuration:

The UPS shall be shelf mounted or rack mounted per the documents. Shelves and cabinets shall be supplied by others. Where rack mounting is required, the 170 style mounting method shall be 19" rack mount. Rack mounting ears shall be removable.

A separate stand alone NEMA Traffic cabinet may be supplied if required in the plans and specifications. 4 rubber feet shall be installed on the bottom of the unit for shelf mounting.

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UNINTERRUPTED POWER SUPPLY SYSTEM

Battery System:

The batteries shall be comprised of a quantity of three (3), high temperature, deep cycle (45AH) batteries which have been proven under extreme temperature conditions. The battery system or configuration shall consist of one string. Each string shall be 36 VDC. The batteries shall be provided with the appropriate interconnect cables. The battery cables shall have a minimum conductor size rating of #10.

The battery cable shall consist of a quick release Anderson connector rated at 25 amps. For the purpose of safety, the connector shall have recessed pins and keyed interlock to prevent reversal of connection or separation.

Battery construction shall be of a polycarbonate high temperature design combined with high, pure lead content with internal resistance of.0028 ohms and a high impact poly case construction, to with stand high vibration and shock. The connections shall be of stainless steel 3/8 stud, with 3/8 stainless nut and locking washer. Removable lifting handle shall be standard.

The batteries shall also meet the following characteristics:

Nominal voltage:	12VDC
Capacity@ 25C:	45AH
Approx weight:	13.5Kg
Internal Resistance:	9.5 mOhms
Dimensions:	197mm x 165mm x 170mm (7.76 x 6.50 x 6.69)
Capacity (10hr rate):	75c-112% 65c-108% 55c-105% 25c-100% 0c- 85% -15c- 65%
Self Discharge:	3 months 91% capacity remaining 6 months 82% capacity remaining 12 months 65% capacity remaining
Operating Temperature:	-15c to +75C
Float Voltage:	13.5 to 13.80
Cyclic charging voltage:	14.5 to 14.90
Maximum charge current:	12A
Terminal material:	Copper
Maximum discharge current:	400A (5 sec)

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UNINTERRUPTED POWER SUPPLY SYSTEM

The system must be 36 volt DC maximum (no exception).

Electrical Specifications:

The unit shall meet the following electrical specifications:

Design:	Double Conversion true on line.
Nominal input:	110, 115 & 120v AC single phase dip switch selectable.
Input Voltage Range:	80v to 140v AC
Input frequency:	50/60hz (47 to 63)
Efficiency:	83 %
Input configuration:	3 wire with ground
Input Protection:	15 amp re-settable breaker (on UPS 700)
Input Current:	10.4 amps (includes charger) (on UPS 700)
Power Rating Continuous:	700 watts, 1400watts, 2100 watts
Output Current:	@ 700 watts 5.8 amps / 11.6 @1400/ 17.7@2100
Output regulation:	+/- 3% with 100% resistive load
Output regulation w/low battery:	+/- 3% with 100% resistive load
Output Voltage:	120v AC
Output Wave Form:	Pure sine wave
Harmonic Distortion:	3% Linear Load; 5% Non Linear Load
Dynamic Response:	+/- 5% RMS for 100% step load change 1 ms recovery time
Overload Capability:	120% for 60 sec 150% watts for 10 sec
Charger:	200 watt 36VDC UPS 700, 72VDC on UPS 1400 Parallel 400, 1000 and 2000 watt.
Surge:	ANSI-C62.41
Fault Clearing:	Current Limit and automatic to bypass
Short Circuit protection:	Output Breaker / Fuse, then shut down
Load Power Factor:	6 leading to .6 lagging
Output Connection:	Anderson Power Pole Connector 6 pin keyed.
DC Connection:	Anderson 50 amp Keyed Recessed connector
Recognition:	UL Recognized & IEE 587 / C62.41 on main UPS board

Mechanical:

The UPS shall meet the following physical dimensions:

For 700 W UPS:

Size:	6.00” H x 10.5” D x 15.15” W
Weight:	18 lbs

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UNINTERRUPTED POWER SUPPLY SYSTEM

The enclosure shall be constructed of 0.064 Carbon steel and aluminum. The enclosure shall be painted with powder coat paint with a minimum of 1.5 mil thickness.

Environmental:

The UPS shall meet or exceed NEMA temperature standards from –40c to + 74c.

Communications, Control & Diagnostics

LED indicators shall be provided for line monitoring, battery mode, charging, low battery, fault / bypass load level, battery level and ground fault. Manual test functions shall be available for alarm function, low battery, battery fail, bypass and overload. An RS 232 port with communication software shall be provided for real time UPS operational status in place of a relay status card when required.

The relay status card shall have the following I/O via contact closure:

1. Bypass ON
2. AC fail or out of tolerance.
3. AC normal or in tolerance.
4. Inverter is operating (ON)
5. Battery low
6. Battery failed or bad
7. UPS general alarm
8. Ground (logic)
9. Apply 6 to +25VDC
10. between pin 9 and 10, will shut the UPS down

Options:

The UPS must be able to accept the following future options

- SNMP/WEB monitoring.
- 24/7 Adjustable perpetual timer.
- Generator input option for hot swap bypass switch.
- Rack mount hot swap bypass switch.

In place of the relay card, an SNMP card can be installed that shall support TCP/IP, UDP, SNMP, and HTTP protocols and shall provide the SNMP MIB for UPS monitoring and UPS status. Remote access to UPS real time information including unit identification, data logging and UPS status in real time shall also be provided on a by unit basis. It shall be possible to use Microsoft Internet Explorer for remote viewing of the following:

1. UPS load
2. Battery Charger status
3. UPS operation Normal/Alarm
4. Input Voltage
5. Output Voltage
6. Battery Voltage
7. UPS Temperature
8. UPS information logging
9. Remote UPS battery testing.
10. Send output email if UPS status has changed
11. Built in reset with panel mounted led indicators for SNMP status.

The SNMP card shall have the following status LEDs:

LED(1) Green LED: Status receiving
Yellow: Data Transmitting
LED(2) Green: SNMP connecting
Yellow: SNM P functioning

The optional 24/7 timer shall be integral to the UPS. It shall include a DB9 connector to provide the connection and programming to the timer. This timer shall be programmable for any number of flash delays related to the time of day. It allows the complete flexibility of flash delay or skipping the flash during that particular event related to traffic flow and even holidays. The time shall have the follow features:

1. 7 days, 24 hrs Flash delay timing.
2. Perpetual Clock.
3. Maximum of 31 setting per day.
4. Timing resolution to the minute.
5. 4 Possible commands per event.
6. Real-time operation, editing functions will not interrupt the unit's functions.
7. J-Tag port for instant preload of complete 7-day schedule file.
8. SPDT 10 amp 240VAC /24VDC ratings.
9. Input Voltage 110 to 240VAC or 24VDC unregulated supply.
10. Plus! Capable of scheduling for holidays or specific year/dates.
11. Capable of operating at 2400 baud micro-modem for direct phone connection
12. Capable of operating at 1200 to 230,000 baud rate on a serial port.
13. Capable of log retention

An optional generator input shall be available for the UPS.

Reliability:

Calculated MTBF shall be 120,000 hours based on component ratings. When bypass switch is installed, system MTBF shall increase to 160,000 hours.

REVISION OF SECTION 614
UNINTERRUPTED POWER SUPPLY SYSTEM

Hot Swap Bypass Switch:

A hot bypass switch shall be provided and wired to function within the UPS system. The bypass switch shall have the following characteristics:

Bypass Rating:	30 amps maximum
Bypass Transfer:	Automatically to line in 20ms, '0' crossing at full load
Control:	Rocker On/Off switch indicating 'Auto' and Bypass
Relays:	AC internal Load relay at 'Zero Crossing' with parallel function DC relay for interlocking and protection failsafe mode to N/C for AC power direct to load when failure occurs or in Bypass position.
Protection:	Internal Snubber circuit for spike attenuation during transfer at 'Zero' crossing. Internal fuse required.
Connections:	Flush mounted Anderson Power connector. With locked and keyed.
Indicators:	LED for Line Available, Bypass, Ups On Line, UPS Available.
Dimensions:	7.5 x 5 x 2.5
Weight:	1.4 lbs

Establishment Period: A standard (2) two year manufacturer establishment period shall be provided for all electronic components. All batteries shall carry a one year warranty.

Subsection 614.13 shall include the following:

Emergency Vehicle Traffic Signal Priority Control System units shall include a four-channel card and the number of detectors as shown on the plans. Emergency Vehicle Traffic Signal Priority Control System shall be measured and paid by the number of intersections at which the system is installed. The item shall include all labor, materials, and ancillary hardware required to provide a fully functioning system to the satisfaction of the Engineer.

Subsection 614.14 shall include the following:

Traffic signal uninterrupted power supply system installation will not be paid for separately, but shall be included in the cost of the Traffic Signal Controller and Cabinet.

END OF SECTION REVISION

REVISION OF SECTION 614
INTERSECTION DETECTION SYSTEM (CAMERA)

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.01 shall include the following:

This work consists of furnishing and installing a fully-functional FLIR vehicle detection camera system, or approved equal (thermal and/or video system), at the specified locations identified in the plans.

Subsection 614.08 shall include the following:

Detection Camera:

The detection camera shall consist of a thermal camera, thermal lens, and enclosure; and shall meet the following specifications:

- ***Thermal Camera & Lens***
  The detection camera shall be a 320 x 240 (minimum) and 10 frames per second (minimum) thermal camera that fits into the camera enclosure specified herein. The lens shall be a fixed thermal lens. Digital zooming is allowed.

- ***Camera Enclosure***
  The camera enclosure shall consist of a dustproof and waterproof outdoor camera housing designed specifically to fit the thermal camera and thermal lens specified herein. The enclosure shall have a sun shield to prevent direct and indirect sunlight entering the lens. A thermostatically controlled heater for window defogging and defrosting is allowed.

- ***Power***
  The detection camera shall be powered by a 120/240VAC, 50/60Hz power source or by a 24VDC (±10%) power source.

- ***Reliability***
  The interface card shall be designed and manufactured to have a MTBF (Mean Time Between Failure) prediction figure of greater than or equal to 10 years continuous operation.

- ***Certifications & Environmental***
  The detection camera shall meet the following Certifications and Environmental specifications:

Certifications	Comply with Electromagnetic Compatibility - 2004/108/EG Comply with FCC Part 15, Class A
Weatherproof	IP66 ingress protection standards (minimum)
Operating Temperature	-34°C to +74°C (-29°F to +165°F) (minimum)
Relative Humidity	Up to 100% non-condensing
Shock & vibration	NEMA II

- ***Mounting Brackets***
  A versatile mounting bracket shall be supplied to mount the camera enclosure, specified herein, to a horizontal luminaire or vertical traffic signal pole.

  All mounts shall be secured with stainless steel mounting straps or bolts. The mounts, including the mass and size of the detection camera, shall be designed to withstand a wind load of 120km/h (or 75mph) with a 30-second gust factor.

- ***Camera to Controller Cabinet Cable***
  Cable needed to power the detection camera specified herein, transmit thermal video and data information to the controller cabinet shall be provided and meet the specifications of the thermal video imaging detection system manufacturer.

Thermal Video Processor:
A thermal video processor shall be included in the detection camera, specified herein, or in the interface card, specified herein; and shall meet the following specifications:

- ***Functionality***
  The thermal video processor shall provide the following functionality:

Detector Display	Capable of displaying bike detection regions on the thermal video image with associated outputs with output status shown on the screen
Detector Placement	By using a portable PC with graphical user interface software or web server
Detector Function	Capable of detecting within the view of the connected detection camera the presence of bicycles in user defined bicycle detection regions
Detector Type	Configurable as presence, count, delay, extension, or pulse mode of either arrival or departure of bicycles. The detector shall be capable of detecting pedestrians and small motorcycles too.
Detector Modification	All detectors and parameters shall be able to be changed without interrupting detection. When one detector is modified, all existing detectors shall continue to operate, including the one that is being modified. When the new detector position is confirmed, the new detector shall have no learning phase and shall be operating while the one being modified ceases to operate
Detector Failure State	Provide a constant call on each active detection channel, in the event of unacceptable interference or loss of the thermal video signal
Regions per Video Output	Up to 4 (minimum)

Detector Delay & Extension	Defined between 0.1-99 seconds and pulse mode between 0-500ms in 10ms increments.
Direction Sensitivity	Able to make a detector directional sensitive

Camera Interface/Surge Suppression Panel

When the thermal video processor is in the detection camera, a UV resistant signal cable with 3 wires (maximum) of wire diameter AWG18 (minimum) shall be provided to power the detection camera, transmits detection information to the interface card specified herein, and provides remote communication specified herein. The cable distance between detection camera and interface card is 300m or 1,000ft (maximum).

When the thermal video processor is in the interface card with coax thermal video cables being used between the detection camera and the interface card, a surge suppression panel shall be provided that powers the detection camera with high-voltage transient protection and power isolation, and suppresses electrical spikes on the thermal video coax cable.

The camera interface/surge suppression panel shall meet the following specifications:

- ***Certifications and Environmental***
  The interface card shall meet the following Certifications and Environmental specifications:

Certifications	Comply with Electromagnetic Compatibility - 2004/108/EG Comply with FCC Part 15, Class A
Weatherproof	IP66 ingress protection standards (minimum)
Operating Temperature	-34°C to +74°C (-29°F to +165°F) (minimum)
Relative Humidity	0-95% non-condensing (minimum)
Shock & vibration	NEMA II

Interface Card:

Input/output main and expansion cards shall be supplied that are designed to convert real-time detection signals from the video processor, specified herein, into contact closure signals to the traffic light controller; and to relay traffic signal phase status to the video processor, specified herein. The interface card shall meet the following specifications:

- ***Functionality***
  The interface card shall provide the following functionality:

Cabinet/Controller Compatibility	US: EDGE card for TS-1 cabinet and 2070 TS-1 and TS-2 controllers Rest of World: EURO card for various standard controllers
Status Indicators	Visual for state of each detection output, visual state of power status (ON/OFF), visual state of camera status (operational/not operational)
Identification	Individually addressable with serial number, MAC address, IP-address, subnet mask and default gateway
Program Retention	Continue to operate in accordance with previous program after recovering from communication system or power failure
Time Synchronization	Manually or NTP time source
Detector Failure State	Provide a constant call on each active detection channel, in the event of unacceptable interference or loss of the thermal video signal
Regions per Video Output	Up to 4 (minimum)
Detector Delay & Extension	Defined between 0.1-99 seconds and pulse mode between 0-500ms in 10ms increments.
Direction Sensitivity	Able to make a detector directional sensitive

- ***Communication***
  The interface card shall meet the following specifications:

Controller Interface Output	Contact closure via interface backplane, providing up to four channels of vehicle detection with no front panel connectors being used
ETHERNET	RJ45 port for hard-wired system set-up and monitoring
USB	USB 2.0 (minimum) on front panel for connecting a USB dongle to allow wireless set-up and monitoring via portable PC, tablet and/or smart phone 4°C to +74°C (-29°F to +165°F) (minimum)

- ***Remote Communications***
  Remote communications to allow remote management specified herein shall be provided via the interface card and shall meet the following specifications:

a) Functionality

Remote communications shall provide the following functionality:

REVISION OF SECTION 614
INTERSECTION DETECTION SYSTEM (CAMERA)

Cabinet/Controller Compatibility	US: TS-1 cabinet and 2070 TS-1 and TS-2 controllers
Thermal Video Compression	MJPEG, MPEG-4 (ISO 14496-2) and/or H.264 (ISO/IEC MPEG-4 AVC)
Thermal Video Frame Rate	Constant and variable 10 frames per second (minimum)
Thermal Video Bandwidth	Between 32 kbps and 4 Mbps (minimum)
Status Indicators	Ethernet link/activity
Identification	Individually addressable with serial number, MAC address, IP-address, subnet mask and default gateway
Program Retention	Continue to operate in accordance with previous program after recovering from communication system or power failure

b) Communication

The remote communications shall meet the following specifications:

Ethernet Port	One 10/100Base-T front-panel RJ45 port (minimum)
Thermal Video Input	Via front panel connector

- ***Power***

The interface card shall meet the following power specifications:

Input Voltage	24VDC ±10% (via cabinet detector rack backplane)
Power Consumption	10W (maximum)

- ***Physical Properties***

The interface card shall meet the following physical properties specifications:

Size	US: Fits directly into NEMA TS-1 cabinet detector rack or fits on DIN-rail

- ***Reliability***

The interface card shall be designed and manufactured to have a MTBF (Mean Time Between Failure) prediction figure of greater than or equal to 10 years continuous operation.

- ***Certifications and Environmental***

The input/output main and expansion cards shall meet the following Certifications and Environmental specifications:

Certifications	Comply with FCC Part; 15 NEMA TS 2-2003 v02.06
Operating Temperature	-37°C to 74°C (-35°F to 165°F) (minimum)
Humidity	0 – 95% non-condensing

REVISION OF SECTION 614
INTERSECTION DETECTION SYSTEM (CAMERA)

Remote Management System
Remote management system shall be provided to monitor, control, and troubleshoot the thermal video imaging detection devices remotely via the Ethernet communication system. The vendor shall provide all software that will be loaded and configured by staff on furnished server hardware that is connected to the thermal video imaging detection devices via the Ethernet communication system. Remote management shall meet the following minimum requirements:

- ***Diagnostic & Health Monitoring***

Management Status	Provide real-time status display of services required to access, troubleshoot, and archive data from the thermal video imaging detection system network connected devices
Network Device View	Provide view of all thermal video imaging detection system network connected devices
Operation Log	Support retrieving, displaying, and saving operational messages, warnings, and errors

- ***Remote Management & Maintenance***

Video Viewing/Recording	Support viewing and recording streaming video including detector overlay
Device Management	Support creating, editing, downloading, and uploading detector configurations
Remote Firmware Updates	Support updating firmware of any device from a remote location
Remote Backup/Restore	Support backup/restore device configuration from remote location
Access Permissions	Support password implementation
Clock Synchronization	Support the Network Time Protocol (NTP) to synchronize the internal clocks of the thermal video imaging detection system network connected devices a minimum of once a day

REVISION OF SECTION 614
INTERSECTION DETECTION SYSTEM (CAMERA)

Subsection 614.13 shall include the following:

Intersection Detection System (Camera) shall be measured and paid by the number of cameras to be installed. The item shall include all labor, materials, and ancillary hardware required to provide a fully-functional camera system to the satisfaction of the Project Manager.

Subsection 614.14 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Intersection Detection System (Camera)	Each

END OF SECTION REVISION

REVISION OF SECTION 614
TELEMETRY (FIELD)

Section 614 of the Standard Specifications is hereby revised for this project as follows.
Subsection 614.01 shall include the following:

Subsection 614.08 shall include the following:

Fiber Optic Patch Pigtail:

The fiber optic pigtail cables shall consist of MM fibers housed individually in protective jackets. Both ends of the cable shall be connected. Fiber optic patch cord cable shall be suitable for operation over a temperature range of -30 degrees to +60 degrees Celsius. Fiber optic patch cord cables shall be of length suitably long to be connected between the interconnect panel and the communications equipment (i.e. fiber optic transceivers). Patch cord couplings shall be compatible with termination points. Appropriate strain relief in the cabinet (through cable ties) shall be installed at a minimum of three locations. Sufficient slack shall be left to allow relocation of the equipment anywhere in the cabinet. The attenuation of a fiber optic patch cord cable after installation, not including the connector loss, shall not exceed 0.1 dB measured at 850 nm and 1300 nm.

Connectors:

The connector shall have a ceramic ferrule with a nickel-plated nut and body. The connector shall be an AT&T ST style compatible field mounted connector. The connector shall be compatible with a physical contact (PC) finish. All connectors shall be polished to a PC finish such that the return loss per mated pair of connectors is less than -25 dB. The return loss when the connector is mated with previously installed connectors shall be less than -18 dB.

The connector insertion loss shall not be greater than 0.20 dB (typical). The connector loss shall not vary more than 0.20 dB after 1000 repeated matings. Tensile strength shall withstand an axial load of 20 lb. with less than 0.20 dB change.

Index matching fluids or gels shall not be used. The connectors shall be compatible with the optical fiber surrounding jacket and shall be installed on one end of the optical fiber in accordance with the manufacturer's recommended materials, equipment and practices. The connector shall be suitable for the intended environment and shall meet the following environmental conditions:

Operating Temperature: -40° to +80º C
Storage Temperature: -40° to +85° C

The connector loss shall not vary more than 0.20 dB over the operating temperature range. Connectors shall be protected by a suitably installed waterproof protection cap.

REVISION OF SECTION 614
TELEMETRY (FIELD)

***Miscellaneous Cabling*:**

Fiber optic patch cords shall be fiber optic jumper cable, duplex, ceramic ferrule, MM 62.5 nm, adaptable to AT&T ST style connectors, 2 meters in length, ITT Canon Model 161001-4020 or approved equal. Cable from fiber optic modem to Port 3 controller harness shall be 25-pin cable Model 44982G4 or approved equal. The Contractor shall deliver transceivers to the City's Traffic Signal Shop. Contact Joe Strauss (720) 865-4062 for coordination.

***Optical Splice Closures*:**

Coyote Runt or Coyote Pup Type closures shall be provided for splicing lateral fiber optic cables to the main (backbone) fiber cable in all pull box locations that are identified in the plans. All closures shall include 1-Inch future port kit (part no. 8003408, Pre-Formed Line Products). The Coyote Runt Closure shall be used at locations with 3 fiber optic cables. In locations requiring more than 3 cables, a Coyote Pup Closure shall be installed.

Subsection 614.13 shall include the following:

Telemetry (Field) shall be measured by the total number of cabinets at which the interconnect cable is fanned out, terminated, connected, patch panels and fiber-optic interfaces installed. All labor and materials required to perform panel installations, provide in-cabinet strain relief, fan-out, cable termination and connection to the controller is considered included in the unit price for this item.

This item, therefore, includes the following:

1. All required in-cabinet cable ties and strain relief (including ancillary hardware and labor to complete);
2. All required fan-out kits, kit tools, ancillary hardware and labor to accomplish the fan-out at the cabinet;
3. All required pigtails and harness cables;
4. All required interconnect centers and fiber optic interface panels in individual controller cabinets as shown in the plans;
    - All required termination enclosures (including specified features), connectors, adapters,jumpers, pigtails, patch cord cables, ancillary hardware and labor required to accomplish the cabinet termination;
    - All required optical splice closures;
    - All other labor and material necessary to complete the item

REVISION OF SECTION 614
TELEMETRY (FIELD)

All labor and materials necessary to complete this item shall be considered included in the unit price and will not be paid separately.

Subsection 614.14 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Telemetry (Field)	Each

END OF SECTION REVISION

REVISION OF SECTION 614
FIBER OPTIC CABLE (SPECIAL)

Section 614 of the Standard Specifications is hereby revised for this project as follows:
Subsection 614.01 shall include the following:

This work is for the installation of either the 72 strands (48 Single Mode and 24 Multi Mode) or the 48 strands (24 Single Mode and 24 Multi Mode) fiber optic communications cable to be installed in conduit or duct as specified in the plans. The Fiber Optic Cable shall meet the requirements of the Project Special Provision, 614 Loose Tube Fiber Optic Cable included in this specification package for all fiber optic cable furnished on this project.

All fiber-optic interconnect cable shall be furnished and installed by the Contractor as shown on the plans. The number denoted prior to the "MM" designator identifies the number of multi-mode fibers (Strands) in the cable. The number denoted prior to the "SM" designator identifies the number of single-mode fibers (Strands) in the cable. The main cable shall be installed in continuous runs except where maximum pull lengths govern. Manufacturer's recommended limits for cable pull lengths shall not be exceeded.

Cable ends shall be stored in pull boxes or splice closures at locations indicated in the plans or as directed by the Engineer. Fibers to be spliced and/or connected in any manner shall be limited to those identified in the plans, and only in designated controller cabinets or splice closures. All other fibers shall be left uncut or sealed as appropriate in a manner recommended by the cable manufacturer.

Fiber optic cable shall be installed in a continuous run between all controller cabinets and splice closures as shown in the plans. Lateral cables shall be spliced only in splice closures and routed to the controllers as shown in the plans. **Under no conditions shall the fiber cable be cut out or spliced at intermediate points without the express written direction of the Engineer.**

Cable shall be installed in new conduit or existing conduit as specified in the plans. The Contractor shall be required to leave a minimum of 10 feet of cable slack in the equipment controller cabinet. The Contractor shall leave a minimum of 50 feet of cable slack in the communication pull box adjacent to the controller or shall leave a minimum of 50 feet of slack in all other communication pull boxes.

Fiber optic cable shall be neatly coiled and clearly tagged and labeled at each communication pull box and at all locations where the fiber is exposed. Cable tags and Labels shall be as follows:

Materials: Metal or heavy plastic identification tags with cable type and number, copper pair or optic number assignments, and destination shall be provided on both ends of all cables (except station cables) and all splice cases. All cables shall be clearly labeled with cable number (City to determine scheme) and size at each end of the cable, when it enters or leaves a conduit and at 30-foot intervals when run in accessible areas such as tunnels, manholes, ceilings, etc.

Manufacturer: Tags shall be 3M, Panduit or an approved equivalent.

Controller cabinets to be connected under this project will connect directly to the appropriate controller as shown in the plans. This connection will be paid under Telemetry (Field).

REVISION OF SECTION 614
FIBER OPTIC CABLE – GENERAL

General Requirements: The Contractor shall provide the Engineer or Engineer's designee with two copies of the cable manufacturer's cable specifications and installation instructions for fiber optic cable in conduit. All installation shall be in accordance with these practices except as otherwise directed by the Engineer or Engineer's designee.

Additional cable costs due to damage caused by the Contractor's neglect of recommended procedures shall be Contractor's responsibility. The main cable shall be installed in continuous runs except where cable type changes or where maximum pull lengths govern. The manufacturer's recommended limits for cable pull tensions shall not be exceeded. Cable ends shall be stored in controller cabinets or pull boxes immediately adjacent to cabinets or as directed by the Engineer or Engineer's designee.

Lateral and Branch cables shall be installed using appropriate strain relief in the cabinet (through cable ties) at a minimum of three locations.

All fiber optic cables to be installed shall be checked with an OTDR before and after installation. Documentation of fiber performance shall be provided to the Engineer or Engineer's designee within 30 days of test. All optical fibers shall be within the manufacturer's recommended tolerances. In addition, any other acceptance testing recommended by the manufacturer shall be provided. Data shall be supplied to the Engineer or Engineer's designee prior to completion of the project.

Fiber optic cable shall be transported to site using cable reel trailers. Care shall be taken at all times to avoid scraping, denting, twisting, or otherwise damaging the cable before, during and after installation. Damaged cable shall be replaced by the Contractor without additional compensation.

Cable shall be installed in conduit or duct in the field in accordance with the contract drawings. The conduit and duct ends shall have all rough edges smoothed to prevent scraping the cable. All existing or suspected dirt and debris within the conduit shall be cleaned with compressed air before installing cable. A manufacturer recommended lubricant shall be applied to the cable to reduce friction between the cable and duct or conduit. Where fiber optic cables are to be installed in inner duct, the Contractor shall secure each section of the conduit to prevent it from being pulled without the cables.

A cable grip shall be attached to the cables so that no direct force is applied to the optical fiber. The cable grip shall have a ball-bearing swivel to prevent the cable from twisting during pulling. Cable rollers and feeders and winch cable blocks shall be used to guide the cable freely into the duct and at maintenance hole locations. Mechanical aids and pulling cable or ropes shall be used as required. **The maximum pulling tension as defined by the cable manufacturer shall not be exceeded.** The cable shall be taken up at intermediate pulling points with an intermediate cable take-up device as approved by the Engineer or Engineer's designee to prevent over-tension on the cable. Cable pulls shall be continuous and steady between pull points and shall not be interrupted until the entire run of cable has been pulled. Personnel equipped with two-way radios shall be stationed at each maintenance hole, cabinet, pedestal, communications box, and junction box through which the cable is to be pulled to observe and lubricate the cable. Intermediate splices between pull boxes shall not be allowed. The cable shall be securely fastened in place within pull boxes, pedestals, manholes and cabinets.

REVISION OF SECTION 614
FIBER OPTIC CABLE - GENERAL

The contractor shall ensure cable length is sufficient to allow for connection between the communications equipment and the splice equipment and the splice enclosures including provision for slack, vertical runs, cable necessary for splicing, wastage and surplus cable to allow for the removal of the splice enclosure for any future splicing work.

Lateral and Branch Fiber Optic Cable: Lateral/Branch fiber optic cable shall be installed in new or existing conduit, or along existing span wire, as depicted in the plans. Cables shall be the 6 x 6 strands (6 Single Mode and 6 Multi Mode) fiber optic cables and shall be provided with appropriate strain relief in the cabinet, consisting of cable ties in at least three interior cabinet locations. Lateral and Branch fiber optic cable shall be clearly tagged and labeled as such at pull boxes and all other locations where it is exposed. At any location where the cable is brought into or out of a span wire pole, the Contractor shall install a new weather-head to accommodate the bending radius of the cable.

Fiber Optic Cable will be measured by the linear feet for the main (backbone), lateral and branch cables, and shall include all labor and materials required to install the main, lateral, branch, and start cables through conduits to all pull boxes, cabinets and closures specified in the plans.

Subsection 614.13 shall include the following:

Installation of the fiber optic cables shall be measured by the total linear feet of cables installed and accepted.

END OF SECTION REVISION

-1-
REVISION OF SECTION 614
PEDESTRIAN PUSH BUTTON

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.08 (f) shall include the following:

1-1: Push button assemblies shall be of the direct push button solid state contact type and shall not have any levers, handles or toggle switches externally or internally. The pushbutton shall be of tamperproof and all weather construction. The pushbutton shall have a protective shroud that is an integral part of the cover and it shall encircle the pushbutton actuator to deter vandalism. The assembly shall be made weatherproof and shockproof by means of synthetic rubber gaskets between the cover and the enclosure and between the plunger and the cover so that it shall be impossible to receive an electrical shock under any weather conditions. The front cover plate shall be secured with stainless steel vandal resistant screws. The push button shall operate on logic ground.

1-2: The solid state switch shall be entirely insulated from the housing and operating button. The pushbutton shall consist of a 2 inch 303 stainless steel metal plunger and an oil and gasoline resistant Piezo driven solid state switch, all encased in a high impact thermoplastic enclosure with four (4) stainless steel mounting screws. The solid state switch shall be normally open and shall be closed with a minimum of pressure on the button (3lb ± 1lb), restoring immediately to the normally open position when the pressure is released.

The aluminum housing shall be the flat back frame type with adjustable mounting staves that will readily enable it to be mounted on any size traffic signal pole or push button standard. The housing shall have a ½ inch access hole in the rear for wiring. The housing shall have a bottom threaded conduit entrance hole and shall be provided with a threaded plug so that access is only possible from the rear of the housing. The plug shall not be removable with ordinary tools. The housing shall be painted Dark Olive/Federal Green baked enamel matching to Federal Standard 595A color #14056.
The frame shall have a cast aluminum attachment to allow the mounting of a 9” X 12” pedestrian instruction sign. By removal of 4 screws the frame shall convert to allow the mounting of a 5” X 7 ¾” pedestrian instruction sign.
Pedestrian Instruction Sign:

2-1: Pedestrian instruction signs shall conform to the latest version of the M.U.T.C.D., published by the U.S. Department of Transportation Federal Highway Administration.

2-2: Pedestrian instruction signs shall be Type R10-3a, Type R10-3b, Type R10-3c, R10-3d, and R10-3e as specified in the contract documents (or bid documents).

Pedestrian instruction signs shall be constructed in accordance with the applicable provisions of the current CCD Standard Specifications. Pedestrian instruction sign need not be reflectorized. The sign shall be fabricated with 0.063 aluminum. The signs shall be mounted using four 5/16” mounting holes 4” X 6 ¾” for the 5” X 7 ¾” sign and 7” X 10” for the 9” x 12” sign. The pedestrian instruction signs shall have rounded corners ¾” radius for the 5” X 7 ¾” sign and 1 ½” radius for the 9” X 12” sign.

REVISION OF SECTION OF 614
PEDESTRIAN PUSH BUTTON AND INSTRUCTION SIGN

Subsection 614.13 shall include the following:

Pedestrian Push Button and Instruction Sign shall be measured by the number of units installed and accepted.

Subsection 614.14 shall include the following:

Pay Item	**Pay Unit**
Pedestrian Push Button	Each

END OF SECTION REVISION

REVISION OF SECTION 614
TEST FIBER OPTIC CABLE

Section 614 of the Standard Specifications is hereby revised for this project as follows.
Subsection 614.08(p), Test Fiber Optic Cable, is hereby added to the Standard Specifications and shall include the following:

This work consists of testing fiber optic cable. Testing shall include both new cable and existing cable. The test procedures involve an OTDR test and an Optical Power Meter Test.

The guidelines for fiber optic cable testing include:

Test jumpers and patch cords must be of the same fiber core size and connector type as the cable system.

The light source and OTDR must operate with the range of 1310±10 nm or 1550±20 nm for testing in accordance with ANSI/EIA/TIA-526-7.

The power meter and the light source must be set to the same wavelength during testing.

The power meter must be calibrated and traceable to the National Institute of Standards and Technology (NIST).

All system connectors, adapters and jumpers must be cleaned as per manufacturer's instructions before measurements are taken.

MATERIALS

The following items are required to perform fiber optic cable tests:

- an OTDR;
- a test reel, if necessary;
- a light source at the appropriate wavelength;
- Optical Power Measurement Equipment; and
- Test Jumpers as specified below.
  - (a) CPR Test Jumper-1 and Test Jumper-2 shall be 1-5 meters long with connectors compatible with the light source and power meter and have the same fiber construction as the link segment being tested.

OPTICAL FIBER CABLE TESTING WITH O.T.D.R

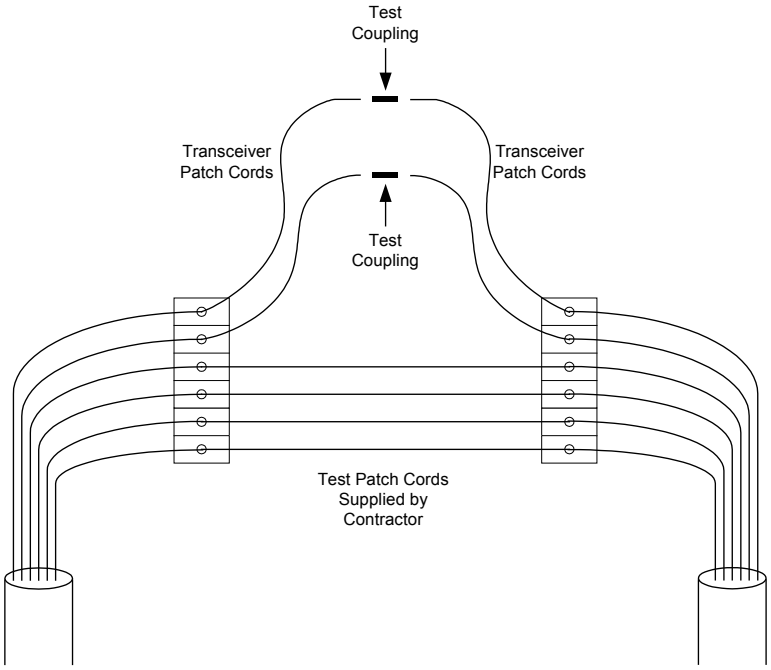
The Contractor shall perform an OTDR test of all fibers in all tubes on the reel prior to installation of the fiber. The test results shall be supplied to the Engineer or Engineer's designee prior to installation of the cable.

If the fiber is specified as "Install Only", the Contractor shall test the fiber on the reel and provide the test results to the Engineer or Engineer's designee prior to accepting the cable. After installation, if there are unused portions of cable remaining on the reel, the Engineer or Engineer's designee may request the Contractor or other qualified technician to perform a reel test.

REVISION OF SECTION 614
TEST FIBER OPTIC CABLE

The Contractor shall provide the Engineer or Engineer's designee the test results prior to delivering the cable to the Engineer or Engineer's designee. Any cable damaged while in the Contractor's possession shall be replaced at the Contractor's expense.

All fiber testing shall be performed on all fibers in the completed end-to-end system. Testing shall consist of a bi-directional end-to-end OTDR trace performed per TIA/EIA-455-61. The system margin loss measurements shall be provided at 1310 and 1550nm. If the Plans require installation of a fiber optic patch panel, the Contractor shall supply patch cords to patch all terminated fibers through the panel for all fiber testing. If patch cords are specified in the Plans for final equipment installation, these patch cords shall be connected using a test coupling for the end-to-end test.



OTDR readings will be used to ensure proper installation and to troubleshoot faults. OTDR signature traces will be used for documentation and maintenance. An OTDR provides an indirect estimate of the loss of the cable plant, generally, more accurate or reliable values will be obtained by using an Optical Power Meter. For fibers that are identified in the Plans to be left non-terminated, an OTDR shall be used to test end-to-end attenuation.

Loss numbers for the installed link shall be calculated by taking the sum of the bi-directional measurements and dividing that sum by two.

The Contractor shall use an OTDR that is capable of storing traces electronically and shall save each final trace.

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REVISION OF SECTION 614
TEST FIBER OPTIC CABLE

To ensure the traces identify the end points of the fiber under test and the fiber designation, the Contractor shall use a test reel, if required, to eliminate the "dead zone" at the start of the trace so

that the start of the fiber under test can be identified on the trace. Indicate the length of the test reel for all test results.

If the fiber designation is not indicated on the trace itself, the Contractor shall provide a cross-reference table between the stored trace file name and the fiber designation.

In compliance with EIA/TIA-455-61 "Measurement of Fiber or Cable Attenuation Using an OTDR" the Contractor shall record the following information during the test procedure:

- Names of personnel conducting the test.
- Type of test equipment used (manufacturer, model, serial number, calibration date).
- Date test is being performed.
- Optical source wavelength and spectral width.
- Fiber identification.
- End point locations.
- Launch conditions
- Method of calculation for the attenuation or attenuation coefficient.
- Acceptable link attenuation.

OPTIC FIBER CABLE TESTING WITH OPTICAL POWER METER

The Contractor shall conduct an Optical Power Meter Test for each fiber installed.

Fiber optic cable segments shall be tested in one direction at both the 1310 nm and 1550 nm wavelength.

In compliance with TIA/EIA-526-7 "Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant," the following information shall be recorded during the test procedure:

- Names of personnel conducting the test.
- Type of test equipment used (manufacturer, model, serial number, calibration date).
- Date test is being performed.
- Optical source wavelength and spectral width.
- Fiber identification.
- End point locations.
- Test direction.
- Reference power measurement (when not using a power meter with a Relative Power Measurement Mode).
- Measured attenuation of the link segment.
- Acceptable link attenuation.

The minor attenuation differences due to test direction are on par with the accuracy and repeatability of the test method. Lateral segments within a building are limited to 90 meters. Therefore, attenuation differences caused by wavelength are insignificant, and as a result, single wavelength testing is sufficient.

ACCEPTABLE ATTENUATION VALUES

Acceptable attenuation values shall be calculated for each fiber tested. These values represent the maximum acceptable test values.

SM Fiber. The general attenuation equation for any SM link segment is as follows:

Acceptable Link Attn. = Cable Attn. + Connector Attn. + Splice Attn.

8.3 μm Single-mode Attenuation Coefficients:

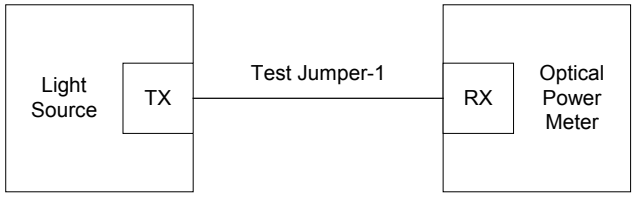
Cable Attn.=Cable Length (km) x (0.34 dB/km@1310 nm or 0.25 dB/km@1550 nm)
Connection Attn. (ST or SC connectors)=(No. of Connections x 0.39 dB)+0.42 dB.
Connection Attn. (LC connectors)=(No. of Connections x 0.14 dB)+0.24 dB.
Splice Attn. (Mechanical or Fusion)=Splices x 0.30 dB.

TEST PROCEDURES

All fiber testing shall be performed on all fibers in the completed end-to-end system.

The Optical Power Meter fiber test shall be conducted as follows:

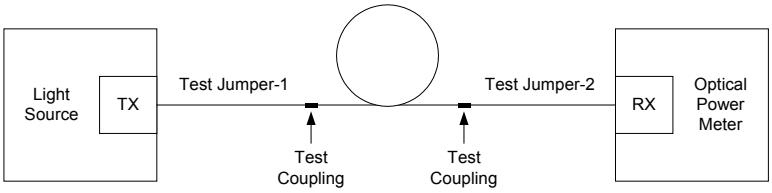
Clean the test jumper connectors and the test coupling per manufacturer's instructions.
Follow the test equipment manufacturer's initial adjustment instructions.
Connect Test Jumper-1 between the light source and the power meter. Avoid placing bends in the jumper that are less than 100 mm (4 inches) in diameter.



If the power meter has a Relative Power Measurement Mode, select it. If it does not, reduce the Reference Power Measurement (P_{ref}). If the meter can display power levels in dBm, select this unit of measurement to simplify subsequent calculations.

Disconnect Test Jumper-1 from the power meter. Do NOT disconnect the test jumper from the light source.

Attach Test Jumper-1 to one end of the cable plant to be measured and Test Jumper-2 to the other end.



Record the Power Measurement (P_{sum}). If the power meter is in Relative Power Measurement Mode, the meter reading represents the true value. If the meter does not have a Relative Power

Measurement Mode, perform the following calculation:

If P_{sum} and P_{ref} are in the same logarithmic units (dBm, dBu, etc.):
CPR (dB) = P_{sum} - P_{ref}
If P_{sum} and P_{ref} are in watts:
CPR (dB)= 10 x $\log_{10}$ [O_{sum}/P_{ref}]

TEST ACCEPTANCE

The Contractor shall demonstrate that each Optical Power Test results in acceptable attenuation values.

The Contractor, solely at the Contractor's cost, shall remake any fusion splices that have test results exceeding acceptable attenuation values.

The Contractor, solely at the Contractor's cost, shall retest any fiber links that have been re-spliced.

The Contractor, solely at the Contractor's cost, shall bring any link not meeting the requirements of this specification into compliance.

SUBMITTALS

The Contractor shall submit test results documentation as both a hard copy and electronic copy.

After each reel test, the Contractor shall submit one hard copy of the OTDR trace for every fiber on the reel. After installation, the Contractor shall submit one hard copy of the OTDR trace for every spliced fiber. Hard copy traces shall be organized and bound in logical order in an 8 ½" x 11" hard cover binder.

REVISION OF SECTION 614
TEST FIBER OPTIC CABLE

The Contractor shall submit, after approval of the hard copy traces, electronic copies of all traces and appropriate software to allow reading the traces. The Contractor shall submit one copy of the complete contract Plans, including additional drawings issued as part of any change orders, with any deviations clearly marked in color. Deviations to be noted and shall include but not be limited to the following:

- Fiber Splice location;
- Fiber Splice configuration; and
- Termination layout.

Subsection 614.13 shall include the following:

The complete end-to-end OTDR test on one fiber, including document submission, represents one OTDR test.

The complete end-to-end optical power meter test on one fiber, including document submission, represents one optical power meter test.

Subsection 614.14 shall include the following:

Payment will be made under:

Pay Item:	**Pay Unit**
Test Fiber Optic Cable	Lump Sum

Payment shall include all labor, materials, and equipment required for a complete and operational system.

END OF SECTION REVISION

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REVISION OF SECTION 614
SIGN PANELS

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.04, first paragraph, last sentence shall be deleted and replaced with:

All new ground mounted traffic signs shall be retro-reflective and conform to at least ANSI Standards for Type III sign sheeting material. Type VII or Type VIII sheeting material is acceptable. All new overhead mounted traffic signs shall be retro-reflective and conform to ANSI Standard for Type IX sign sheeting material.

END OF SECTION REVISION

REVISION OF SECTION 614
LED PEDESTRIAN SIGNAL HEAD (COUNT DOWN)

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.01 shall include the following:

This work includes the installation of LED Pedestrian Signal Faces with countdown timers as shown in the Contract.

Subsection 614.08 (h) shall include the following:

Pedestrian signal faces with count down timers shall meet the following requirements:

i. The dimensions of the signal housing and the LED symbols, as well as moisture and dust resistance requirements shall be in accordance with the current ITE PTCSI Standards.
ii. Signal housing shall be aluminum, painted in Federal Green and "clam-shell" mounted.
iii. The signal shall have user-selectable modes for countdown for walk cycle only, pedestrian cycle only, or both walk and pedestrian clearance.
iv. The countdown module shall have an internal conflict monitor to prevent any possible conflicts between the Hand/Person signal indications and the time display. The display shall not countdown during a Solid Hand indication.
v. LED symbols shall be solid icons and shall provide uniform light dispersion such that the "pixel" effect is minimized. Lettered or outline symbol styles will not be permitted.
vi. The Man/Hand configuration shall provide clear and distinct lamination where either symbol is in use.
vii. The LED module shall be rated for use in an ambient operating temperature range of -40° F to 165° F.
viii. The signal shall meet NEMA Standard TS2 for voltage surge protection, and shall have an automatic reset in case of a power outage.

Subsection 614.13 shall include the following:

LED Pedestrian Signal Face (16) (Count down) will be measured by the actual number of units that are installed and accepted.

Subsection 614.14 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Pedestrian Signal Face (16) (Count Down)	Each

END OF SECTION REVISION

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REVISION OF SECTION 614
TRAFFIC CONTROL DEVICES

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.08 (h) shall include the following:

"Light Emitting Diode" (LED signal lenses shall be installed in all Red, Yellow, Green, Walk and Don't Walk signal sections. This work shall be included in the cost of the Traffic Signal Face and will not be paid for separately.

END OF SECTION REVISION

REVISION OF SECTION 614
EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.08 shall include the following:

System Description:

The emergency vehicle traffic signal priority control system shall enable designated vehicles to remotely cause the traffic signal controller to advance to and/or hold a desired traffic signal display by using existing controller functions. The control shall be activated at a minimum distance of 548.6M (1,800 feet) along an unobstructed "line of sight" path. The control shall not terminate until the vehicle is within 12.2M (40 feet) of the detector or at the intersection.

The system shall consist of the following components:

A. Vehicle Emitter which shall be mounted on the emergency vehicle and shall transmit optical energy signals only in the forward direction. If the municipality presently uses optical pre-emption, the emitters shall be of the same manufacture currently used by the City and County of Denver Fire Department.

B. Phase Selector (minimum 2 channels) which shall cause the signal controller to advance to and/or hold the desired traffic signal display for the emergency vehicle. A pre-emption system chassis shall house two phase selectors.

C. Optical Detector which shall be mounted on or near a traffic signal and shall receive the optical energy signals generated by the Vehicle Emitter.
   a. Detector (Type A), 1 Direction, 1 Channel
   b. Detector (Type B), 2 Direction, 1 Channel
   c. Detector (Type C), 2 Direction, 2 Channel

D. Detector Cable (Optical).

System Operations:

A. The operating sequence shall be initiated when the optical detector receives the required optical energy signal from the Emitter.

B. The phase selector shall cause the traffic signal controller to advance to and/or hold the desired traffic signal display for the emergency vehicle.

C. The phase selector shall cause the controller to advance to and/or hold the desired traffic signal display even if the optical energy signals cease before the desired display is obtained.

D. The phase selector shall allow the traffic signal controller to resume normal operation within ten seconds after optical energy signals cease if the optical energy signals cease after the desired traffic signal display is obtained.

E. The phase selector shall not respond to optical energy signals from an emergency vehicle if it is already processing optical energy signals from another emergency vehicle.

System Components:

A. Vehicle Emitter:

The emitter assembly consists of an emitter and power supply and an emitter control switch assembly. The emitter assembly is mounted on a vehicle and produces a flashing optical signal when in operation. The following shall apply to the vehicle emitter:

1. Shall operate on ten to fifteen volts DC input voltage, but shall not be damaged by input voltage surges up to twenty-five volts DC.

2. Shall be controlled by a single on/off switch that requires no other adjustments by the operator. The on/off condition shall be indicated by a light located adjacent to the switch.

3. Shall be automatically disabled or de-activated by one or a combination of the following: seat switch, emergency brake switch, door switch, and transmission safety switch.

4. Shall operate over an ambient temperature range of minus 34O C to plus 60O C. (minus 30O F. to plus 140O F.)

5. Shall operate in 0 to 95 % humidity.

6. Shall be a pulsed optical energy source with a controlled repetition rate.

7. Shall not generate voltage transients on the battery input line which exceed battery voltage by more than four volts.

8. Shall produce optical energy in a cone of not more than 90 degrees horizontal and not more than 30 degrees vertical. The detectors and/or phase selector shall not sense a pre-emption signal from an emitter outside this cone.

B. Optical Detector:

The optical detector receives the high intensity optical pulses produced by the emitter. These optical energy pulses are transformed by the detector into appropriate electrical signals which are transmitted to the phase selector. The optical detector is mounted at or near the intersection in a location which permits an unobstructed line of sight to vehicular approaches. The units may be mounted on signal span wires, mast arms or other appropriate structures. The following shall apply to the optical detector:

1. Shall produce optical energy in a cone of not more than 90 degrees horizontal and not more than 30 degrees vertical. The detectors and/or phase selector shall not sense a pre-emption signal from an emitter outside this cone.
2. Shall be of solid state construction.
3. Shall operate over an ambient temperature range of minus 34O C to plus 60O C. (minus 30O F. to plus 140O F.)
4. Shall have internal circuitry potted in a semi-flexible compound to ensure moisture resistance.
5. Shall operate in 0 to 95 % humidity.
6. Shall have a cone of detection of not more than 13 degrees. The detector and/or phase selector shall not sense a pre-emption signal from an emitter outside this cone.

C. Phase Selector:

The phase selector supplies power to and receives electrical signals from the optical detector. When detector signals are recognized as a valid call, the phase selector causes the signal controller to advance to and/or hold the desired traffic signal display. This is accomplished by activating the pre-empt input to the controller.

The phase selector is capable of assigning priority traffic movement to one of two channels on a first-come, first-serve basis. Each channel is connected to select a particular traffic movement from those normally available within the controller. Once a call is recognized, "commit to green" circuitry in the phase selector functions so that the desired green indication will be obtained even if optical communication is lost. After serving a priority traffic demand, the phase selector will release the controller to follow normal sequence operation. The following shall apply to the phase selector:

1. Shall include an internal power supply to supply power to the optical detectors.
2. Shall have minimum two-channel operation with the capability of interfacing with an additional phase selector for expansion of channels of operation.
3. Shall have adjustable detector range controls for each channel of operation, from 12M (40 feet) to 548M (1800 feet).
4. Shall have solid state indicator lights for power on and channel called.
5. Shall operate over an ambient temperature range of minus 34O C to plus 60O C (minus 30O F. to plus 140O F.)
6. Shall operate in 0 to 95 % humidity.

REVISION OF SECTION 614
EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM

D. Detector Cable (Optical):

The following shall apply to the detector cable:

1. 3-Conductor cable with shield and ground wire.
2. AWG #20 (7x28) stranded.
3. Individually tinned copper strands.
4. Conductor insulation: 600 volt, 75 deg. C (167O F.).
5. 1 Conductor-yellow; 1 Conductor-blue; 1 Conductor-orange.
6. Aluminized Mylar shield tape or equivalent.
7. AWG #20 (7x28) stranded uninsulated drain wire
8. DC resistance not to exceed 11.0 ohms per 305M (1000 feet).
9. Capacitance from one conductor to other two conductors and shield not to exceed 157pf/M (48pf /ft.).
10. Jacket: 600 volts, 80 deg. C (176O F.), minimum average wall thickness - 1.14mm (.045").
11. Finished O.D.: 7.62mm (0.3") max.

System Interface:

System shall be capable of operating in a computerized traffic management system when appropriate interfacing is provided by the computer supplier.

General:

The Contractor shall furnish the manufacturer the phasing diagrams indicating controller sequence and timing.

The Contractor shall secure from the manufacturer a guarantee for the equipment for a period of sixty (60) months, which time shall commence from the date of delivery. Manufacturer shall certify upon request that all materials furnished will conform to this specification. The manufacturer or his designated representative shall be responsible for determining and setting all required range and emitter intensity for the emergency vehicle operation.

REVISION OF SECTION 614
EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM

Construction Methods:
All equipment except the vehicle emitter assembly shall be installed and wired in a neat and orderly manner in conformance with the manufacturers' instructions. The vehicle emitter assembly shall be delivered to a designated City representative.

Installation of the vehicle emitter assembly shall be the responsibility of the City and County of Denver Fire Department.

Traffic signals owned and maintained by the State that have optical pre-emption equipment owned and maintained by the town shall have an Auxiliary Equipment Cabinet (AEC) attached to the controller cabinet. The optical pre-emption equipment shall be housed in the AEC. Traffic signals owned and maintained by the town do not require an AEC to house the pre-emption equipment.

Detector cables shall be continuous with no splices between the optical detector and the AEC.

Detector locations shown on the plan are for illustration purposes only. Exact location shall be determined by the contractor or the designated representative for the best possible line of sight.

If not present in an existing traffic controller cabinet, the following items shall be installed and connected, in conformance with the current Functional Specifications for Traffic Control Equipment, "D" Cabinet Requirements (Pre-emption Type):

- Controller "D" harness and adapter.
- Pre-emption termination panel with terminal block and relay bases.
- Pre-emption disconnect switch, mounted on the emergency switch panel (on inside of cabinet door).
- Pre-emption test buttons, mounted on the pre-emption termination panel.

All connections from the phase selector to the "D" harness and to the cabinet wiring shall be made at the termination panel. The termination panel shall have AC+ Lights, AC-, and a switched logic ground. The switched logic ground feeds all the pre-empt inputs to the phase selector. When switched off by the pre-emption disconnect switch, the traffic controller shall not be affected by pre-empt calls from the optical pre-emption system. A minimum of two test buttons shall be provided. If there are more than two pre-empt runs, a button for each shall be installed. A chart or print out indicating the program steps and settings shall be provided along with the revised cabinet wiring diagrams.

Test the Pre-emption System According to the following Guidelines:

REVISION OF SECTION 614
EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM

1. Notify the system owner/user, such as the Municipal Fire Chief or City Traffic Engineer, of the scheduled inspection

2. Request a fire department representative and an emergency vehicle, which has an emitter to conduct the test. If not available, the contractor shall provide an emitter.

3. In the presence of the Engineer and the municipal representative, test each pre-empted approach with the emergency vehicle. Test the following items of the system:

    a. Confirm that the emitter activates the phase selector and the phase selector activates the correct pre-emption input to the controller.

    b. Confirm adequate range. The traffic signal must be pre-empted to green sufficiently in advance of the emergency vehicle arrival. The vehicle emitter shall initiate pre-emption at a minimum distance of 548.6M (1800 feet).

    c. Confirm there are no false calls. Keep the emitter active as the emergency vehicle passes through the intersection. No other optical detectors shall sense the strobe.

4. Document the test. Provide the Engineer and, upon request, the municipality copies of the test results.

If a malfunction is found or the system needs adjustment (such as range, emitter intensity, or detector location), schedule a follow-up test. Repeat the above steps for all approaches that did not pass.

All adjustments such as emitter intensity, phase selector range, sensitivity, detector placement, shall be made at the intersection by the contractor so that the optical pre-emption operates correctly with other major manufacturers' equipment currently owned by the town.

Subsection 614.13 shall include the following:

Emergency Vehicle Traffic Signal Priority Control System units shall include a four-channel card and the number of detectors as shown on the plans. Emergency Vehicle Traffic Signal Priority Control System shall be measured and paid by the number of intersections at which the system is installed. The item shall include all labor, materials, and ancillary hardware required to provide a fully functioning system to the satisfaction of the Engineer.

Subsection 614.14 shall include the following:

Pay Item	**Pay Unit**
Emergency Vehicle Traffic Signal Priority Control System	Each

END OF SECTION REVISION

REVISION OF SECTION 614
ETHERNET MANAGED SWITCH

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Subsection 614.01 shall include the following:

This work consists of furnishing and installation of an Ethernet Managed Field Switch, in the CCD controller cabinets. The switch shall be compatible with the existing system.

Subsection 614.08 shall include the following:

An Ethernet Managed Field Switch is hereby added to the Standard Specifications and shall comply with the following specifications:

General System Requirements –The Ethernet Managed Field Switch, or equivalent with the Industrial Ethernet Managed Field Switch, shall be a Garrettcom Magnum Ethernet Managed Field Switch comprising of the following four (4) parts:

(1) 6KQ-24VDC base unit with four 10/100 copper ports in slot A (without 24VDC power supply).
(2) 6KQ-RJ45 module with four 10/100 copper ports in slot B.
(3) 6KQ4-MLC module with four 100Mb 2km multi-mode LC fiber ports in slot C.
(4) 6KQ-BLNK blank cover for 1 unused module in slot C.

The field switch must also meet the following requirements:

- May be configured with a variety of 10/100/1000 Mb fiber and copper port connector types - 16 total ports maximum.
- Heavy duty and environmentally hardened fully enclosed metal case with advanced thermal design used as a heat sink (no fan).
- Dual LEDs for all-around status viewing.
- Wire speed filtering and forwarding across all ports - 802.3x flow control, 802.1p priority packet processing, self learning 4K-node address table, large 240KB packet buffers for 10/100 and 120KB for 1000Mb.

The unit shall be configured as a minimum:

Filtering/Forwarding Rate Performance:

- Ethernet (10Mb):14,880 pps
- Fast Ethernet (100Mb): 148,800 pps
- Gigabit Ethernet (1000Mb): 1, 488,000 pps
- Switching Processing Type: Store and Forward with IEEE 802.3x full duplex flow control, non-blocking
- Data Rate: 10Mbps, 100Mbps and 1000Mbps
- Address Table Capacity: 4K node, self-learning with address aging
- Packet buffer size: 240KB for 10/100 and 120KB for 1000Mb

- Latency: 5 µs + packet time (100 to 100Mbps); 15 µs + packet time (10 to 10 Mbps, and 10 to 100Mbps)
- Throughput with 12 10/100 and 2Glink max.- 4.76M pps (Transmit)
- Back plane- 2.66 GB/s per slot LEDs:
- Per Port (one set at the port, one set on swivel top on right side)
- LK: Steady ON when media link is operational
- ACT: ON with receiver port activity
- FDX/HDX: ON = Full-Duplex Mode; OFF = Half-Duplex Mode
- 100/10: ON = 100Mbps speed; OFF = 10 Mbps

Network cable connectors:

- 1000Mb fiber ports: all standard Gb SFP Transceiver types supported
- 1000Mb copper ports: 10/100/1000Mb auto-negotiating, Cat5e & 6 UTP/STP
- 100Mb Copper and PoE: Category 5 UTP/STP; 10 Mb: Cat. 3, 4, 5 UTP/STP
- 100 Mb Fiber ports connector options: multi-mode FX-MTRJ, LC, ST, SC; Single-mode 15Km LC, 20Km SC and ST, and 40 Km “long reach” single-modes SC.

Operating Environment:

- Ambient Temperature: -40° to 140° F (-40° to 60°C)

Alarm Relay Contacts:

- One NC indicating internal power, one NC software controllable

DC Power Supply:

- 24VDC Power Input nominal (range 18 to 36VDC)
- Power Consumption: 35 watts worst case (for a fully loaded fiber model); 12 watts typical (for a small 4 port copper-only model)

Vertical mounting normal:

- Suitable for wall or DIN-Rail mounting

Testing Requirements - The Contractor shall supply one unit of Ethernet Managed Switch to the Engineer for specification compliance testing and approval. If the product passes the specification compliance testing and approval evaluation, the Contractor will be notified to complete the order. If the product does not pass the specification compliance testing and approval evaluation by CCD-TES, the test unit will be returned back to the Contractor. The Contractor shall supply other units until satisfactory test results are achieved.

REVISION OF SECTION 614
ETHERNET MANAGED SWITCH

Subsection 614.13 shall include the following:

The Ethernet Managed Switch will be measured by the number of units fully operational and tested in accordance with this specification or as directed by the Engineer. All work and installation shall include all wiring for hook-up and related labor and material required for the completion of the installation. All necessary documentation and testing shall also be included in the contract bid price.

Subsection 614.14 shall include the following:

Each package shall contain one Ethernet Managed Field Switch, set of mounting bracket, Installation and User guides, and Product Registration Card. Ethernet Manged Field Switch Package will not be paid for separately, but shall be included in the cost of the Traffic Signal Controller and Cabinet.

END OF SECTION REVISION

-1-

SPECIAL CONSTRUCTION REQUIREMENTS
TRAFFIC SIGNAL INSTALLATION
PERSONNEL REQUIREMENT

The Contractor shall adhere to the following requirements regarding Traffic Signal construction and maintenance personnel. Current Certificates showing qualifications shall be submitted at the pre-construction meeting.

(1) For any work inside the traffic signal cabinet, Signal and Signal Bench Technician shall be minimum IMSA Level II certified. This includes the completion of training in construction, corrective maintenance, and signal turn-on.
(2) For all work external to the signal cabinet, a minimum IMSA Level I Traffic Signal Field Technician/Electrician or Traffic Signal Bench Technician/Signal Technician is required. An IMSA Level II Traffic Signal Electrician shall be on the job site at all times that signalization work is taking place to ensure proper construction. A maximum ratio of four IMSA Level I to one IMSA Level II will be allowed for work external to the signal cabinet.

The United States Department of Labor – Bureau of Apprenticeship and Training may be substituted for the IMSA Level I Traffic Signal Electrician requirement.

END OF SECTION REVISION

REVISION OF SECTION 619
WATER LINES

Section 619 of the Standard Specifications is hereby revised for this project as follows:

Irrigation plastic pipe and copper pipe descriptions are specified in *Section 623, Irrigation System, Subsection 623.10.*

Subsection 619.03 shall include the following:

Construction of Waterlines, Gate Valves, Curb Stops, Temporary Water Service, New Water Services, Water Meters and Water Meter Vaults shall conform to the details and requirements of the Denver Water Department. Construction of Irrigation Waterlines shall conform to the details and requirements noted in the plans.

Water taps 2 inches and smaller will be made by Denver Water. The Contractor shall expose the main for Denver Water forces to complete the tap. Water taps 2 inches and larger will be done by the Contractor.

Subsection 619.04 shall include the following:

Gate Valves, Curb Stops, Water Meters and Water Meter Vaults will be measured by each unit installed and accepted.

The pay item 3/4 Inch Copper Pipe Connections, 1 Inch Copper Pipe Connections, 1-1/2 Inch Copper Pipe Connections will be paid for by the unit Each and will include all labor, equipment and materials for the contractor to expose the main and connect service lines to the water taps completed by Denver Water at each water tap location.

Subsection 619.05 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
3 Inch Ductile Iron Pipe	Linear Foot
6 Inch Ductile Iron Pipe	Linear Foot
8 Inch Ductile Iron Pipe	Linear Foot
6 Inch Plastic Pipe (C900)	Linear Foot
8 Inch Plastic Pipe (C900)	Linear Foot
3 Inch Gate Valve & Valve Box	Each
6 Inch Gate Valve & Valve Box	Each
8 Inch Gate Valve & Valve Box	Each
6 Inch Gate Tapping Valve & Valve Box	Each
8 Inch Gate Tapping Valve & Valve Box	Each
6 Inch Swivel Tee (All Branch Sizes)	Each
6 Inch Tapping Sleeve (All Branch Sizes)	Each
8 Inch Tapping Sleeve (All Branch Sizes)	Each
30 Inch Tapping Sleeve (All Branch Sizes)	Each
8 Inch Swivel Tee (All Branch Sizes)	Each
6 Inch Tee (All Branch Sizes)	Each
8 Inch Tee (All Branch Sizes)	Each

REVISION OF SECTION 619
WATER LINES

Pay Item	**Pay Unit**
6 Inch Horizontal Bend (All Angels)	Each
8 Inch Horizontal Bend (All Angles)	Each
6 Inch Vertical Bend (All Angles)	Each
8 Inch Vertical Bend (All Angles)	Each
Water Meter	Each
Meter Pit (24 Inch)	Each
Meter Vault	Each
Curb Stop and Box	Each
3/4 Inch Copper Pipe	Linear Foot
1 Inch Copper Pipe	Linear Foot
1-1/2 Inch Copper Pipe	Linear Foot
3/4 Inch Copper Pipe Connections	Each
1 Inch Copper Pipe Connections	Each
1-1/2 Inch Copper Pipe Connection	Each

END OF SECTION REVISION

REVISION OF SECTION 619
FIRE HYDRANT

Section 619 of the Standard Specifications is hereby revised for this project as follows:
Subsection 619.01 shall include the following:

This work consists of the installation of fire hydrants in accordance with these specifications, the Denver Water Department Design and Construction Standards, the latest revision of the American Water Works Association Standards and in conformity with the lines and grades shown on the plans or established.

Subsection 619.02 and 619.03 shall include the following:

All materials and workmanship shall be in accordance with these specifications, the Denver Water Department Design and Construction Standards and in conformity with the lines and grades shown on the plans or established. In the case of conflicts, the Water Department Standards shall control.

Fire hydrants shall be installed in accordance with the Denver Water Design and Construction Standards, all applicable technical drawings shown in the plans. The work shall include all labor and materials required for installation of the inlet pipe, valve and valve box, break-off flange and hydrant.

Subsection 619.04 shall include the following:

Fire hydrants will be measured by the actual number of the specified type installed and accepted.

Fire hydrant assembly (Extra Depth) will be measured by the actual number of hydrants greater than 5 feet from finished grade to the elbow.

Subsection 619.05 shall include the following:

The accepted quantities will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule.

Payment will be made under:

Pay Item	**Pay Unit**
Fire Hydrant Assembly	Each
Fire Hydrant Assembly (Extra depth)	Each

Excavation, bedding, backfill, compaction, pipe cutting, connections to existing piping from the main to the new Hydrant location, thrust blocks, bends, concrete foundations, felt paper or heavy vinyl sheeting, quality assurance, operations check, cleaning and testing for the installation of the fire hydrant will not be measured or paid for separately, but shall be included in the work. Construction traffic control will not be measured or paid for separately, but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 621

DETOUR PAVEMENT

Section 621 is hereby added to the Standard Specifications for this project and shall include the following:

DESCRIPTION

621.01 This work consists of installing and maintaining temporary vehicular detour pavement as shown on the Construction Zone Traffic Control Subset plans.

MATERIALS

621.02 The Contractor shall be responsible for quality control required ensuring adequate quality of materials incorporated into the production of hot bituminous pavement used in the detour pavement. The minimum detour pavement thickness shall be determined by the Contractor, but in no case shall it be less than 6-inches.

CONSTRUTION REQUIREMENTS

621.03 Detour pavement construction shall include grading, embankment material, planing and any other items necessary for the complete installation and maintenance of all required detour pavement. The Contractor shall construct temporary ditches, temporary culvert pipe, and maintain existing storm sewer necessary for the control of storm drainage. The minimum detour pavement thickness shall be 6-inches, with the actual thickness used determined by the Contractor. The Contractor shall remove all associated items installed with the detour pavement when it is no longer needed to maintain traffic.

The Contractor shall maintain the detour for the entire period that it is open to traffic, including regular sweeping. Any distress that affects the ride, safety or serviceability of the detour roadway as determined by the Engineer, shall be corrected immediately at the Contractor's expense as directed by the Engineer.

The Contractor shall provide smooth pavement transitions between new and existing roadways. Transverse joints between new and existing pavement shall be constructed with Hot Bituminous Pavement. Grade differences shall not exceed 5% break-over. Longitudinal joints which have a vertical drop-off of one inch or greater shall be tapered with Hot Bituminous Pavement. Tapers shall be 8 horizontal to 1 vertical or flatter.

METHOD OF MEASUREMENT

621.04 Hot mix asphalt used in the detour will be measured by the square yard of bituminous mixture placed in accordance with Section 403.

BASIS OF PAYMENT

621.05 The accepted quantities will be paid for at the contract unit price for each of the pay items listed below that appears in the bid schedule.

Pay Item	**Pay Unit**
Detour Pavement	Square Yard

All work necessary and incidental to the installation, maintenance and removal of the detour pavement, including but not limited to grading, embankment material, asphalt placement and material, culvert pipe,

inlet modifications, and planing will not be measured and paid for separately but shall be included in the work.

All temporary pavement required for maintaining pedestrian/bicycle access will not be measured and paid for separately, but shall be included in the work.

Any leveling over existing pavement or sidewalk ordered by the Engineer for the Detour Construction shall be paid for at the top lift pavement unit price per Ton included in the project bid items.

END OF SECTION REVISION

REVISION OF SECTION 622

STONE SITE ELEMENTS

Section 622 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

Subsection 622.01 shall include the following:

This work shall also consist of the installation of various Stone Site Elements in conformity to the lines, grades, dimensions and details shown on the plans or established. Stone Site Elements include the following items: Masonry Work Sandstone Face, Stone End Markers, Masonry Work Sandstone Curb

MATERIALS

Subsection 622.02 shall include the following:

Stone Site Element materials shall conform to the following:

All sandstone shall be obtained from quarries having adequate capacity and facilities to meet the specified requirements. Fabrication shall be by a firm equipped to process the material promptly in accordance with specifications. Evidence to this effect shall be provided by the supplier if required by the Project Manager.

Sandstone Standard: All sandstone shall comply with ASTM C 615, "Standard Specification for Granite Dimension Stone" for material characteristics, physical requirements, and sampling for selection of granite.

Stone Site Elements shall comply with ASTM Sections C 97, C 170, C 99, C 241, C 880, C 67.

All sandstone shall be of standard architectural grade, free of cracks, seams, or starts, which may impair its structural integrity or function. Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling or mock-up phases will be accepted provided they do not compromise the structural or durability capabilities of the material. Texture and finish shall be within the range of samples approved by the Project Manager. Each stone type listed below shall be obtained from the same quarry for consistency in material.

Cut stone from one block or contiguous, matched blocks in which natural markings occur.

(a) *Stone, Type 1*.

Stone Type:	Sandstone, Lions Red
Supplier:	Tribble Stone, 303-444-1840 or approved equal
Finish:	Varies: RE Site Details
Project Items:	Landscape Wall Type 2, Median End and Sandstone Curb

(b) Mortar Setting Bed. Laticrete 3701FB Fortified Mortar Setting Bed or approved equal

(c) *Sealant.* Pecora 890 FTS color to match adjacent stone or approved equal

(d) *Backer Rod.* Closed cell polyethylene.

(e) *Wall, SS Expansion Anchors.* SS Kwik Bolt 3 by Hilti or approved equal.

(f) *Wall, Veneer Anchors.* 16 gauge, Type 304 SS strap anchors by Dur-O-Wal or approved equal

(g) *Plastic Weep Tube.* Dur-O-Wal weep hole w/ outside diameter of 3/8" by Dayton Superior or approved equal

(h) *Shims.* PVC or other acceptable stable plastic.

(i) *Water.* Potable.

Subsection 622.03 shall include the following:

Submittals:
Product Data/Material Test Reports. For each stone indicated provide structural analysis data signed and sealed by the qualified structural Project Manager responsible for their preparation.

Certification. Submit a letter of certification from the stone fabricator, stating the material being furnished is the specified material and there are sufficient reserves available to supply the project and furnish replacements if needed.

Shop Drawings. The stone supplier shall submit: copies of required shop drawings to the Project Manager for approval. These drawings shall show all bedding, bonding, jointing and anchoring details, and the dimensions of each piece of stone. No final
sizing or finishing shall be done until the shop drawings for that part of the work have been approved.

Stone Samples for Verification. Provide one (1) set of samples specified. Sample set shall consist of 12" x 12" stones and show anticipated range of color, natural variations of grain structure, inclusions and any other visual characteristics to be expected in the final installation. Approved sample set shall establish the standard by which stonework will be judged.

Mortar Samples. Submit samples with full range of exposed color and texture.

Sealant Samples. Submit samples for each type and color of joint sealant required.

REVISION OF SECTION 622
STONE SITE ELEMENTS

Any piece of sandstone showing manufacturing flaws upon receipt at the construction site shall be referred to the Project Manager for determination as to whether it shall be rejected, patched, or redressed for use.

Delivery, Storage, and Handling:

A. Finished sandstone shall be carefully packed and loaded for shipment using all reasonable and customary precautions against damage in transit. No material which may cause staining or discoloration shall be used for blocking or packing.

B. Upon receipt at the project site, the sandstone shall be stacked on timber or platforms at least 4" above the ground, and extreme care shall be taken to prevent staining during storage. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between any wood and finished surfaces, and shall be used also as an overall protective covering. All holes shall be plugged during freezing weather to prevent the accumulation of water. Salt shall not be used for melting of ice formed in Lewis holes or on pieces, or for any purpose involving its contact with the granite.

    1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
    2. Store stone on wood skids or pallets with non-staining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multi-component materials.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

Quality Assurance:

A. Mockups. Before installing stone site elements, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

    1. Locate mockups as directed by Project Manager.
    2. Notify the Project Manager seven (7) days in advance of dates and times when mockups will be constructed.

3. Obtain the Project Manager's approval of mockups before starting installation.
4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

B. Execute masonry work by skilled mechanics, and employ skilled stone fitters at the site for necessary field cutting as stone is set. All masonry shall be installed by a firm with a minimum of 5 years experience placing similar types of stone veneer. These qualifications must be submitted to the county and approved prior to beginning of work.

C. Fabricator Qualifications: Engage experienced fabricator that has completed stone fabrication similar in material, design, and extent to that indicated for the project.

D. Preconstruction Stone Testing: Engage and independent testing agency to perform the following testing for each stone variety:

1. Furnish test specimens that are representative of materials.
2. Physical Property Tests: ASTM standards specified for stone type.
3. Flexural Strength Tests: ASTM C 880

E. Cold-Weather Requirements: ACI 530.1/ASCE6/TMS 602.

F. Hot-Weather Requirements: ACI 530.1/ASCE6/TMS 602.

Subsection 622.10A is hereby added and includes the following:

622.10A Stone Site Element

A. Fabrication
1. Stone shall be selected for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
2. Fabricate stone to comply with requirements indicated and with the following references

a. Granite: NBGQA's "Specifications for Architectural Granite"

3. Cut stone to produce pieces of thickness, size and shape indicated, including details on Drawings and Shop Drawings.

a. Pattern: As indicated on drawings
b. Joint Width: As indicated on drawings

4. Carefully inspect finished stone units at fabrication plant for compliance with requirements. Replace defective units. Clean backs of stones to remove rest stains and iron particles.

B. Installation
1. Proceed with the installation of the stonework in accordance with drawings and using skilled mechanics capable of proper handling of the setting of the stone and able to field cut where necessary with sharp and true edges.
2. Examine surfaces indicated to receive stone. Proceed with installation only after unsatisfactory conditions have been corrected.
3. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
4. Remove substances from concrete substrates that could impair mortar bond.
5. Clean stone before setting. Fiber, stainless steel wire brushes or wool may be used, but the use of other wire brushes or of acid or other solutions which may cause discoloration is expressly prohibited. Fabricator should be contacted before cleaners other than detergents are used.
6. Do necessary field cutting as stone is set. Cut lines straight and true and finish field-cut edges to match shop-cut edges.
   a. Use power saws with diamond blades to cut stone.
7. Saturate concrete with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
8. Latex-Modified Setting Mortar: Proportion and mix Portland cement, aggregate, and latex additive to comply with manufacturer's written instructions.
9. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.
10. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16 inch thick bond coat to bed or to back of each stone unit.
11. Set stone to comply with Drawings and Shop Drawings, with joints uniform in appearance and stone edges and faces aligned to tolerances indicated.
12. Set stone in full bed of mortar with head joints slushed full, unless otherwise indicated. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes with mortar.
13. Tamp and beat stone with a wooden block or rubber mallet.
    1. Set each unit in a single operation before initial set of mortar; do not return to areas already set.
14. Provide expansion, control, and pressure-relieving joints of widths and at the location shown on drawings.
15. Rake out joints to depth required to receive sealant.

16. Apply sealant to joints.
17. Protect installed areas with nonstaining kraft paper and cover with a layer of untreated plywood where adjoining areas require construction work access.

C. Tolerances
1. Variation in Line: Do not exceed ¼" in 20 feet.
2. Variation in Joint Width: Do not vary joint thickness more than 1/16 inch or ¼ of nominal joint width, whichever is less.
3. Variation in Surface Plane between Adjacent Units (Lipping): Do not exceed 1/32 inch difference between planes of adjacent units.

D. Adjusting
1. Remove and replace stone not matching final samples and mockups.
2. Remove and replace stone not complying with requirements.
3. Replace non-complying stone to match final samples and mockups, comply with specified requirements. Replacement stone shall show no evidence of replacement.
4. Patching: Minor patching in small areas may be acceptable if the repair does not distract from the overall appearance of the finished project.

Subsection 622.10 (d) shall include the following:

Cleaning. Sandstone shall be shop cleaned at the time of final fabrication. Clean stone as work progresses. Remove mortar, sealant, and stains before tooling joints. After installation and pointing or caulking are completed, the contractor shall carefully clean the granite, removing all dirt, excess mortar, weld splatter, stains, and/or other site incident defacements.

Stainless steel wire brushes or wool may be used, but the use of other wire brushes or of acid or other solutions which may cause discoloration is expressly prohibited. Fabricator should be contacted before cleaners other than detergents are used.

After the sandstone work is installed, the sandstone shall be properly and adequately protected from damage. Boxing or other suitable protection shall be provided wherever required, but no lumber which may stain or deface the granite shall be used. All nails used shall be non-corrosive. Traffic shall be kept off installed granite for a period of 72 hours.

All sandstone work in progress shall be protected at all times during construction by use of a suitable strong, impervious film or fabric securely held in place. When cleaning is completed remove temporary protection.

REVISION OF SECTION 622
STONE SITE ELEMENTS

METHOD OF MEASUREMENT

Subsection 622.27 shall include the following:

The accepted quantities of Stone Site Elements will be paid for at the contract unit price for the various items. Stone Site Elements will not be measured but shall be the quantity shown on the plans; measurements will be made when field changes are ordered, or for an error of plus or minus ten percent of the plan quantity.

BASIS OF PAYMENT

Subsection 622.28 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Median Concrete Planter Wall	Linear Foot
Masonry Work Sandstone Face (Median Wall)	Linear Foot
Stone End Markers	Each
Masonry Work Sandstone Curb (Median Wall)	Linear Foot

Payment for Stone Site Elements shall be full compensation for materials, labor, and equipment including stone, mortar, and all other miscellaneous hardware required to complete the installation.

END OF SECTION REVISION

REVISION OF SECTION 623
IRRIGATION SYSTEM

Section 623 of the Standard Specifications is hereby deleted and replaced with the following: This new section is hereby added to the Standard Specifications as follows:

DESCRIPTION

623.01 WORK INCLUDED - Work of this Section generally includes provisions for the installation of an underground irrigation system including the following:

A. Static pressure verification and coordination of irrigation system installation with landscape material installation.

B. Trenching, stockpiling excavation materials, refilling and compacting trenches.

C. Complete irrigation system including but not limited to piping, backflow preventer assemblies, valves, fittings, heads, Automatic Irrigation Controllers and wiring, and final adjustments to insure complete coverage.

D. Water connections.

E. Replacement of unsatisfactory materials.

F. Clean-up, inspections, and approval.

G. Tests.

623.02 RELATED SECTIONS

A. Section 208 – Erosion and Sedimentation Control

B. Section 107– Tree Retention & Protection

C. Section 207 – Earth Moving

D. Section 207 – Excavation and Backfilling of Trenches

E. Division 600 – Concrete Walks, Curbs, and Miscellaneous Flatwork

F. Section 207 – Soil Preparation

G. Section 207 – Topsoil

H. Section 212 – Turfgrass Seeding

I. Section 212 – Native Seeding

J. Section 212 – Sodding

K. Section 214 – Trees, Plants, and Groundcovers

Establishment Period: Irrigation systems must be in full working condition, as determined by the City, prior to issuance of the "Notice of Substantial Landscape Establishment ". The Contractor shall ensure the irrigation system to be in working condition for a period of two years from the date of Substantial Landscape Establishment. To ensure proper operation of the system, the Contractor shall perform, as required, activities including, but not limited to, the following: inspection and correction of system leaks, improperly operating valves, clogged spray heads, malfunctioning automatic control valves and other components, maintaining optimum sprinkler coverage, and adjusting sprinkler head elevations relative to finish grade. The Contractor shall make corrections as necessary to ensure proper operation before final acceptance.

623.03 REFERENCES

A. Perform Work in accordance with requirements of Conditions of the Contract and Contract Drawings - General requirements as well as provisions of all applicable laws, codes, ordinances, rules, and regulations.

B. Conform to requirements of reference information listed below except where more stringent requirements are shown or specified in Contr1.

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.

623.04 (intentionally blank)

623.05 EXTRA STOCK - In addition to installed system furnish the following items to Owner:

A. Furnish the following maintenance items to Owner prior to Final Acceptance:

1. Two (2) head adjustment tools for each type of head installed.
2. Two (2) valve keys for operating each type of manual valve. (Manual drain valves, isolation valves).
3. Two (2) keys for each automatic controller.
4. Two (2) decoders of each type used.
5. Two (2) quick coupler keys and 2 matching hose swivels for each type of quick coupling valve installed.
6. Two (2) aluminum drain valve keys of sufficient length for operation of drain valves.
7. Two (2) sprinkler heads for each size and type specified.
8. One (1) 100' roll of emitter tubing, each type used.

REVISION OF SECTION 623
IRRIGATION SYSTEM

MATERIALS

623.06 MATERIALS:

A. General

1. 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.
2. All material shall be of the highest grade possible and where applicable, shall be marked accordingly and shall be new.

B. 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. HDPE pipe, pressure rating DR 11 (200 PSI) may be used by approval of Project Manager for portions of mainline that require boring such as below trees and paving. HDPE requires fusion butt weld transition to PVC mainline using ISCO Industries IPS Bell MJ Adapter with kit, model #ISMFMJ03IPSBELL.
7. 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.

C. Sleeving:

1. Horizontal sleeves under paved surfaces: Class 200 PVC.
2. Vertical sleeves for access to drains and valves: Class 200 PVC.
3. Horizontal sleeving for boring applications and between medians: HDPE.

D. Copper Pipe and Fittings:

1. Copper Pipe - Type K, hard tempered.
2. Fittings - Wrought copper, solder joint type.
3. Joints - Soldered with solder, 45% silver, 15% copper, 16% zinc, and 24% cadmium and solidus at 1125~F and liquids at 1145~F.

E. Brass Pipe and Fittings:

1. Brass Pipe - 85% red brass, ANSI Schedule 40 screwed pipe.
2. Fittings - Medium brass, screwed 125-pound class.
    a. Mainline larger than 3" to be installed using tapping saddles, per CPS.

3. Identification Markings:
   a. Identify all pipe with following indelible markings:
      1) Manufacturer's name.
      2) Nominal pipe size.
      3) Schedule of class.
      4) Pressure rating.
      5) NSF (National Sanitation Foundation) seal of approval.
      6) Date of extrusion.
4. Class 200 PVC Pipe (pressurized main line two and one-half inches (2-1/2") and under).
5. Pipe will be assembled with Schedule 80 PVC fittings using ASTM-F-656 purple primer followed with heavy bodied ASTM-D-2564 glue.
6. Fittings shall be installed with concrete thrust blocks as per Details.

F. Flexible Plastic Pipe (non-pressure lateral lines):

1. Manufactured from virgin polyethylene in accordance with ASTM D2239, designated as PE 3408. Maximum size two inches (2"); minimum size one inch (1").
2. Fittings: Manufactured in accordance with ASTM D2609; PVC Type 1 cell classification 12454-B.
3. Clamps: All stainless steel worm gear screw clamps. Use two (2) clamps per joint on all insert fittings.
4. Non-Potable water systems – Install Christy's TA-DT-3-PRW marking tape in all trenches containing polyethylene lateral piping. Install at six inch (6") depth.
5. Risers for Pop-up Heads: Shall be swing pipe, 0.49 ID, operating pressure of eighty (80) PSI, manufactured by Rainbird or approved equal.

G. Drip Irrigation Systems, Bubblers and Micro Irrigation:
1. Drip Tubing - Manufactured of flexible vinyl chloride compound conforming to ASTM D1248, Type 1, Class C, Category 4, P14 and ASTM D3350 for PE 122111C. Capillary tubing shall have 1/8" I.D.
2. Fittings - Type and make recommended by tubing manufacturer.
3. Drip Valve Assembly - Type and size shown on Drawings.
   a. As manufactured by Rainbird, or approved equal. Strainer shall have 120 mesh nylon screen with ½" blow-out. Pressure reducing valve shall have manual adjusting nut.

H. Low Volume Irrigation

1. Valve: Rain Bird XCZ-100-PRB-COM, size per Contract Drawings. Valves shall be installed in Carson Brooks #1220 jumbo box or approved equal with bolt down T-cover. Brand lid with zone numbers.
2. All low volume irrigation shall be zoned independently from turf, and product applications may not be mixed within zone.
3. Lateral Pipe: Flexible polyethylene pipe as per Sub-paragraph 2.2.D.4, above. All lateral piping shall be installed at an eighteen inch (18") depth, or as directed by the Project Manager.

4. Sub-surface Irrigation: Landscape Dripline manufacturer, emitter spacing and flow as per Contract Drawings. All sub surface laterals to be buried at a four inch (4") depth minimum or as directed by the Project Manager.
    a. Requires Rain Bird XCZ Drip Kit with Basket Filter valve and bronze angle valve in Carson 1324-12 valve box with corner hex bolt down cover. Brand lid with "FIL".
    b. Flush valve in Carson round ten inch (10") valve box with bolt down T-cover as per Contract Drawings. Brand lid with "FV".
    c. Rain Bird 1812 spray head with closed 6 series (orange) VAN nozzle shall be installed adjacent to flush valve furthest from the control zone valve to act as zone operational indicator.

I. Tree/Shrub Bubblers: Pop up sprinkler heads shall be used for all tree and shrub applications including medians, size and nozzle type as per the Contract Drawings or as directed by Project Manager or Forestry.

1. Precipitation rate of the bubblers must not exceed soil infiltration rate.
2. Supplemental tree watering systems in native areas: Two twelve inch (12") pop up sprinkler heads with Rotary nozzles shall be used at each tree in a native areas.
3. Install two heads on opposite sides of the trees dripline.
4. Precipitation rate of the nozzles must not exceed soil infiltration rate.

J. 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

K. 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

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L. Manual Drain Valve:

1. Drain Valve: Mueller Oriseal #H-10283, one inch (1") with brass swing joint assembly, or approved equal.

M. 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.
3. Brand Lids as follows:
   a. Isolation/Gate Valve "GV"
   b. Quick Coupler Valve "QC"
   c. Manual Drain Valve "DV"
   d. Air Relief Valve "AR"
   e. Master Valve "MV"
   f. Flow Sensor "FS"
   g. Wire Splice Box "SB"
   h. Grounding Rod "GR"
4. 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.
5. Box color for valves:
   a. Green for potable systems.
   b. Purple for non-potable systems.
6. 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.

N. 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.

d. Control Wire connections and splices shall be made with 3M DBM direct bury splice, or similar UL listed dry splice methods.

2. Miscellaneous control wiring materials:

a. Materials for both standard and two wire systems.

1) Data Wires: Paige 7171D-A direct burial shielded and armored signal cable with polyethylene jacket (NO SUBSTITUTIONS)
2) Data Wire connections and splices shall be made with Ranger Servi-Seal.
3) 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.
4) 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.
5) 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.
6) Splice Box: Carson Brooks 10-inch round box, branded "SB."
7) High Voltage: Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

b. Two Wire Systems:

1) Two-Wire Decoder Cable – Two twelve (12) ga. twisted-pair wires each with single, solid copper conductors with polyethylene insulation. Wires shall be contained within separate polyethylene jacket. Cable shall be Paige Electric P7350D cable (NO EQUALS).
2) Two-wire single station decoders Toro ESB-BLD-1 to be installed in each valve box, one per valve in each box. Decoders shall have a serial number engraved on each decoder for future identification.
3) Two-wire decoder cable shall have surge arrestors Toro ESB-DLTSLA installed every five hundred (500) ft. along two-wire path or every eight decoders whichever is the shortest distance. Surge arrestors are to be place in valve box containing valve cluster or in separate ten inch (10") round valve box.
4) Surge arrestor Ground rods are to have a minimum diameter of five-eighths of an inch (5/8") and a minimum length of eight feet (8'). Ground rod shall be located a minimum of 9 feet from two-wire cable located in mainline trench such that six (6) gauge copper wire connecting surge arrestor to ground rod is perpendicular to tow-wire cable in mainline trench.
5) Copper wire shall be six (6) gauge bare solid copper wire connected to the ground rod using a Cadweld GR1161GPLUS "Plus One Shot" welding kit.

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O. Automatic Controller (City of Denver):

1. Central Control systems shall be Toro Sentinel special build central control with wireless output boards. Update to Sentinel central control is required on all projects unless a variance is granted by Denver Parks Water Conservation.
   a. Sentinel satellite Automatic Irrigation Controller in prefabricated enclosure with pedestal is available exclusively through C.P.S. Distributors. Contractor shall purchase fully assembled enclosure including back panel, terminal strips, power supply unit, interior fused disconnect with 120 volt GFI duplex outlet, heavy duty transient surge protection boards, antenna(s) with cable, louvers and fan kit. Enclosure and pedestal shall be stainless steel with factory applied powder coating finish, Color #6005 Tiger Drylack color chart. Enclosure shall have a heavy duty hasp for locking. Model number is per plan as specified by Toro.
   b. 450 MHz radio communication shall be fully compatible with Denver Parks and Recreation frequency required by the Operations District.
2. If variance is granted, Automatic Irrigation Controller must have the following minimum characteristics:
   a. Solid state, fourteen (14) day clocks, with multiple programming capabilities.
   b. Capable of opening normally closed electric solenoid type valve.
   c. Automatic Timing: Capable of incremental units from three (3) to at least sixty (60) minutes per station.
   d. Water Budgeting: Capable of global program run time changes in percentage increments.
   e. Ability to provide repeat and/or syringe cycle capabilities and ability to eliminate or isolate one station without disturbing remaining Automatic Irrigation Controller features.
   f. Flow sensing capability with automatic shut-down or alarm signal.
   g. Minimum 40 VA transformer rating.
   h. Automatic Irrigation Controller cabinets shall be stainless steel Strongbox or Hoffman enclosure with factory-applied Federal Green powder-coat finish and heavy duty locking hasp. Size cabinet per specification from manufacturer.
   i. Automatic Irrigation Controller and cabinet require grounding per manufacturer recommendations, outside disconnect, inside fused disconnect, interior duplex GFI outlet.
   j. Automatic Irrigation Controller shall have capability to interface with normally-open master valve.

3. Automatic Irrigation Controller and remote control equipment: Manufacturer and Model shall be noted on Drawing.
4. Contractor shall provide concrete pad, 120V electrical power, conduits, grounding and control wire connections to terminal surge strips.
5. Concrete Pad: Comply with plan detail and Division 600 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

P. Hydrometer:
1. Hydrometer shall be Netafim normally open valve with Reed Switch output.
2. Size shall match backflow size for 1-1/2" and larger. Install 1-1/2" hydrometers on 1" systems.

Q. 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.

R. Sprinkler Heads - As indicated on Drawings. Fabricated riser units in accordance with details on Drawings - with fittings and nipples of equal diameter of riser inlet in sprinkler body.

1. 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.
    a. Pop-Up Sprinkler Heads in turf areas: 1806 SAM-PRS.
    b. Pop-Up Sprinkler Heads in native grass areas and flower bed areas: Rain Bird 1812 SAM-PRS.
    c. 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.

2. Flexible Connectors to Lateral Pipe:
    a. 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.
    b. Gear Driven Heads: Shall be field constructed PVC swing joints as per detail, connected to lateral pipe with PVC insert fittings.

S. Backflow Preventer:

1. High hazard, reduced pressure type, approved by University of Southern California (USC) or other approved testing laboratory; fully ported, ball-type gate valves on units 2-inch or smaller, as manufactured by Febco Model 825YA or approved equal. Resilient gate valves on units larger than two inch (2"); as manufactured by Febco Model 880V or approved equal.
2. Backflow Preventer Cover: Guardshack enclosure of appropriate size, equipped with Lock Shield Brackets, manufactured by BPDI, phone: 800-266-5411. Color: forest green.
3. For devices two inches (2") and smaller, install Sentry SC75-200 locking device.
4. Concrete Pad: Comply with Division 03 Section "Cast-in-place Concrete".

T. Pressure Reducing Valve: Watts #223 Hi-Capacity commercial grade or equal required where system pressures exceed one-hundred (100) PSI.

U. Water Meter and Vault:

1. Construction of Water Meter and Vault shall conform to the details and requirements of the Denver Water Department.

V. MISCELLANEOUS MATERIALS:

1. Rain Sensor: Hunter wireless Rain Clik with by-pass or Mini-Clik (wired) with Sensor Guard or approved equal. Rain sensor shall be installed per manufacturer's recommendations.

CONSTRUCTION REQUIREMENTS

623.07 QUALITY ASSURANCE:

1. Special Requirements:

a. Work involving substantial plumbing for installation of copper piping, backflow preventer(s), and related Work shall be executed by licensed and bonded plumber(s). Work shall meet the latest edition of the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and all applicable laws and regulations of the City & County of Denver Building Department and Denver Water. Secure a permit at least 48 hours prior to start of installation.
b. Tolerances - Specified depths of mains and laterals and pitch of pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, compaction, and repair of finish grade treatment.
c. Coordination with Other Contractors - Protect, maintain, and coordinate work with work under other Sections.

d. 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.
e. 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.
f. 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.
g. 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 or construction) requires irrigation system operation between the hours of 10 am to 6 pm. The signs are to be used are available from Denver Water.
h. Refer to maintenance requirements for water during construction.
i. Work involving high voltage electrical wiring, grounding and related Work shall be executed by licensed and bonded electrician(s). Work shall meet the latest edition of the National Electric Code, and all applicable laws and regulations of the City & County of Denver Building Department. Secure a permit at least 48 hours prior to start of installation.

623.08 PRE-CONSTRUCTION CONFERENCE AND SITE MEETINGS

A. Contractor shall schedule and conduct a conference to review in detail quality control and construction requirements for equipment, materials, and systems used to perform the Work. Conference shall be scheduled not less than 10 days prior to commencement of Work. All parties required to be in attendance shall be notified no later than 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 Landscaping and Irrigation System Coordinator, the City Project Manager, the Parks Project Director, Parks Operations Supervisor, Water Conservation, Contractor's Designated Representative, and Installer.

B. 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.

C. 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.

a. Minutes of each conference shall be recorded and distributed by contractor to all parties in attendance within five days of conference.

623.09 SUBMITTALS:

A. Prepare and make submittals in accordance with conditions of the Contract.

1. Material List Submittal – Prior to commencing construction of the irrigation systems, submit for review material cut-sheets of all equipment to be installed including 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. Submittal shall include a cover sheet that identifies all items within the submittal. The Contractor shall not order any materials nor begin any work on any irrigation system until the City and County of Denver has approved the Contractor's Parts and Materials.
2. Mock Ups:
   a. 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.
   b. 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
   c. Drain valves: Provide a mock up including the service tee, and required fittings, and drain valve.
   d. Other: Mock ups that may be requested by the Project Manager.
3. Record Drawings (As-Builts):

a. At onset of irrigation installation secure copies of original irrigation design. At the end of every day, revise prints for Work accomplished that day in red ink. As-built copies shall be brought up-to-date at the close of the working day every Friday. A print of record plan(s) shall be available at Project Site. Indicate zoning changes on weekly as-built drawings. Indicate non-pressure piping changes on as-builts. Upon completion of Project, submit for review, prior to final acceptance, final set of as-built copies. Dimensions, from two permanent points of reference (building corners, sidewalk, road intersections or permanent structures), location of following items:
   1) Connection to existing water lines. – include service line, meters and vault dimensions, curb stops and backflow devices.
   2) Routing of sprinkler pressure lines.
   3) Sprinkler control valves.
   4) Master Valves

5) Flow Sensors
6) Rain sensors/weather station
7) Power service drop
8) Quick coupling valves.
9) Drain valves.
10) Control wire routing if not with pressure mainline.
11) Gate valves.
12) Control wire splices and splice boxes
13) Sleeves
14) Flush valves
15) Other related equipment as directed.

b. The City will not certify any pay request submitted by the Contractor if the as-built drawings are not current, and processing of pay request will not occur until as-builts are updated.

c. 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.

4. Operation Instructions – Submit 3 written operating instructions including winterization procedures and start-up, manufacturer's maintenance and checking instruction for backflow preventer (if applicable, with cut sheets of products, and coordinate controller/watering operation instruction with the Owners maintenance personnel.

1. Controller Charts:

a. Do not prepare charts until record (as-built) drawings have been reviewed by Owners Representative.

b. Provide one controller chart for each automatic controller installed.
1) Chart shall be reproduction of record drawing. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility (11"x 17" minimum size)
2) Chart shall be blueline print of actual "as-built" system, showing area covered by that controller.

c. Identify area of coverage of each remote control valve, using a distinctly different pastel color drawing over entire area of coverage.

d. Following review of charts by Owners Representative, they shall be hermetically sealed between two layers of 20 mm thick plastic sheet.

e. Charts shall be completed and reviewed prior to final review of irrigation system.

2. Shop Drawings – Submit Shop Drawings if noted on construction drawings, include a complete materials list 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.

3. 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 draftsperson. 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:

a. 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.

4. Request for final payment will not be certified or processed until all Contract Record Drawing prints and digital files have been received and approved.

623.10 DELIVERY, STORAGE, AND HANDLING:

A. Deliver, unload, store, and handle materials, packaging, bundling, products in dry, weatherproof, condition in manner to prevent damage, breakage, deterioration, intrusion, ignition, and vandalism. Deliver 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. 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. Handling of PVC Pipe – Exercise care in handling, loading and storing, of PVC pipe. Provide forty eight (48) hours advance notice of delivery to the Project

2. Manager for observation of unloading and handling of PVC materials during delivery. 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 if installed, shall be replaced with new piping. All piping to be stored on-site in excess of three days shall be fully covered with non-transparent material. Piping stored in improper manner shall be subject to rejection by Owner and replaced by contractor at no additional cost to Owner.

623.11 JOBSITE CONDITIONS:

A. Existing Conditions:

1. Contractor is responsible for knowing that information contained in the Specifications for earthwork and other related operations is as specified and indicated in those documents before beginning work under this Section.
2. 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.

3. Report unsatisfactory conditions in writing to the Project Inspector.
4. Coordinate power requirement and electrical connections with, the affected utility company and the City prior to beginning work.
5. Beginning of installation means acceptance of existing conditions by this contractor.

B. Protection of Property:

1. Preserve and protect all trees, plants, monuments, structures, and paved areas from damage due to work of this Section. Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site. In the event damage does occur, all damage to inanimate items shall be completely repaired or replace to satisfaction of 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. Barricade open ditches. Damage caused to asphalt, concrete, or other building material surface shall be repaired or replaced at no cost to Owner. Restore disturbed areas to original condition.
3. 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. Existing Trees:

1. Refer to Section 107 “Tree Retention and Protection”.
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
2. 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 Protection and Repair of Underground Lines:
4. 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 Utility Owner. All costs of such repairs shall be paid by Contractor unless other arrangements have been made.

D. Replacement of Paving and Curbs – Where pipes and sleeves cross existing roadways, paths, curbing, etc., damage to these shall be kept to a minimum and shall be restored to original condition, unless otherwise directed by Owners Representative.

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623.12 ESTABILISHMENT PERIOD:

A. A two-year establishment period is required for materials and installation as described in Section 214.04.

B. Settling of backfilled trenches which may occur during the establishment period shall be repaired by the Contractor at no expense to Owner, including complete restoration of damaged property.

C. Expenses due to vandalism before Final Acceptance shall be the Contractor's responsibility.

D. The 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 establishment period.

E. The Contractor shall make repairs and replacements within three days of notification. If Contractor fails to make repairs within three days, the City may make such repairs at Contractor's expense. The Contractor shall be solely responsible for any damage caused by the Contractor's failure to make timely repairs.

623.13 MAINTENANCE:

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

B. 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.

C. Outside Limits of Construction: Coordinate Automatic Irrigation Controller scheduling and maintenance operations with Project Manager for portions of City property unaffected by construction.

D. Additional Maintenance During Establishment 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. The Contractor shall be responsible for winterization regardless of whether the City provides notification. 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 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.

623.14 INSPECTION:

A. 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.

B. Grading operations, with the exception of final grading, shall be completed and approved by Owner before staking or installation of any irrigation system begins.

623.15 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**.**

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623.16 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.

623.17 STATIC 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.

PREPARATION:

1. Staking shall Occur as Follows:

    a. Layout and stake system before beginning installation. Staking shall occur as follows:

    b. 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.

    c. Valve boxes and mainline will not be located in ball fields, and multi-use sport fields, recovery zones, or below playground equipment.

    d. 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.

    e. The Project Manager may request the City Foresters approval of proposed trenching prior to start of trenching.

    f. Review backflow prevention device location and operation with the Project Manager prior to mainline installation.

2. Pipe Installation

    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.

3. 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.

4. Clearances:

   a. Main pressure line: Make trenches of sufficient width to properly assemble and position pipe in trench. Clearances:
      a. 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.
      b. Piping two and one-half (2-1/2") and smaller: Trenches shall have a minimum width of four inches (4").
      c. Line Clearance: Provide minimum six inches (6") of clearance between each line, and minimum twelve inches (12") of clearance between lines of other trades.
      d. Lateral Pipe: Trenches shall have a minimum width of four inches (4").
      e. 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.
      f. Installation of multiple runs of piping in common trench is prohibited.
   b. Pipe and Wire Depth to finish grade:
      a. Pressure Supply Piping within Parks: thirty inches (30") from the top of pipe, maximum variation two inches (2").
      b. Pressure Supply Piping within Right-of-Way: twenty four inches (24") from the top of pipe, maximum variation two inches (2").
      c. PVC Sleeving: At specified pipe or wire depth.
      d. Non-pressure Piping (gear driven heads): eighteen inches (18") from top of pipe, maximum variation two inches two inches (2").
      e. 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")
      f. 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.
   c. Install sleeving under asphalt paving and concrete walks, prior to concreting and paving operations, to accommodate piping and wiring. Compact backfill around sleeves to 95%

a. Boring will be permitted only where pipe must pass under obstruction(s) which cannot be removed. In backfilling bore, final density of backfill shall match that of surrounding soil. It is acceptable to use sleeves of suitable diameter installed first by jacking or boring, and pipe laid through sleeves. Observe same precautions as though pipe were installed in open trench.

d. Vibratory Plow - Not permitted without written authorization of the Project Manager.

623.18 INSTALLATION - Locate other equipment as near as possible to locations designated. Project Manager shall review deviations prior to installation.

A. 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.

B. 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.

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.

8. Sleeve size requirements for wire and pipe, control wire shall be placed in sleeving separate from pipe sleeving:
   c. 1" to 1-1/4" Pipe: 2" PVC (1)
   d. 1-1/2" to 2" Pipe: 4" PVC (1)
   e. 2-1/2" to 3" Pipe: 6" PVC (1)
   f. 4" Pipe:8" PVC (1)
   g. 1 to 25 Control Wires: 2" PVC (1)
   h. 26 to 50 Control Wires: 3" PVC (1)
   i. Two-Wire Decoder Cable: 2" PVC (1)

9. HDPE pipe shall be used for sleeving purposes when directional boring takes place under any existing hard surfaces, walks, roadways or trees, etc. HDPE pipe may be used as the irrigation mainline under existing hard surfaces, walks, roadways or trees in lieu of sleeving.
   a. Install HDPE pipe to ensure that the end section of the HDPE pipe is a minimum of two feet (2') beyond any hard surface or tree dripline.
   b. All connections to the HDPE pipe are to be made with fusion welded fittings per the manufactures recommendations. All connection fittings between HDPE and PVC or any other pipe material being used are to be made a minimum of twenty four inches (24") away from any hard surface or tree drip line.
   c. Fittings to be used as couplings between HDPE and PVC shall be fusion welded by straight PVC pipe and shall be installed as specified per the Contract Drawings, Specifications and Manufactures recommendations. The following are pipe size requirements and coupling types:
      1) Pipe sizes two and one-half inches (2-1/2") and less shall utilize a HDPE to PVC pipe transition. The fittings shall be fusion welded on the HDPE side and be solvent welded on the PVC side, Poly-Cam Inc, Model #730 or approved equal.
      2) Pipe sizes three inches (3") and up shall utilize a HDPE flange to PVC pipe transition with coupling and restraints. The fitting shall be fusion welded on the HDPE pipe and utilize joint restraints on the PVC side, Harco or approved equal.

C. 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.

2. Thrust Blocks on all PVC mainline two and one-half-inches (2-1/2") and smaller: Construct thrust blocks per Contract Drawings and Details.

3. 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

4. Joint restraints on all gasketed PVC mainline pipe three inches (3") and larger: Install joint restraints per the plans and or manufactures recommendations.
   a. 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.

5. Flexible Plastic (Polyethylene) Pipe: Lay pipe and assemble fittings according to manufacturer's recommendations and per Contract Drawings and details.

D. 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.

E. 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.

F. Automatic Controller:

1. Sentinel Central Control:
   a. Contractor is to arrange and pay for C.P.S. Distributors to conduct a signal test and survey to maximize signal quality of any antenna and each Sentinel controller installed, and maximize layout for flow sensing. Contact Brandon Gully, with C.P.S Distributors at (303) 394-6040 or gulyb@cpsdistributors.com. Signal test and survey is to be conducted or verified prior to construction during full tree leaf-out when possible. Location of the controller shall be based on the field test. Contractor is responsible to coordinate optimization of central control with the Toro Factory Representative, Water Conservation, Denver Parks Operations Supervisor, and the Project Manager.
   b. All irrigation schedules during establishment period and establishment period are to be submitted via email to the Toro Factory Representative, Water Conservation, Denver Parks Operations Supervisor and Project Manager. Upon approval of the schedule the Toro Factory Representative will input schedules and make all changes, corrections or updates within 48-hours.
2. Field Wiring Testing Requirements.
   a. Contractor shall provide a pre-installation Ohm test report of all field wires located within an existing controller prior to removing any wires from the terminals in the Automatic Irrigation Controller. Provide a report to the Project Manager of each zone wire tested, the Ohm readings for each wire, date of test, Automatic Irrigation Controller location. Please indicate in the report any wires or solenoids that do not meet standards for the operating ranges of the specified or existing materials.
   b. Contractor shall provide an Ohm test report of all field wires prior to installing any wires at the Automatic Irrigation Controller terminals. Provide a report to the Project Manager of each zone wire tested, the Ohm readings for each wire, date of test, Automatic Irrigation Controller location. Please indicate in the report any wires or solenoids that do not meet standards for the operating ranges of the specified or existing materials. The report shall include the Ohm readings prior to removal of the existing controller and after relocation or installation of new Automatic Irrigation Controllers.
   c. All field wiring issues must be resolved prior to the connection of wires at the Automatic Irrigation Controller terminal strips.

d. Install Automatic Irrigation Controller and enclosure in accordance with the Contract Drawings and per the manufacturer's instructions. All work including but not limited to concrete pad, 120v electrical power, conduits, grounding and control wire connections to terminal surge strips shall be by the Contractor.

e. Provide Automatic Irrigation Controller to earth ground as per manufacturer recommendations. Central Control Satellite: Provide Automatic Irrigation Controller to earth ground in accordance with Article 250 of the National Electrical Code (NEC). Earth ground shall be ten (10) OHMS or less as measured by a Megger® or similar instrument, or as per manufacturer recommendation. Contractor shall arrange with the Toro Factory Representative and perform testing in presence of Denver Parks Operations Staff and Project Manager.

f. Ground rods are to have a minimum diameter of five-eighths-inch (5/8") and a minimum length of eight feet (8').

g. Copper wire shall be six (6) gauge bare copper wire connected to the ground rod using a Cadweld GR1161GPLUS "Plus One Shot" welding kit.

3. Install above ground wiring in rigid conduit in accordance with applicable codes.

4. Coordinate installation with electrical work to insure electrical power supply line(s) are provided to Automatic Irrigation Controller location(s).

   a. Permanently engrave date of installation and Xcel service pole number inside Automatic Irrigation Controller enclosure.

5. Wire control valves in a logical zone sequence or as shown on Contract Drawings.

G. Backflow Prevention Device: Contractor must meet all applicable laws, rules and codes, including but not limited to Uniform Building codes and applicable amendments Plumbing Codes and State Water Regulations. Assemblies must be installed per the manufacturer's specifications. Backflow devices shall not be installed within the public right-of-way.

1. Install in strict accordance with current requirements of Denver Water. Connections to the Denver Water System are to have an approved assembly for the type of protection they provide, either isolation or containment.

2. Successful Testing of backflow assembly by a certified Backflow Prevention Assembly Tester is Contractor's responsibility and any cost shall be considered incidental. Test reports shall be forwarded to Denver Water in accordance with the State of Colorado regulations. Copies of the report, the tester's certification and the certification of the testing equipment used are to be forwarded to the Project Manager.

3. Request for final payment will not be certified or processed until certification reports have been filed with Denver Water and received by the Project Manager.

H. Sprinkler Heads - 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.

I. Backfilling - 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.

J. 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.

623.20 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 furthermost 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.
    c. 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.
    d. Retest system until test pressure can be maintained for duration of test.

C. Testing Controller Operations:

1. Functional test of the control system shall be performed and demonstrate that all parts of the control system function as specified or intended, as per Parks **Central Control Certification Checklist**. The functional test for each system shall consist of not less than 30 days of continuous, satisfactory operation of the complete system serviced by a controller.

2. Any materials determined to be faulty as part of the installation shall be replaced or corrected by the Contractor at his expense in a manner respective to the Plans, Details and other sections of this Specification. In the event of a system failure due to faulty installation, programming or workmanship, the 30-day period will be repeated until testing is complete.

D. System Operations Orientation:

1. System Operation Training Session: A training and orientation session for Parks staff shall be required.
   a. The Contractor, the irrigation subcontractor, a representative of the manufacturer or distributor, and representatives of Parks maintenance and Water Conservation shall be present. The date and time of the session and attendees present shall be subject to approval by a Parks representative.
   b. The completed "As-Built" plans and “Controller Chart(s)” shall be reviewed.
   c. Controller features, flow sensing, alarms and programming will be reviewed.
   d. Hand held operation of field units will be demonstrated.

E. Walk-Through for Substantial Completion:

1. Arrange for Parks Project Manager’s presence forty-eight (48) hours in advance of walk-through.
2. Entire system shall be completely installed and operational and trenches shall be finish graded prior to scheduling of walk-through.
3. Electrically operate each zone in its entirety for Parks Project Manager at time of walk-through. Project inspection by Parks Project Manager shall include:
   a. Review operation, coverage, head/nozzle adjustment, and system adjustment per specifications.
   b. Open all valve boxes to confirm materials, gravel bedding, compaction, elevation, workspace access within boxes, clearance from lid and bedding, locking mechanisms, and zone branding. Interior of boxes should be free of visible soil. All valves must be tagged with zone identification and valve box lids must be branded with zone valve identification. Verify connections in all zone valve and wire splice boxes.
   c. Contractor shall resistance test all spare common and hot wires for continuity in the presence of Parks Project Manager.
   d. Confirm irrigation heads are at specified elevation and distance 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, finish, access, spare conduit/sleeving as required for wiring.

f. Confirm quality of controller enclosure and mounting (there must be no gap between controller and concrete), grounding, high voltage installation, low voltage wiring, ID tagging of wires in controller, and communication set up. Each controller must have a color-coded zone chart and programming chart as per specifications.

g. Contractor shall submit written certification for testing that proper grounding for all controllers has been installed to Owner.

h. Review trench and related excavation repair including backfill, compaction, fine grade, seed and sod installation.

i. Review appropriate use of purple valve lids and other product as required for reuse water applications.

4. Certify Central Control Operation: Central control operation will be verified by Parks Certification of Central Control Checklist. See Exhibit "A"

5. Generate a punch list of items to be corrected prior to Final Completion.

6. Furnish all materials and perform all work required to correct all inadequacies of coverage due to deviations from Contract Documents.

F. Walk-Through for Final Completion:

1. Arrange for Parks Project Manager and Consultant to be present a minimum of seventy two (72) hours in advance of walk-through.

2. Show evidence to Parks Project Manager that the City has received all maintenance items and accessories, charts, record drawings, and equipment and backflow certification reports and controller grounding assembly certificates as required before Final Completion walk-through is scheduled.

3. Operate each zone, in its entirety for Parks Project Manager at time of walk-through to insure correction of all incomplete items.

4. Items deemed not acceptable by Parks Project Manager shall be reworked to complete satisfaction of Parks Project Manager.

5. If after walk-through for Final Completion of irrigation system, Parks Project Manager finds items during walk-through which have not been properly adjusted, reworked, or replaced as indicated on punch list from previous walk-through, 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 by Parks Project Manager to conduct and document further walk-throughs as deemed necessary to ensure compliance with Contract Documents.

6. The Contractor shall provide 5 five copies of all documents to the City, including five copies of a comprehensive operations and maintenance manual for all irrigation system components.

623.21 ADJUSTING - Upon completion of installation, "fine-tune" entire system by regulating valves, adjusting patterns and break-up arms, and setting pressure reducing valves at pro-per 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 +/- 7%.

A. If it is determined that irrigation adjustments will provide proper coverage, and improved water distribution as determined by Consultant, contractor shall make such adjustments prior to Final Acceptance, as directed, at no additional cost to Owner. Adjustments may also include changes in nozzle sizes, degrees of arc, and control valve throttling.

B. All sprinkler heads shall be set perpendicular to finish grade unless otherwise designated.

C. Areas which 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 Owner.

623.20 CLEANING - Maintain continuous cleaning operation throughout duration of work. Dispose of, off-site at no additional cost to Owner, all trash or debris generated by installation of irrigation system.

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REVISION OF SECTION 623
IRRIGATION SYSTEM

EXHIBIT "A"

CENTRAL CONTROL CERTIFICATION CHECKLIST
Required for Substantial Completion

PROJECT / LOCATION:
_____

PROJECT FOREMAN/COMPANY:
_____

PHONE #: _____

DENVER PARKS' REPRESENTATIVE: _____

DATE: _____

ENCLOSURES

□ Enclosure mounted on concrete pad and mounting template is removed. For wall mounts enclosures – proper size conduits and connectors have been used ensuring a waterproof insect free environment. Enclosure has been mounted away from direct hit by irrigation heads.

□ 110 VAC power connected to enclosure and in conduit as required by Electrical Code. The electrical ground is not connected to the "ground" lug in the controller.

□ The enclosure has an operational fan, with electrical to City standards.

□ Communications: (Circle the one that applies)
- If required, an Ethernet connection has been installed and is operational at the Sentinel or SRTA/CTM.
- If required, the external antenna has been installed with the proper antenna cable and connections and in a waterproof manner.

□ Ground rods installed to specifications, have been CAD welded, and ground wire is connected to "ground" lug in controller.

□ Contractor has provided grounding test results (with Megger meter) and grounding provided is 10 OHMS or less.

□ Master Valve Wire connected to "MV" position and programmed as N/O in the controller.

□ All station outputs are in the "Auto" position.

□ The flow sensor wires have been connected to the "Flow" side of the alarm terminal strip, or to the MSI assembly if using multiple sensors. Flow sensor wires are armored signal cable, Paige 7171D-A.

□ If Map-To units are required, distance between the Satellite and each Map-to is (fill in the blank) **_____.**

□ If required, the rain sensor (with bypass switch) is properly installed and connected to the "alarm" side of the alarm terminal strip. If wireless, the rain sensor is within 200 feet of the controller, installed a minimum of 15 feet above ground and not obstructed from rain collection by tree canopy or any other cover.

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REVISION OF SECTION 623
IRRIGATION SYSTEM

HYDROMETER

- □ Hydrometer is Netafim, model as specified.
- □ Hydrometer is installed on downstream leg of backflow device per manufacturer's requriements and has been installed in the correct direction.
- □ Polarity of wiring is consistent between Hydrometer & the Sentinel Satellite.
- □ The hydrometer wire is Paige P-7171D-A or equivalent and is connected at BOTH ends.
- □ If required, additional interface equipment such as MSI has been installed. Specify_____.
- □ Flow sensor has been calibrated and set up correctly in field to accurately register flow. Flow sensing has been visually verified at the at Sentinel satellite.
- □ Wire splices are made with 3MDBY-6 or equivalent

WEATHER STATION – if required

- □ Weather station is installed per manufacturer's specifications, including grounding and Paige 7171D-A wire.
- □ As required, a direct cable connection, wireless connection or other acceptable connection is installed and connection between weather station, console and central computer is visually verified at the console and at the central computer.

PROGRAMMING AND COMMUNICATION

- □ All satellite units have complete irrigation programs, including start times, run times and schedules.
- □ All equipment has been programmed with correct frequency, and communication between central control, Satellites, Map-to units and hand held remote's has been confirmed.

Completed By: _____ _____ Date: _____
Contractor Representative Print Name/Company

Completed By: _____ _____ Date: _____
Toro Representative Print Name

Completed By: _____ _____ Date: _____
Parks Representative Print Name

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REVISION OF SECTION 623
IRRIGATION SYSTEM

METHOD OF MEASUREMENT

Subsection 623.32 shall include the following:

Automatic controllers and backflow preventers will be measured by the number of units of each size installed and accepted, including concrete pad, conduit, bolts, enclosure, ground wire, and all other items necessary to complete the work as shown in the plans.

Valves, quick couplers, sprinklers, drip emitters of the various types and sizes including risers, check valves, swing joints, and fittings, will be measured by the number of units installed and accepted.

Plumber will be measured by each location where a new irrigation water line service is being installed and will include all work associated with installation of copper piping, backflow preventer, and related work.

Plastic and copper pipe will be measured by the linear foot installed and will include the cost of all fittings, manual drain valves and blow-out stubs.

Power source wire and control wire 120 volt will be measured by the linear foot installed.

Structure excavation and backfill including compaction and water will not be paid for separately but shall be included in the work.

Water Meter and Vault will be measured by each unit installed and accepted.

Subsection 623.33 shall include the following:

BASIS OF PAYMENT

The accepted quantities will be paid for at the contract unit price for the various items below that appear in the bid schedule.

Payment will be made under:

Pay Item	**Pay Unit**
1 Inch Type K Copper Piping	Linear Foot
1 ½ Inch Class 200 PVC Mainline	Linear Foot
2 Inch Class 160 PVC Sleeves	Linear Foot
2 Inch HDPE Sleeves	Linear Foot
4 Inch Class 160 PVC Sleeves	Linear Foot
4 Inch HDPE Sleeves	Linear Foot
1 Inch 80# NSF Poly Lateral	Linear Foot
1 Inch Drip Valve Kit with Ball Valve and Basket Filter	Each
1 ½ Inch Gate Valve	Each
0.5 GPM Bubbler Assembly	Each
12 Inch Pop-up Spray Head with Nozzle	Each
1 Inch Automatic Control Valve Assembly w/ PRS-D and Valve Box – Parks	Each
1 Inch Backflow Preventer Assembly with Concrete Pad	Each

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REVISION OF SECTION 623
IRRIGATION SYSTEM

Backflow Enclosure Assembly	Each
Plumber	Each
1 Inch Quick Coupler Valve	Each
Electrician – Controller Hookup	Each
2-Wire Communication Cable	Linear Foot
120 Volt Electrical Conductor	Linear Foot
12 Station Automatic Central Controller Assembly-Parks	Each
Radio Remote with Transceiver (Turnover Item) – Parks	Each
Rain Sensor	Each
1-1/2'' Hydrometer	Each
¾ Inch Drain Valve	Each
1 Inch Stop and Waste Valve Assembly with Valve Box	Each
Subsurface Dripperline	Linear Foot
Dripline Blowout with Indicator Popup	Each

All work that is incidental to unit costs including but not limited to installation and labor shall be included in the cost for that unit.

END OF SECTION REVISION

REVISION OF SECTION 625
CONSTRUCTION SURVEYING

Section 625 of the standard specifications is hereby revised as follows:

Delete section 625 and replace with the following:

DESCRIPTION

625.01 This work consists of the construction surveying, calculating, and staking necessary for the construction of all elements of the project including temporary and permanent easements. The work shall be done under the supervision of a Professional Land Surveyor (PLS) who is licensed in the State of Colorado.

Locating, preserving, referencing, installing and restoring land monuments such as Primary Control monuments from which the Right of Way or any land boundary will be calculated, described or monumented, Public Land Survey System (PLSS) monuments, General Land Office (GLO) monuments, Bureau of Land Management (BLM) monuments, Mineral Survey (MS) monuments, Right of Way (ROW) monuments, property boundary monuments and offsets, range points, benchmarks, easement monuments, and other monuments that are required by law or regulation to be established by a PLS, and the determination of any land boundary, shall be done under the supervision of a Professional Land Surveyor (PLS) who is licensed in the State of Colorado.

MATERIALS AND EQUIPMENT

625.02 The Contractor shall furnish all personnel, survey equipment, safety equipment, materials, and traffic control necessary to perform the required construction surveying and staking. This includes all surveying equipment, including Electronic Distance Meters (EDM), total stations, theodolites, levels, rods, tapes, tripods, tribrachs, and Global Positioning System (GPS) receivers and equipment.

If any survey equipment is found to be functioning outside the manufacturer's specified tolerance, certification from an approved repair facility showing that the instruments have been repaired, properly adjusted, or both if necessary shall be included in the survey records and submitted to the City Surveyor's Office before being used.

CONSTRUCTION REQUIREMENTS

625.03 A Construction Survey Conference shall be held with the City Surveyor's Office prior to performing any surveying work under this section. The Contractor's Surveyor (PLS) and Party Chief shall attend. A Construction Survey Checklist shall be completed and signed by the City Surveyor's Office and the contractor.

The Contractor shall check and verify all established Primary horizontal and vertical control points.

All survey records generated shall be the property of the City and shall be available to the City Surveyor's Office for inspection or reproduction at all times. All survey records shall be transmitted to the City Surveyor's Office for inclusion into the project records before final project acceptance.

REVISION OF SECTION 625
CONSTRUCTION SURVEYING

Electronic formats may be acceptable, please coordinate with the City Surveyor's Office.

Copies of any new Monument Records filed by the PLS with the State Board of Registration shall be submitted to the City Surveyor prior to filing.

625.04 Contractor Surveying. The Contractor's PLS shall perform all construction surveying and staking that is necessary for construction of the project.

625.05 Staking. It is the responsibility of the Contractor's PLS to adhere to industry standards and acceptable practices in regards to staking. Any restaking will be the responsibility of the Contractor's PLS at no cost to the City.

625.06 Accuracy and Tolerances. It is the responsibility of the Contractor's PLS to adhere to industry standards and applicable standards with regard to horizontal and vertical accuracy tolerances.

625.07 Responsibility and Inspection. Supervision and coordination of construction surveying and staking is the Contractor's responsibility. The City Surveyor's Office or Engineer may inspect the Contractor's surveying; however, such inspection will not relieve the Contractor of any responsibility for accuracy or completeness of work. All Contractor surveying inaccuracies, errors, or omissions shall be corrected at the Contractor's expense.

625.08 Reset Monuments and Stakes. Survey monuments, benchmarks, and other significant stakes that are damaged, destroyed, or made inaccessible by the progress of construction shall be replaced, transferred or reestablished at the Contractor's expense.

Locating, preserving, referencing, installing and restoring land monuments as described in 625.01, shall be done in accordance with Section 629, under the supervision of a PLS who is experienced and competent in Right of Way and boundary surveying and licensed in the State of Colorado. The contractor shall stake all permeant and temporary easements.

625.09 Changes. All changes in lines and grades required by field conditions and all discrepancies in grades, alignment, location or dimensions detected by the Contractor shall be immediately submitted to the Engineer in writing. No changes in given data or plans will be allowed unless approved by the Engineer in writing. All changes shall be documented by the contractor.

625.10 Pay Quantities Measurements. The Engineer will perform all interim and final measurements deemed necessary by the City to determine contract pay quantities. The Contractor shall establish and maintain Control points and stationing as required for these measurements.

625.11 Survey Records. Survey records shall be completed as the work is done. Field survey notes for construction surveying and checking by the Contractor shall be recorded in survey records in conformance with industry standards and acceptable practices.

All survey records generated shall be the property of the City and shall be available to the City Surveyor's Office or the Engineer for inspection or reproduction at all times. All survey records shall be transmitted to the City Surveyor's Office for inclusion into the project records before final project acceptance. All survey records shall be stamped with the seal of, and signed by, the responsible PLS.

REVISION OF SECTION 625
CONSTRUCTION SURVEYING

Electronic submittal of survey records may be acceptable, please coordinate with the City Surveyor's Office.

METHOD OF MEASUREMENT

625.12 Construction surveying will not be measured but will be paid for on a lump sum basis.

Construction Surveying (Hourly) is to be used for survey work that is needed strictly due to changed conditions, and will not be used for any Work included in Construction Surveying (Lump Sum). In order for payment to be made under Construction Surveying (Hourly), the Work to be paid for must be pre-approved by the Engineer and will be measured on an hourly basis.

BASIS OF PAYMENT

625.13 Payment for construction surveying will be the contract lump sum bid and will be full compensation for all surveying work necessary to complete the project to including attendance at the Construction Survey Conference as described in Section 625.03, all setting and resetting of stakes, marks, monuments and preparing survey documentation as required.

Payment of Construction Surveying (Hourly) will be full compensation for surveying for those items approved in advance and/or directed by the engineer.

Partial payment for construction surveying, as determined by the Engineer, will be made as the work progresses.

Payment will be made under:

Pay Item	**Pay Unit**
Construction Surveying	Lump Sum
Construction Surveying (Hourly)	Hour

Traffic control for construction surveying will be measured and paid for in accordance with Section 630.

END OF SECTION REVISION

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REVISION OF SECTION 626
MOBILIZATION

Section 626 of the Standard Specifications is hereby revised for this project as follows:

Subsection 626.01 is revised to include the following:
The Contractor shall deliver written notice to all Grantors of Temporary Easements stating that the term of the Temporary Easement will commence thirty (30) days after the written notice is delivered to the Grantor ("Commencement Date"), and will terminate twenty-four (24) months from the Commencement Date. The Contractor will not be allowed access to or the use of any Temporary Easement before the Commencement Date nor after the termination of the Temporary Easement. In the event that the Project is not completed within the term of the Temporary Easement, the Contractor, only with the written approval of the City, may give written notice to the Grantor thirty (30) days prior to the expiration of the term that the City is extending the term of the Temporary Easement for up to an additional six (6) months. All written notices shall be sent both via certified mail and regular US Postal Service mail. The Contractor is also responsible for informing all adjacent property owners, tenants, and other interested parties of project start up and other information in accordance with the provision of Section 626, Public Information Services.

No additional payment will be made for any delays caused by the Contractor's failure to properly deliver these Notices.

The Contractor shall prepare and submit to the Engineer an access maintenance plan as described and required in the "Traffic Control Plan -General" specification. Failure to comply with this requirement will result in withholding of payment to the Contractor.

Throughout the duration of the project, the Contractor shall limit all of his actives and disturbed areas to Right-of -Way, temporary easements and permanent easements. All disturbed or damaged areas outside of these limited shall be restored in accordance with the general contract conditions to original or better condition to the satisfaction of the Engineer at no additional cost to the project. See the "Temporary Construction Easements" section of the Project Special Provisions for additional information including specific requirements on specific easements.

The Contractor shall satisfy all the requirements in the "Special Notice to Contractors" found in the Appendices to the project special provisions and in the Colorado Department of Transportation Field Materials Manual. Failure to comply with this requirement will result in withholding of payment to the Contractor

Throughout the duration of the project, the Contractor shall comply with all CDOT requirements and Federal requirements as required in the Contract Documents, and as determined by CDOT and the Engineer. Also included in this requirement is that the Contractor fill out all required CDOT Forms as required in the Contract Documents and as determined by CDOT and the Engineer, including all required CDOT Form 205's, Sublet Permit Application, which must be submitted and approved before work by that subcontractor can begin.

All of the Contractor's costs of whatsoever nature required to fulfill all of the above requirements in their entirety shall be included in the Lump Sum Price paid for Item 626, Mobilization, and no additional payment will be made. Should the Contractor fail the satisfy any of the above requirement, appropriates payment to the Contractor will be withheld or deducted.

END OF SECTION REVISION

REVISION OF SECTION 626
PUBLIC INFORMATION SERVICES
(TIER II)

Section 626 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of providing regular and continuous public information services throughout the duration of the project. Final approval of approach and collateral will be given by the Project Engineer.

CONSTRUCTION REQUIREMENTS

(a) *Public Information Manager (PIM)*. The Contractor shall provide a full-time Public Information Manager (PIM) who shall be the responsible charge for all activities associated with public information services for this project. As part of the key project staff submittal prior to the Preconstruction Conference, the Contractor shall submit the name, contact information and qualifications of the Public Information Manager (PIM) for this project for approval by the Engineer. The PIM shall have a minimum of five years professional experience in Public/Media Relations, Marketing or other related field and good verbal and written communications skills. Experience with roadway construction projects is preferred.

(b) *Activities of the PIM.* Throughout the duration of the project, the PIM shall be responsible for the following:

(1) *On Call.* The PIM shall be available or on call on every day there is work on the project and shall be available when needed and upon the Engineer's request at other than normal working hours.

(2) *Weekly Project Meetings.* The PIM shall participate in weekly project meetings held on-site. At the meetings, PIM shall discuss weekly communications issues and shall develop strategies to provide timely details for upcoming media advisories/press releases, lane closure reports, fliers, meetings, website updates and information line recordings.

(3) *Public Information Plan.* Prior to the pre-construction meeting, the PIM shall submit a Public Information Plan (PIP) for approval by the Engineer. The PIP shall include project milestones and planned public information strategies; primary stakeholder communications list; identification of any public information issues and proposed outreach and approach to crisis communications. The PIP shall be updated if necessary based on project milestones and progress.

(4) *Public Information Line/Communications.* The PIM shall establish a public information office equipped with a telephone, voicemail, computer and email address. The public information office may be located off-site or within the PIM's field office, provided that the telephone line is a local call line. The voicemail greeting for the project information line shall provide an updated message each week, or each day if necessary, concerning the project's completion date and forthcoming activities on the project and allow the recording of a message from the caller. If unable to answer the public information line, the PIM shall check and respond to voicemail messages throughout each day of construction operations and lane closures are being carried out. The PIM shall track inquiries made by citizens and businesses, including names, addresses, phone numbers, and subsequent action taken during construction. The PIM shall provide a report to the Engineer each week.

All inquiries and complaints shall be followed up with a return phone call or email from the PIM.

(5) *Photos/Video.* The PIM shall take and submit photos/videos of the project work on regular intervals. A cell phone camera is permitted. Photographs/videos may include traffic control, paving, slope repair, erosion control, wall and rail work, and other key areas of work as identified by the Contractor for use in reports to interested agencies, social media, and flyers. A minimum of two digital photographs/videos shall be submitted each month to the Engineer.

(6) *Media Relations.* At least one week prior to the project start date, the PIM shall prepare a media release summarizing the project scope, construction phasing, potential traffic and construction, duration of project and summary of project benefits. The PIM shall develop additional media releases and traffic advisories based on major construction milestones such as major traffic shifts, key closures, etc. or as requested by the Engineer.

The PIM shall immediately notify the Engineer of any on-site situations involving the media.

(7) *Paid Advertisements.* The PIM shall work with local media to develop and place a quarter-page ad in the local papers at least one week prior to start of construction. The ad shall detail the dates and scope of construction, will note that business access will be maintained but only temporarily altered and shall encourage readers to sign up for free updates from the PIM. Selection of local paper for advertising shall be as approved.

(8) *Public Meetings*. The PIM shall host up to three Contractor-hosted in person public meetings as requested by the Engineer. Participants may include the City of Denver, Colorado Department of Transportation, local elected officials, city/county staff, surrounding local agencies and businesses, residents and the traveling public. This meeting shall be held locally at a convenient location that shall accommodate the above attendees. The PIM shall publicize the meetings through multiple means including local media, email, and inserts in local newsletters, flyers, mailers and others. The focus shall be to inform attendees of project plans and schedules and to provide information on how those interested can receive updates on the project (via email address) and to address any specific concerns that anyone may have. At the meetings, PIM shall have available for viewing project displays that will provide information on work, phasing, traffic impacts, etc. subsequent project meetings may be necessary.

(9) *Stakeholder Meetings.* The PIM and contractor staff shall participate with the City on any meetings throughout the duration of the project as requested. The contractor shall provide appropriate technical staff as required.

REVISION OF SECTION 626
PUBLIC INFORMATION SERVICES
(TIER II)

(10) *Tours and Special Events.* The PIM shall provide media, businesses and government officials tours of the construction areas and to support the coordination of special events (groundbreaking or grand opening or other key milestones) as requested and approved by the Engineer. The PIM will provide representatives of the contractor to participate in tours and events, as well as assist in the coordination of events.

(11) *Lane Closure Reports.* PIM shall submit a Lane Closure Report each Thursday, for the following week's activities (Saturday through Friday), to the contacts listed on the Report and at the end of this specification.

(12) *Web Page Updates.* The PIM shall work with Denver to update the internet web page content specifically for this project and provide consistent updates with the latest project information (web page development experience is not necessary as the PIM will simply supply information). It shall contain all appropriate links to/from other sites if applicable, e.g., local city, county, bus service, etc. The PIM shall ensure the web page is updated at least weekly with pertinent schedule information, new photos, contact information, etc.

(13) *Project Fliers.* At least 10 working days prior to the start of work, the PIM shall prepare and deliver one flier to each *property* owner potentially impacted by the work zone such as properties with direct access to the roadway, nearby businesses, schools, homes, churches or others who rely on regular traffic access in the construction zone. An email containing the flier shall also be sent to all those known to use the project limits having significant or daily use of the roadway contained within the project corridor. Examples of these are bus services, community centers, schools. Additional fliers may be required, as directed by the Engineer.

The flier shall provide the anticipated project start and end date, location and description of work, traffic impacts and hours/days of operation, PIM's project information line, email address, web address, project map (if necessary) and a construction safety message. Flier may also contain contractor logo, if desired. Fliers shall be submitted for approval. Final approval is provided by Engineer.

Language Assistance for LEP Persons. The Contractor is required to provide access to Limited English Proficient (LEP) persons. LEP persons are individuals for whom English is not their primary language and who have a limited ability to read, write, speak or understand English. Examples of language assistance include, but are not limited to, translation of meeting notices and interpretation services at meetings. At a minimum, the PIM shall provide interpretation services upon request by an LEP person. All flyers and project information shall be translated into Spanish and shall be distributed in Spanish and English. The PIM shall document all measures taken to communicate with LEP persons and record all requests for language assistance.

(14) *Public Information Collateral.* The PIM shall develop a variety of outreach collateral to share coping information to the public as necessary for major project milestones such as long-term closures or impactful construction activities (i.e. nighttime noise, restricted access, utility impacts, etc). Collateral could include newsletters, fact sheets, flyers, social media updates, etc.

(c) *Construction Signing.* In accordance with Section 630, a minimum of one week prior to start of work, the Contractor shall erect signs at both ends of the project limits, with the estimated dates when the project will commence and end. The signs shall include the Contractor's name and public information contact number.

(d) *Response Protocol to CDOT and the public.* The PIM shall conform to Table 626-1 in responding to correspondence from stakeholders and the public:

Table 626-1
RESPONSE PROTOCOL

TYPE OF COMMUNICTION	TIMING OF RESPONSE
Hotline Calls	Check messages throughout day Respond same day (initial call) or within 24 hours (including weekends if work is occurring)
Email	Same day (within two business days for high volume situations)
Call from Denver Staff	As soon as possible
Webpage Inquiries	Same day (within two business days for high volume situations)
Public Meeting Inquires	Within one week of the meeting

(e) *Deliverables Protocol to Denver.* The PIM shall conform to Table 626-2 in submitting the following for City review and approval prior to dissemination:

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REVISION OF SECTION 626
PUBLIC INFORMATION SERVICES
(TIER II)

Table 626-2
DELIVERABLES AND SUBMITTAL TIME TO ENGINEER

Deliverable	When to be submitted
PIM Name and Credentials	Before Pre-Construction Meeting (along with key staff submittal)
PIM Contact Information	At Pre-Construction Meeting
Emergency Response Telephone Tree (when required in the Contract)	Before works starts
Local Telephone Hotline	Before works starts
Stakeholder Distribution List (if required for non-work zone flyer recipients and emergency service providers)	At Pre-Construction Meeting
Lane Closure Reports	Weekly, on Thursday by noon
Traffic Advisories/Media Releases	48 hours prior to scheduled distribution date
Fliers, posters or other public material	5 Working Days prior to the scheduled distribution date In cases of rapid response, 48 hours prior to distribution
Photos/Video	Twice a month or as requested.

(f) *Deliverable protocols to the public.* The PIM shall conform to Table 626-3 in providing the following information to the public:

Table 626-3
DELIVERABLES AND SUBMITTAL TIME TO THE PUBLIC

Deliverable	When to be published
Full road closures, detours, and major traffic impacts lasting seven days or longer	14 days prior to the beginning of activity in any area of the Project.
Major project activities (such as major lane shifts, bridge demolitions, etc.) lasting seven days or less	7 days prior to the beginning of the activity
Other remaining types of construction Activities in any area of the Project including: ▪ Night Work ▪ Utilities ▪ Change of business/residential access	7 days prior to the beginning of activity in any area of the Project or as determined jointly by teams
Other construction updates (e.g., cancellation of planned closures, additional lane closures, closure removals, major traffic shifts, etc.) that directly impact the public.	As soon as known with at least 24 hours' notice

(g) Public Information Contact Sheet. A Public Information Contact Sheet shall be completed by the PIM with the names of contact as appropriate to the project:

Public Information Services Contact Sheet

Owners:

City of Denver:
Name: Jim Geist, Project Manager
Phone/s: 720-913-4504
Email: James.Geist@denvergov.org

Colorado Department of Transportation Regional Communications Manager
Name: Carol Anderson, Local Agency Unit
Phone/s: 303-512-5993
Email: carol.anderson@state.co.us

REVISION OF SECTION 626
PUBLIC INFORMATION SERVICES
(TIER II)

Key Stakeholders (as appropriate)

Schools/School District

Businesses

Community Centers

Churches

Visitor Centers/Tourist Destinations

Neighborhood Associations

Multi-Family Housing/Property Management Firms

Special Districts (Business Improvement, Parks, Maintenance, Water, etc.)

Utility Owners

Commercial Vehicle Operators

Others

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REVISION OF SECTION 626
PUBLIC INFORMATION SERVICES
(TIER II)

METHOD OF MEASUREMENT

The Engineer will monitor the PIM and all public information services. When the PIM provides acceptable public information services in accordance with these specifications, partial payments for the pay item Public Information Services will be made as the work progresses. Failure to provide acceptable public information services will result in withholding of payment for this item. These partial payments will be made as follows:

Partial payments for public information services will be made once each month as work progresses. The monthly partial payments will be determined by pro-rating the lump sum bid amount by the number of months in the actual construction schedule.

BASIS OF PAYMENT

Payment will be made under:

Pay Item	**Pay Unit**
Public Information Services (Tier II)	Lump Sum

Payment for Public Information Services will be full compensation for all work, materials and equipment to provide public information throughout the project in accordance with this specification.

Construction Signs will be measured and paid for in accordance with Section 630.

END OF SECTION REVISION

REVISION OF SECTION 627
PAVEMENT MARKING

Section 627 of the Standard Specifications is hereby revised for this project as follows:

Subsection 627.13 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Pavement Marking Paint	Gallon
Preformed Pavement Marking (Type II) (Inlaid)	Square Foot
Thermoplastic Pavement Marking	Square Foot
Preformed Thermoplastic Pavement Marking (60 Mil) (WORD-SYMBOL)	Square Foot
Preformed Thermoplastic Pavement Marking (60 Mil) (XWALK-STOPLINE)	Square Foot

END OF SECTION REVISION

REVISION OF SECTION 627
RAISED PAVEMENT MARKER

Section 627 is hereby revised for this project as follows:

Subsection 627.11 shall include the following:

A Raised Pavement Marker is a permanent two-direction reflector to be installed on sections of the raised median as shown in the plans.

The Raised Pavement Marker (sometimes referred to as a "reflective pavement marker") shall contain two retro-reflective faces (approach and trailing) that each retro-reflect amber light. The body of the Raised Pavement Marker, other than the retro-reflective faces, shall be yellow. The size, material type, and reflective quality requirements shall conform to Section 713.18 of the Standard Specifications.

Installation and adhesives shall conform to manufacturer recommendations. Prepare all surfaces and ensure that the bond surfaces are free of dirt, curing compound, grease, oil, moisture, loose or unsound pavement markings, and any other material that would adversely affect the adhesive bond. Apply adhesives in sufficient quantity to ensure that 100% of the bonding area of raised pavement markers is in contact with the adhesive. Apply adhesives in accordance with manufacturers recommendations, including minimum temperature requirements.

Subsection 627.12 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Raised Pavement Marker	Each

Payment for Raised Pavement Marker will be full compensation for all work, materials and labor required to properly install the marker, including fasteners/adhesives.

END OF SECTION REVISION

REVISION OF SECTION 629
SURVEY MONUMENTATION

Section 629 of the standard specifications is hereby revised as follows:

Delete section 629 and replace with the following:

DESCRIPTION

629.01 This work consists of locating, preserving, referencing, installing and restoring land monuments, such as Primary Control monuments from which the Right of Way or any land boundary will be calculated, described or monumented, Public Land Survey System (PLSS) monuments, General Land Office (GLO) monuments, Bureau of Land Management (BLM) monuments, Mineral Survey (MS) monuments, Right of Way (ROW) monuments, property boundary monuments and offsets, range points, benchmarks, easement monuments, and other monuments that are required by law or regulation to be established and recorded by a Professional Land Surveyor (PLS), along with installing or adjusting Monument Boxes. This work shall be done in accordance with the range point and monument requirements found in the Appendix.

The production of additional documentation may be required by the City Surveyors' Office. All such work included in this section shall be under the supervision of a PLS who is licensed in the State of Colorado.

MATERIALS AND EQUIPMENT

629.02 The Contractor shall furnish all personnel, survey equipment, safety equipment, materials, and traffic control necessary to perform the required monumentation and related surveying.

CONSTRUCTION REQUIREMENTS

629.03 A Construction Survey Conference shall be held with the City Surveyor's Office prior to performing any surveying work under this section. The Contractor's Surveyor (PLS) and Party Chief shall attend. A Construction Survey Check List shall be completed and signed by the City Surveyor's Office and the contractor.

The Contractor shall check and verify all established Primary horizontal and vertical control points.

All survey records generated shall be the property of the City and shall be available to the City Surveyor's Office for inspection or reproduction at all times. All survey records shall be transmitted to the City Surveyor's Office for inclusion into the project records before final project acceptance.

Electronic formats may be acceptable, please coordinate with the City Surveyor's office.

Copies of any new Monument Records filed by the PLS with the State Board of Registration shall be submitted to the City Surveyor's Office prior to filing.

629.04 Locating Monuments. This work consists of field locating all survey monumentation as discussed in 629.01 which is in place within the project limits. A diligent search of construction zones and project limits shall be performed by the PLS.

REVISION OF SECTION 629
SURVEY MONUMENTATION

629.05 Preserving and Referencing Monuments. All monuments as described in 629.01 shall be preserved, reference and reset by a PLS within the project limits.

629.06 Installing Monuments. All monuments as described in 629.01 shall be preserved through construction. If any monuments as described in 629.01 are to be disturbed/removed during construction, it will be the contractor's PLS responsibility to reset all monuments to current City of Denver standards. Appropriate documentation will be required for all reset monuments.

629.07 Monument Box. This survey work shall consist of installing or adjusting monument boxes to current City or State requirements. This work shall be done in accordance with the range point and monument requirements found in the Appendix.

METHOD OF MEASUREMENT

629.08 Survey Monuments, Monument Boxes, and Adjust Monument Boxes will be measured by the actual number of the various types installed and accepted by the Engineer. Measurement for locating survey monuments, preserving and referencing monuments will not be measured.

BASIS OF PAYMENT

629.09 The accepted quantities will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule.

Prior to final payment, all survey records and documentation must be submitted and accepted by the City Surveyor's Office.

The Construction Survey checklist, equipment calibrations, and survey records will not be paid for separately but shall be included in the work. The locating of monuments, preserving and referencing monuments will not be paid for separately but shall be included in the work.

Payment will be made under:

Pay Item	**Pay Unit**
Survey Monument (Type 1)	Each
Survey Monument (Type 3A)	Each
Survey Monument (Type 6)	Each

Traffic control for monumentation and related surveying will be measured and paid for in accordance with Section 630.

END OF SECTION REVISION

REVISION OF SECTION 630
TRAFFIC CONE

Section 630 of the Standard Specifications is hereby revised for this project as follows:

In Subsection 630.05, revise the second paragraph as follows:

The reflectorized material shall be AP 1000 Polyester (Reflexite Corp.), 3M Type III, Transparent (Reflexite Corp.), or 2010 Vinyl Cone Collar (Reflexite Corp.). Any other material is not acceptable unless its brightness is equivalent or greater than the types named.

END OF SECTION REVISION

REVISION OF SECTION 630
IMPACT ATTENUATOR (TEMPORARY)

Section 630 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of the construction of temporary impact attenuators of the type shown on the plans. This work shall be done in accordance with these specifications and in conformity with the lines and details shown on the plans or established.

MATERIALS

The system shall meet the following design parameters:

Design Speed: 40 mph

Width: 2 (feet)

Bi-directional: yes

Object to be shielded: Concrete Barrier (Temporary)

CONSTRUCTION REQUIREMENTS

The impact attenuator shall be fabricated and installed in accordance with the manufacturer's recommendations. The Contractor shall provide a copy of the manufacturer's installation instructions and parts lists to the Engineer prior to installation of the device.

Each installation shall be supervised and certified as correct upon completion by a representative of the device manufacturer or by an employee of the Contractor who is a certified installer. The certified installer shall have completed device training and shall be registered with the manufacturer as a certified installer

METHOD OF MEASUREMENT

Impact attenuators will be measured by the number of attenuators shown on plans, installed, and accepted.

BASIS OF PAYMENT

The accepted quantities will be paid for at the contract unit price for the pay item listed below.

Payment will be made under:

Pay Item	**Pay Unit**
Impact Attenuator (Temporary)	Each

Payment will be full compensation for all work and materials required to furnish, install, and certify the impact attenuator. Site preparation, pavement pad and all necessary hardware including anchors and transitions will not be paid for separately, but shall be included in the work.

END OF SECTION REVISION

REVISION OF SECTION 630
PORTABLE MESSAGE SIGN PANEL

Section 630 of the Standard Specifications is hereby revised for this project as follows:

Subsection 630.01 shall include the following:

This work consists of furnishing, operating, and maintaining a portable message sign panel.

Add subsection 630.031 immediately following subsection 630.03 as follows:

630.031 Portable Message Sign Panel. Portable message sign panel shall be furnished as a device fully self contained on a portable trailer, capable of being licensed for normal highway travel, and shall include leveling and stabilization jacks. The panel shall display a minimum of three - eight character lines. The panel shall be a dot-matrix type with an LED legend on a flat black background. LED signs shall have a pre-default message that activates before a power failure. The sign shall be solar powered with independent back-up battery power. The sign shall be capable of 360 degrees rotation and shall be able to be elevated to a height of at least five feet above the ground measured at the bottom of the sign. The sign shall be visible from one-half mile under both day and night conditions. The message shall be legible from a minimum of 750 feet. The sign shall automatically adjust its light source to meet the legibility requirements during the hours of darkness. The sign enclosure shall be weather tight and provide a clear polycarbonate front cover.

Solar powered message signs shall be capable of operating continuously for 10 days without any sun. All instrumentation and controls shall be contained in a lockable enclosure. The sign shall be capable of changing and displaying sign messages and other sign features such as flash rates, moving arrows, etc.

Each sign shall also conform to the following:

1. Flip-disks legend signs shall have fluorescent ultraviolet blacklight bulbs.

2. In addition to the onboard power source with battery back up, each sign shall be capable of operating on a hard wire, 100 110 VAC, external power source.

3. Each sign shall be furnished with an operating and parts manual, wiring diagrams, and trouble shooting guide.

4. The portable message sign shall be capable of maintaining all required operations under Colorado mountain winter weather conditions.

5. Each sign shall be furnished with an attached license plate and mounting bracket.

6. Each sign shall be wired with a 7 prong male electric plug for the brake light wiring system.

REVISION OF SECTION 630
PORTABLE MESSAGE SIGN PANEL

7. All communications hardware for remote programming, including, cellular phone, laptop computer, computer hardware and software, on trailer electrical wiring connectors, and switch controls necessary to allow all sign functions required by the specification shall be provided with each sign.

8. Each sign shall also be provided with all necessary equipment so that it can be switched to remote programming, using either hard wire dedicated telephone line, or remote dial-up via cellular telephone.

9. The supplier shall demonstrate the capabilities of the sign, and provide 2 days of training for operation and maintenance of the sign.)

Prior to obtaining this item, the Contractor shall submit the trade name, model number and specifications of the portable message sign panel he intends to use, to the Engineer, for approval. ADDCO Manufacturing Co. Inc., American Signal Company, Winko Matic Signal Company, Precision Solar Controls Inc. and National Signal Company are known to produce a suitable portable message sign panel. The Engineer's decision concerning acceptability of this item shall be Final.

Subsection 630.12 shall include the following:

The portable message sign panel shall be available on the project site at least ten working days prior to the start of active roadway construction. Maintenance, storage, operation, relocation to different sites during the project, and all repairs of portable message sign panels shall be the responsibility of the Contractor.

Subsection 630.15 shall include the following:

Portable message sign panels will be measured by the maximum number of approved units in use on the project at any one time. Two portable message sign panels shall be in continuous use throughout the duration of construction.

Subsection 614.16 shall include the following:

Pay Item	**Pay Unit**
Portable Message Sign Panel	Each

END OF SECTION REVISION

REVISION OF SECTION 630
UNIFORMED TRAFFIC CONTROL

Section 630 of the Standard Specifications is hereby revised for this project as follows:

Subsection 630.09 shall include the following:

Uniformed Officers - The Contractor shall employ off-duty police officers to provide traffic control and traffic enforcement throughout the project as required by the Project Manager. Authorization must be made by the Project Manager in advance of working arrangements for Uniformed Traffic Control. Arrangements for officers shall be made at least 2 weeks in advance by contacting the following police agency:

Denver Police Department (Special Events Unit)

Phone Number: (720) 327-7333

Subsection 630.14 shall include the following:

The quantity to be measured for Uniformed Traffic Control will be the total number of hours that Uniformed Traffic Control is actually used as authorized.
Subsection 630.15 shall include the following:

The accepted number of hours of Uniformed Traffic Control will be paid for at the contract unit price per hour.

Payment will be made under:

Pay Item	**Pay Unit**
Uniformed Traffic Control	Hour

END OF SECTION REVISION

REVISION OF SECTION 630
CONSTRUCTION ZONE TRAFFIC CONTROL

Section 630 of the Standard Specifications is hereby revised as follows:

Subsection 630.01 shall be modified to read:

…as required by, in descending order of precedence, these plans and special specifications, Traffic Barricade Manual published by the City and County of Denver, the Standard Specifications, as augmented by the Colorado Department of Transportation M and S standards, and the Manual on Uniform Traffic Control Devices for Streets and Highways.

This work also consists of satisfying all the requirements of the "Traffic Control Plan -General" found in the project special conditions.

Subsection 630.02 shall include the following:

Roll-up construction signs will not be allowed.

Subsection 630.02 through 630.08 shall be as provided in the City and County of Denver Traffic Barricade manual, latest edition. Modifications to said manual are:

Section III shall include:

Traffic Control. Traffic control through the construction area is the responsibility of the Contractor. Before starting construction the Contractor shall submit, in writing, the proposed Method of Handling Traffic (MHT) for the initial phase of construction. When a different MHT is required for a subsequent construction phase, it must be submitted two weeks prior to starting that phase. All proposed MHTs shall be approved, in writing, by Denver Public Works. No phase of construction shall start until an acceptable MHT has been received and approved by Denver Public Works. The proposed methods shall include, as a minimum, the following:

A detailed diagram that shows the location of all sign placements, including advance construction signs (if not previously approved) and speed limit signs; method, length and time duration for lane closures; purpose and location of flag persons.

A tabulation of all traffic control devices shown in the detailed diagram including, but not limited to: construction signs, vertical panel; vertical panel with light; barricades; cones, drum channelizing devices; concrete barrier (temporary); advance warning flashing or sequencing arrow panel. Certain traffic control devices may be used for more than one operation or phase. However, all devices required for any particular phase must be detailed and tabulated for each phase. Certain traffic control devices may be used for more than one phase of construction.

Number of flaggers and hours required.

Number of days a Traffic Control Supervisor is required.

Number of hours for uniformed traffic control.

Approval of the proposed MHT is intended to indicate those devices for which payment is to be made. Such approval 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.

REVISION OF SECTION 630
CONSTRUCTION ZONE TRAFFIC CONTROL

VI.B.3 therein shall include:

Non-metallic drums may be substituted for vertical panel channelizing devices.

VI.F shall include:

The Contractor shall, at the preconstruction conference, designate one of his employees, other than the Superintendent, to be responsible for traffic control management. This responsibility shall include management of the Contractor's signing and all other details covered by the Specifications which contribute to the convenience, safety, and orderly movement of traffic and to the comfort of the traveling public. The designated employee will have the Certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) in lieu of completion of the CDOT minimum training requirements.

Traffic control management shall be maintained and inspected on a 24-hour per day basis at no additional cost to the project. The Contractor shall make arrangements so that the Traffic Control Manager or his approved representative will be available on every working day, "on call" at all times and available upon the Engineer's request at other than normal working hours. The Traffic Control Manager shall have an up-to-date copy of part VI of the MUTCD, pertaining to traffic controls for street and highway construction, as well as the City and County Traffic Barricade manual, available at all times. In addition, provisions shall be made for flaggers to assist handicapped individuals, those who live or work near the project vicinity, and others traverse through the construction zone safely, at no additional cost to the project.

VI.F.2 The third item shall read:

The flagger's STOP/SLOW sign paddle shall be 18 inches with letters six inches high.

Subsections 630.09 through 630.14 of the Standard Specifications shall apply except as otherwise provided herein.

Subsection 630.09 (4) shall be revised to include the following:

Vehicular and pedestrian access to all properties adjacent to the project shall be maintained continually throughout the duration of construction.

Access to driveways and doorways shall be maintained at all times during construction. The Contractor shall coordinate driveway work and other work adjacent to the buildings and doorways with the property owner a minimum of one week prior to starting the work.

Subsection 630.15 shall be revised to include the following:

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REVISION OF SECTION 630
CONSTRUCTION ZONE TRAFFIC CONTROL

A day shall be defined as the time from 12:00 midnight to 12:00 midnight. A week shall be defined as the time from Sunday at 12:00 midnight to the following Sunday at 12:00 midnight. The Traffic Control Manager shall keep a daily log of traffic control devices and personnel. The log shall list all devices and personnel deployed within the limits of construction for each day and shall be available for review by the Engineer by noon the following Monday to be eligible for payment for the previous week's work.

Plastic temporary fencing shall conform to section 710.04 and chain link fencing shall conform to section 710.03. Both items will be paid for by linear foot. Installation, maintenance, and relocation shall be included in the cost of the bid.

Construction traffic control devices, as determined by the approved MHT, will be paid for based upon the Traffic Control Manager's weekly submittal of daily logs. The number of traffic control devices paid per week shall be the maximum number of approved devices deployed on any one day during that week.

END OF SECTION REVISION

REVISION OF SECTION 630
TEMPORARY TRAFFIC SIGNAL

Section 630.01 of the Standard Specifications is hereby revised for this project as follows:

This work shall consist of furnishing, installing, maintaining, and removing temporary traffic signal installations at the intersections of 8th and Federal and 10th and Federal to accommodate the various phases of roadway construction. This work also includes any modification of the existing traffic signal that will be required to facilitate installation of the temporary signal.

Subsection 630.04 paragraph two (2) shall be replaced with the following:

If not included in the list below, the Contractor shall submit a list of equipment proposed to be used. The equipment shall be identified by trade name, size, and number. Material deemed inadequate by the Engineer shall not be used.

Poles: Steel poles shall conform to CDOT standards for traffic signal span wire poles with luminaries. All poles shall be 35 feet long, Class 5 minimum. The poles shall be erected with a 1-inch rake. Pole depth shall be in accordance with CDOT Standards for span wires. The backfill shall be tamped and compacted around the pole in 6-inch lifts.

Span Wire: The span wire shall be 3/8 inch nominal diameter, 7-strand, zinc-coated steel wire conforming to ASTM A 475, utilities grade.

Span Wire Accessories: the components of span wire accessories shall meet the following requirements and, with the exception of nylon cable hangers, shall be galvanized in accordance with AASHTO M 232.

Thimble-eye bolts, nuts, and washers: The thimble-eye bolts and nuts shall be 5/8 inch in nominal diameter and conform to ASTM A 307.

3-Bolt clamps: The 3-bolt clamps shall have a minimum breaking strength of 51.2 KN.

Dead-ends: The dead-ends shall be made of the same materials as the span wire to which they are attached.

Cable Hangers: The cable hangers shall be made of nylon or steel.

Traffic Signal Heads: The Contractor shall provide appropriate traffic signal heads and all accessories and cables necessary to complete the installation as shown on the plans. Traffic signal heads shall be lightweight.

Wiring: Type and size of wire and cable to be used and installation methods employed shall conform to the requirements of the National Electrical Code and to IMSA cable specifications.

Subsection 630.09 (5) shall be revised to include the following:

Accessible pedestrian push buttons which accommodate the allowable signalized pedestrian crossings during the various phases of construction shall be provided with the temporary signal installation.

REVISION OF SECTION 630
TEMPORARY TRAFFIC SIGNAL

Add subsection 630.13B Temporary Traffic Signal. Subsection 630.13B shall include the following:

The span wire accessories shall be assembled and installed in accordance with CDOT standard S-614-40 for span wire signals.

The Engineer and representatives of the City and County of Denver will inspect the installation. After approval, the maintenance of the temporary signal installation, including all energy charges, shall become the responsibility of the Contractor until the Engineer directs removal. The Contractor will be responsible for coordinating the power supply to the temporary signal with Xcel Energy. The Contractor will be responsible for all payments to Xcel Energy for power supplied to the temporary signal. The Contractor shall be responsible for maintaining the signals in proper operating condition. Any damage to the temporary traffic signal installation from any cause whatsoever shall be repaired by the Contractor at this own expense. The Contractor may institute action to recover damages from a responsible third party. If, at any time, the Contractor fails to perform any work deemed necessary by the Engineer to keep the temporary traffic signals in proper operating condition, CDOT reserves the right to have other Contractors perform the needed work. The cost of such work will be deducted from the amount due to the Contractor. All equipment installed shall remain the property of the Contractor.

The Contractor shall remove the temporary traffic signal installation when notified to do so by the Engineer. The Contractor shall be responsible for proper disposal of unusable material. Any holes resulting from removal of the poles shall be backfilled and compacted by the Contractor in accordance with the respective sections.

The Contractor shall reset temporary traffic signal heads as required or as directed by the Engineer to accommodate traffic shifts as needed. This will primarily consist of resetting heads to match the current or changing phases of work, or as requested by the Engineer. All resetting of temporary heads to accommodate construction traffic shifts shall be considered included in the unit price for Traffic Signal (Temporary) and will not be paid for separately.

Subsection 630.14 shall include the following:

Traffic Signal (Temporary) will be measured by each intersection (8th and Federal Blvd intersection and 10th and Federal Blvd intersection) where a temporary traffic signal is required. Payment for Traffic Signal (Temporary) each shall be full compensation for all work, materials, and equipment necessary to properly install, maintain, and remove the temporary traffic signal.

Subsection 630.15 shall include the following:

Pay Item	**Pay Unit**
Traffic Signal (Temporary)	Each

END OF SECTION REVISION

REVISION OF SECTION 705
PREFORMED JOINT FILLERS

Section 705 of the Standard Specifications is hereby revised for this project as follows:

Subsection 705.01 shall include the following:

(c) *Preformed Joint Fillers*. Preformed fillers for concrete pavement and curb and gutter joints (including isolation joint between back of curb and attached sidewalks and median cover material) shall be flexible foam (or resilient caramar type) expansion joint filler material as noted in the plans. The flexible foam expansion joint filler material shall meet the requirements of ASTM D 5249, Type 2, ASTM D 1752, Sections 5.1 through 5.4, with the compression requirement modified to 10 psi (7.03 g/mm^2) minimum and 25 psi (17.58 g/mm^2) maximum. The preformed fillers shall be non-gassing and be compatible with hot-pour joint sealants. Preformed fillers shall be punched to admit the dowels where called for in the plans. The filler for each joint shall be furnished in a single piece for the full depth and thickness required for the joint unless otherwise authorized by the Engineer. When the use of more than one piece is authorized for a joint, the abutting ends shall be fastened securely, and held accurately to shape, by stapling or other positive fastening satisfactory to the Engineer.

END OF SECTION REVISION

REVISION OF SECTION 715
LIGHTING AND ELECTRICAL MATERIALS

715.01 General. Materials shall be of a standard line from a name brand manufacturer. Electrical material shall be listed by the Underwriters' Laboratories, Inc., and shall conform to the National Electrical Code.

Materials shall be the same as, or compatible with, that used and accepted by the agency responsible for maintenance.

The Engineer may inspect all lighting materials and all electrical materials and accepted or reject them at the project site. Samples may be taken or manufacturer's certifications may be accepted in lieu of samples.

715.02 Light Standard Foundations and Concrete Foundation Pads. Concrete shall be Class B conforming to Section 601.

Anchor bolts shall be designed by the Contractor's Engineer and shown on the working drawings. The threaded ends of the anchor bolts, the nuts, and the washers shall be galvanized in accordance with ASTM A 153. Galvanizing on anchor bolts shall extend 2 to 4 inches beyond the threads.

Reinforcing steel shall conform to Section 602.

715.03 Light Standards.

(a) *General.* All structural components of light standards, bases, couplers, anchor bolts, luminaires, and other attachments to be used for lighting shall be designed for a minimum of 100 MPH wind velocity, in accordance with AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.*

All breakaway bases and couplers shall meet the breakaway requirements specified in AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals,* Section 12. Conformance shall be verified by crash tests reviewed and accepted by FHWA. A certificate of compliance shall be provided.

(b) *Metal Light Standards.* Metal light standards shall be fabricated of either steel or aluminum, unless otherwise specified. Whenever Light Standard Metal is specified, the Contractor may furnish either steel or aluminum. Material type and shape of light standards shall be the same throughout the project, unless otherwise shown in the Contract.

All standards shall have cable-entrance holes located in conformity with the type of arm mounting used. Metal surfaces shall be free of imperfections marring the appearance and of burrs or sharp edges that might damage the cable.

All metal poles shall be tapered and shall be supplied with pole caps.

Aluminum alloys shall have a minimum yield strength of 25,000 psi. Aluminum poles, arms, and fittings shall be made of aluminum alloy conforming to the following for the material form required:

ASTM Standard	Alloy number
B 209	6061-T6
B 211	6061-T6
B 221	6061-T6 6063-T6 6005-T5
B 241	6061-T6 6063-T6

Aluminum poles may also be made of aluminum alloy 5086-H34 conforming to ASTM B 313 (excluding pressure and burst tests).

Aluminum mast arms shall be tapered unless otherwise shown on the plans.

Steel mast arms shall be made of Schedule 40 standard steel pipe conforming to ASTM A 53.

All steel poles, mast arms and base flanges shall be hot-dip galvanized in accordance with ASTM A 123. Units on which the spelter coating has been damaged shall be repaired as provided in AASHTO M 36, or other approved method.

Base flanges for both aluminum and steel poles shall have continuous welds both inside and outside, unless otherwise permitted. Base flanges inserted into the pole and bonded shall meet the requirements for materials and strength stated herein.

Base flanges for aluminum poles and transformer bases shall be aluminum castings of alloy ANSI 356.0-T6 or UNS A03560 T6 conforming to ASTM B 26 or an acceptable equivalent.

Each metal light standard shall be wired with a breakaway fused connector of proper capacity rating. The fused connector shall be located in the transformer base. If the light standard has no transformer base, the fused connector shall be located in the pole at the hand hole.

All transformer bases shall have vandal resistant, removable access doors.

The transformer base shall be a frangible breakaway type as shown on the plans and shall accommodate the anchorage and base flange of the light pole supplied. Each transformer base shall have a ½ inch bolt or lug fastened inside the base for grounding; the lug or bolt shall be visible from the door opening. The transformer base shall have a wire hole for outside grounding, if required.

(c) Hardware used with steel standards shall be either cadmium plated steel, hot dip galvanized steel, or stainless steel. All hardware used with aluminum standards shall be anodized aluminum or stainless steel. Bolts to be inserted in aluminum threads shall be stainless steel.

715.04 Luminaires and Light Sources. Luminaires shall be UL or ETL listed for use in wet locations and IP66 rated. Luminaires shall be adaptable to the type of power distribution system to be used. Luminaires shall be acceptable to Xcel Energy.

(a) *General.* Luminaires shall conform to the following requirements:

(1) Housing. The luminaire enclosure shall be an injection-molded or die-cast opaque housing. The housing shall have a powder-coated, corrosion-resistant finish. The color shall be as specified on the plans. The mounting shall be as shown on the plans.

The housing shall have a door that provides access to all internal components. The door shall be equipped with a safety catch and a latch. The housing shall have an inner rolled flange to support the door frame. The door frame shall be an aluminum casting, hinged to the housing. The door frame shall be sealed to the housing with a molded silicone gasket and shall be secured with a minimum of four captive screws.

(2) Optical Chamber. The luminaire distribution shall be equal to or less than an Illuminating Engineering Society of North America (IES) TM15-11 Backlight Uplight and Glare (BUG) ratings listed below in Table 715-1 based on initial lumens or Light Loss Factor (LLF) = 1.0. Roadway luminaires with a U value greater than U0 shall not be accepted. The optical chamber shall be completely sealed from the housing, or the housing shall be completely sealed. A seamless one-piece memory-retentive gasket shall seal the optical chamber or housing against the luminaire lens door. All wires entering the optical chamber shall be gasketed at their point of entry. Socket mountings, rivets used in the construction or support of the reflector system, and all other penetrations into the optical chamber shall be completely sealed. The optical chamber shall be water tight when the luminaire door is closed.

Table 715-1: Backlight, Uplight, and Glare (BUG) Values

Luminaire Mounting Location	Minimum Initial Luminaire Lumen Range	Backlight (B) Rating Maximum	Uplight (U) Rating Maximum	Glare (G) Rating Maximum
Non median-mounted	Less than 5,000	B2	U0	G1
	5,000 – 22,000	B3	U0	G2
	Above 22,000*	B3	U0	G3
Median-mounted	Less than 5,000	B3	U0	G1
	5,000 – 22,000	B4	U0	G2
	Above 22,000*	B4	U0	G3
	*By special application only.			

(3) Lens and Lens Door. The lens shall be constructed of clear, flat (for lamps over 3200 lumens), tempered glass. The glass shall be thermal-resistant and impact-resistant. The lens shall be sealed to the door frame with continuous silicone gasketing. The door shall have an easy-access, quick-release safety latch. The door shall have aluminum or stainless steel quick-release hinge pins for tool-less or one-hand easy and secure opening. When the door is closed, the electrical component compartment and the optical chamber shall be completely sealed.

(4) Electrical Components. All components shall be Underwriters Laboratory (UL) listed for wet locations or by an Occupational Safety & Health Administration Nationally Recognized Testing Laboratories (OSHA NRTL). Luminaires shall operate from 120 to 277 VAC as specified on the plans or adaptable to the type of power distribution system to be used. All internal wiring and quick disconnects shall be rated for at least 600 VAC and insulated for 302°F. The dimmable driver shall be easily removable from the luminaire housing without the use of tools. The following components shall be in accordance with corresponding sections of ANSI C136.37:

i. Wiring and grounding
ii. Terminal blocks for incoming AC lines
iii. Photocontrol receptacle
iv. Latching and hinging

(b) *Roadway Luminaires.* Roadway luminaires shall be LED type with integral driver, flat lens, aluminum housing, and be UL Listed for wet locations. All luminaires for the project shall be the same type and design unless the plans specify otherwise.

(1) The luminaire and all components shall be UL or Intertek Testing Services (ETL) listed for Wet Location and shall have minimum Ingress Protection Rating of IP66.

(2) Light source shall be comprised of LED modules connected to a non-integrated driver and ready for connection to a production line luminaire. Luminaires utilizing integrated driver LED light sources, screw-based or panel retrofit products shall not be accepted.

(3) The luminaire shall have a Type II or III distribution for non-median mounted luminaires, and Type II, III, IV or V for median mounted luminaires.

(4) Transmissive optical components shall be applied in accordance with LED manufacturer's Original Equipment Manufacturer (OEM) design guidelines to ensure suitability for the environment in which the luminaire is installed.

(5) Luminaires shall utilize an adjustable slipfitter-type mounting system for installation on 1.25-inch (1.66-inch o.d.) to 2-inch (2.375-inch o.d.) outside diameter pipe tenons. Slipfitter shall consist of a two-piece clamp and four 9/16-inch hex bolts. Slipfitter shall allow for a vertical tilt adjustment of ± 5 percent in order to mount luminaire plumb for a U0 rating. Luminaires shall be equipped with integrated leveling bubble.

(6) Access to all internal parts requiring replacement shall not require tools (i.e. "tool-less entry").

(7) The luminaire housing shall be constructed of aluminum alloy.

(8) Power Supply/Driver shall be provided in compliance with section 715.05(a). Driver must be internal and thermally separated from LED compartment.

(9) Dimming controls shall conform to Section 715.09.

(10) Luminaire finish shall be corrosion resistant Super triglycidyl isocyanurate (TGIC) polyester powdercoat. Color shall be gray.

i. Powder coat: Super TGIC polyester powder coat 2.5 mil nominal thickness.
ii. Finish shall exceed a rating of six (6) per ASTM D1654 after 1000hrs of testing per ASTM B117.
iii. The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

(11) Effective Projected Area (EPA) for wind-loading calculations shall be no greater than 1.2 square feet.

(12) Luminaire weight shall not exceed 45 pounds.

(13) Luminaire shall be tested in accordance with IES LM79 and TM21 certifying photometric performance and rated life, respectively. LM79 (performance) and TM21 (predicted life at 55°C) testing shall both be for the same luminaire's operating drive current as specified.

(14) Luminaire shall have a maximum Backlight rating as shown in Table 715-1, an Uplight rating of U0, and a maximum Glare rating as shown in Table 715-1.

(15) Luminaire system efficacy shall be no less than 68 luminaire lumens per input watt.

(16) Luminaire shall have an external label per ANSI C136.15 and internal label per ANSI C136.22.

(c) *Light Sources*. LED luminaires shall not be retrofit to existing luminaire housing; the Contractor shall replace housing along with the luminaire as a single unit. Light sources shall be compatible with dimmable drivers supplied with the luminaires in which they are to be installed. All light sources of a similar type shall be provided by the same manufacturer.

LED light sources shall meet or exceed the following requirements:

(1) CCT, CRI and Flux:

i. Correlated Color Temperature (CCT). All LED light sources shall emit white light and have a CCT no greater than 3000K nominal in accordance with ANSI C78.277.
ii. Color Rendering Index (CRI). All LED light sources shall have a minimum Color Rendering Index (CRI) of 70 per the LM79 test results.
iii. Luminous Flux. LED light sources shall not exceed the junction temperature recommended by the LED manufacturer. Luminous flux differences between LEDs shall not exceed 10 percent.

(2) LEDs shall have a minimum rated life of 70,000 hours per IES TM-21 at 55°C at the normal operating driver current for the specific luminaire. The lumen output shall be maintained at 70 percent of initial rated lumens (L70) or greater at the rated life of the luminaire.

(3) LEDs shall be temperature rated for operation and storage within the range of -40°C to +50°C, and shall withstand low and high frequency vibration (ANSI C136.31 Vibration Level 3G) over the rated life of the light source.

(4) Cooling System

i. Mechanical design of protruding external surfaces (e.g. heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.
ii. The cooling system must be passive utilizing heat sinks, convection or conduction.
iii. Fans, diaphragms, pumps, or liquids shall not be acceptable.

715.05 LED Drivers.

(a) Dimming signal protocols are 0-10VDC or Digital Addressable Lighting Interface (DALI).

(b) Operating voltage shall be 120/277-volt at 50/60 Hz, and shall operate normally with input voltage fluctuations of ±10 percent, consistent with NEMA SSl-1-2010, Electronic Drivers for LED Devices, Arrays or Systems.

(c) Minimum Power Factor (PF) shall be 0.90 at full input power and across specified voltage range.

(d) Maximum Total Harmonic Distortion (THD) shall be 20 percent at full input power and across specified voltage range.

(e) Factory-set drive current shall be 530mA or less unless approved by Engineer. If higher drive currents are proposed, the submittal must be accompanied with IES LM79 and TM21 test results for higher operating drive current.

(f) Drivers shall be Restriction of Hazardous Substances (RoHS) compliant.

(g) Rated case temperature shall conform to subsection 715.04 (c) 3.

(h) All electronics of the power supply and the LEDs shall be protected from all electrical surges with an elevated electrical immunity rating, including but not limited to lightning strikes and stray current in rebar and concrete. Surge protection shall be integral to the LED power supply.

(i) Luminaire, including driver, shall consume no more than 4 watts in the off state power.

(j) Electrical immunity (including surge protection). Luminaire shall meet the "Elevated" requirements per IEEE C62.41.2 -2002. Manufacturer shall indicate whether failure of the electrical immunity system can possibly result in disconnect of power to luminaire.

(k) Electromagnetic interference: Shall comply with Federal Communications Commission (FCC) 47 Code of Federal Regulations (CFR) part 15 non-consumer radio frequency interference (RFI) and/or electromagnetic interference (EMI) standards.

715.06 Conduit. Unless otherwise specified, conduit shall be rigid metallic or semirigid plastic electrical conduit. Metallic conduit shall be clean, free of burrs, and galvanized.

Plastic conduit shall be a semirigid type currently recommended and approved by Underwriters' Laboratories, Inc. for the proposed use. Underground plastic conduit for street lighting shall conform to ASTM-F 441 schedule 80. Fittings shall be the type used outside the conduit. Fittings shall connect the conduit in a manner that makes the joints watertight.

Junction boxes used in structures shall be galvanized steel, 6 inches square by 4 inches deep, with weatherproof covers.

Pull boxes and splice boxes shall be a minimum of 16 inches by 12 inches and 6 inches deep unless otherwise shown on the plans. Pull and splice boxes shall have heavy duty weatherproof covers rated for roadway applications. The housing shall be resistant to sunlight exposure, weathering, and chemicals; it shall be unaffected by freeze/thaw cycles. Covers shall fit flush to the sidewalk, turf area, or roadway surface. Hardware and inserts shall be stainless steel. The cover for street lighting circuits shall be marked "ELECTRICAL" or "STREET LIGHTING". The cover shall list the minimum HS load rating of 20,000 psi.

715.07 Lighting Circuitry and Wiring. Lighting systems shall be photoelectric controlled. Photoelectric controls shall be the hermetically sealed, cadmium sulfide twist-lock type with high impact polypropylene cover with clear UV stabilized window. Photoelectric controls shall have a turn-on setting of 1.4 footcandles ±0.2 footcandles. The maximum ratio of the turn-off to turn-on setting shall be 3:1.

All electrical apparatus used in the lighting system shall be rated to adequately handle the necessary loads and shall conform to power source requirements.

REVISION OF SECTION 715
LIGHTING AND ELECTRICAL MATERIALS

715.08 Secondary Service Pedestals and Lighting Control Centers. Secondary Service Pedestals and Lighting Control Centers shall be metal conforming to ANSI C47.12.28, *Pad Mounted Enclosure Integrity Standard* and shall be the nominal size and dimensions shown in the Contract.

New pedestal type Lighting Control Center 'LCC1' and 'LCC2' – Pay Item #613-50100 Lighting Control Center, Shall include but not limited to the following:

(1) 120/240V-1ph-3w, Combination Metered/Power Pedestal
(2) Stainless steel NEMA 3R enclosure.
(3) Meter Sockets (200 amp minimum) with lever bypass to Xcel Energy specifications.
(4) Meter Pull-Out, Fusible Disconnect with Fuses ahead of meter (cold sequence). See one-line diagram for fuse size.
(5) Meter cover hold open lever to Xcel Energy specifications
(6) Meter tab lockable dead-front cover to Xcel Energy specifications.
(7) Copper bus, service entrance rated, load center panel for always on loads, with main circuit breaker and all branch breakers and number of spaces as indicated on the panel schedule on the plans. AIC rating of panel shall be as indicated on the one-line diagram or panel schedule whichever is higher.
(8) Built-in GFCI duplex maintenance receptacle flush mounted in dead front.
(9) 4000 PSI Concrete pad foundation. Provide structural engineered stamped drawing.
(10) ¾" x 10'-0" Ground Rods, (2) required
(11) Provide all service lateral and secondary feeder connections as shown on the plans and details.
(12) Provide white phenolic label with black letter stainless steel screw attached to enclosure. Label to include "panel designation, voltage, amperage, and fed from" information in a minimum of 1/8" high lettering.
(13) Provide a printed panel directory.
(14) Provide document pocket on inside of hinged cover with one-line diagram and all documentation for each individual LCC in a clear plastic zip-lock bag.
(15) See electrical drawings for manufacturer and part numbers required.

"Arc-Flash Hazard Warning" labels shall be furnished and installed by the electrical contractor per the National Electric Code-2014 NEC 110.6 and the NFPA 70E-2015, and all other labels required by NFPA 70 shall be installed on All new panels.

END OF SECTION REVISION

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FORCE ACCOUNT ITEMS

DESCRIPTION

This special provision contains the City and County's estimate for force account items included in the Contract. Force Account work shall be performed as directed by the Engineer.

BASIS OF PAYMENT

Payment will be made in accordance with the General Contract Conditions. Payment will constitute full compensation for all work necessary to complete the item.

Force Account Item	Quantity	Estimated Amount
F/A Partnering	F.A.	$ 10,000
F/A On the Job Trainee	F.A	$ 4,480
F/A Adjust Utilities	F.A.	$ 200,000
F/A Furnish & Install Electrical Service	F.A.	$ 35,000
F/A Erosion Control	F.A.	$ 30,000
F/A Environmental Health & Safety Management	F.A.	$ 30,000
F/A Removals	F.A.	$ 25,000

F/A Partnering – This work is described in the Project Special Provision -Partnering.

F/A On the Job Trainee – The Contractor shall provide on the job trainees in the construction crafts and comply with OJT Colorado Training Program

F/A Adjust Utilities- This consists of reimbursing eligible charges for utility adjustments and unanticipated items on water lines as directed by the Engineer.

F/A Install & Furnish Electrical Services – This force account is for the cost charges from the power service provider, and all necessary materials, labor and coordination required to maintain existing or establish new power sources required for permanent operation of equipment.

Description	ROM
Severn PL - VMS Sign – new power source (LE04)	$ 15,000
W 8th Ave. (west side) - new power source (LE04)	$ 15,000
W 8th Ave. (east side) - existing power source (LE04)	$ 1,000
W 10th Ave. (west side) - existing power source (LE07)	$ 1,000
W 10th Ave. (east side) - existing power source (LE07)	$ 1,000
Assumed 2 each / temp connection at 8th & 10th	$ 2,000
Total	$ 35,000

F/A Erosion Control – This force account is to pay for any additional erosion control items the erosion control supervisor will need during the duration of this project as directed by the Engineer, including items that may be needed after unanticipated storm water events. Payment will be made based on the time and materials used to perform the work. Work must be performed in a manner and scheduled to minimize cost and inconvenience to the City and or adjacent property owners. All additional erosion control items shall be approved by the Engineer prior to installation.

F/A Environmental Health and Safety Management – This force account will pay for additional material sampling, handling and disposal in case hazardous soils or other unanticipated materials are encountered. No hazardous soils have been identified on the project. This force account will also cover review fee for the Project Specific Regulated ACS Management Plan (PSRMP) if charged by CDPHE. See Revision of Section 250 for more information.

F/A Removals – This force account will pay for removal of items not otherwise covered in the plans or specifications that conflict with this project's proposed improvements which adjacent property owners were to remove but have not removed. All removal items shall be approved by the Engineer prior to removal.

END OF SECTION REVISION

TEMPORARY CONSTRUCTION EASEMENTS

Temporary construction easements on private properties are required to complete the construction. The easements are shown and described in the Right-of-Way plans for the project. The plans also include ownership and contact information for each property.

The Contractor shall notify each property Owner in writing that the term of the Temporary Easement will commence as required in the Revision of Section, 626 Mobilization, of the Project Special Provisions.

The Contractor shall maintain vehicular and pedestrian access to all properties adjacent to the project continually through the duration of construction. There shall be no storage of equipment or materials within the temporary construction easements for any work unrelated to the construction required in the easement. Long term storage of materials, equipment, or any other items will not be allowed within any temporary construction easement.

In the process of acquiring the right of way and easements needed to construct the project, the City has entered into agreements with individual property owners. Some of the agreements have specific requirements which require coordination by the Contractor during construction. The following table lists requirements which the Contractor shall be responsible for in addition to other project requirements.

Location (Owner)	**Requirements**
724 Federal Blvd (Dolezal)	The property owner shall demolish west end of building within new ROW. Property owner shall build a wall on the private property that this project will tie to.
749 Federal Blvd (Weaver)	Property owner to remove business sign. Contractor to notify property owner 60 days or more in advance of needing sign removed. Contractor shall provide security through fencing or other means acceptable to the property owner when existing fence is removed until new fence and gate is constructed.
750 Federal Blvd (Denver Public Schools - DPS)	
830 Federal (Kim)	Property Owner will demolish building within limits of new ROW.
950 & 970 Federal Blvd (Nekouie)	The property owner shall have the right to salvage any existing materials and improvements that are to be removed to accommodate the expanded Right of Way including advertising signs, security lights and cameras, chain link fence and gates. The Owner shall have 30 days from the date that notice is given by the Contractor within which to remove such materials. If the Owner should fail to remove the materials, the Contractor shall remove the materials and give them to the property Owner.

TEMPORARY CONSTRUCTION EASEMENTS

990 Federal Blvd (Raeouf)	Building to be demolished by City forces prior to construction.
1000 Federal Blvd (7-Eleven)	All notices sent by the Contractor to this property owner are to be mailed by certified mail only to: Peter Donovan Property Specialist 7-Eleven, a Texas Corporation One Arts Plaza 1722 Routh St. Ste. 1000 Dallas, TX 75201, Peter.Donovan@7-11.com Office: 972-828-3030 Legal Counsel Attorney Joseph J. Bronesky Sherman and Howard, LLC 633 17th St., Ste 3000 Denver CO 80202 jbronesky@shermanhoward.com
1041 Federal Blvd (Torres)	If the Contractor impacts the existing fence and bollards with the Temporary Easement, the Contractor shall provide temporary fence acceptable to the property Owner to maintain a secure enclosure and reinstall any impacted fence and bollards before expiration of the temporary easement.

All of the Contractor's costs of whatsoever in nature required to satisfy all of the above requirements shall be included in the Work, and no additional payment will be made.

END OF SECTION REVISION

TRAFFIC CONTROL PLAN – GENERAL

The key elements of the Contractor's method of handling traffic (MHT) are outlined in subsection 630.09 and the requirements of this "Traffic Control Plan – General" are hereby included in the contract requirements.

The components of the TCP for this project are included in the following:

(1) Subsection 104.04 and Section 630 of the specifications.

(2) Standard Plan S-630-1, Traffic Controls for Highway Construction, and Standard Plan S-630-2.

(3) Manual on Uniform Traffic Control Devices (MUTCD).

(4) Denver Barricade Manual.

Traffic Control shall be provided as required by, in descending order of precedence, MUTCD, the plans and special provisions for this project, Denver Barricade Manual, Colorado Department of Transportation Standard Specifications, and Colorado Department of Transportation M and S Standards.

Special Traffic Control Plan requirements for this project are as follows:

1. During the construction of this project, traffic shall use the present traveled roadway.

2. Work is permitted during the following hours **except as otherwise noted and subject to the City and County of Denver's approval or as approved by the Engineer:**
    - Monday through Friday
        - Day Work Times 8:30 am to 3:30 pm
        - On Federal Boulevard, the Contractor shall maintain two through lanes in each direction (northbound and southbound) continuously open to through traffic throughout the duration of the project.
        - If additional lane closures are required to perform the work, they must occur during daytime work and be approved by the Engineer.
        - No work will be allowed at night, except as otherwise approved by the Engineer
    - No work on Holidays (as recognized by the State of Colorado)
    - Contractor shall not close additional lanes during special events, including but not limited to Denver Bronco Home games, Cinco de Mayo, and major events at Sports Authority Field (or renamed Stadium). The Cinco de Mayo holiday typically includes more than one day for which additional lanes cannot be closed.
    - Contractor shall coordinate lane closures with adjacent projects.
    - Contractor shall maintain business access during business hours.

    The Contractor shall cooperate fully and adhere to all the requirements specified by both the Denver Traffic Operations Department and the Denver Police Department during Cinco de Mayo, Denver Broncos home games and other major events. Any cost incurred by the Contractor to adhere to these requirements shall be included in the cost of the work.

TRAFFIC CONTROL PLAN - GENERAL

3. As shown in the phasing plans, the Contractor is limited to working in only two consecutive blocks at a time along Federal Blvd. The suggested phasing of the 6-block segment would have two blocks under construction with the adjacent blocks undisturbed. This is done primarily to leave either the 8th Avenue or 10th Avenue signals/pedestrian crossings fully operational throughout the project and to minimize impacts to access for the adjacent businesses.

4. A bike route detour for route D-12 (10th Ave) shall be in place whenever the 10th Ave bike route is impacted by construction activities. The Contractor shall submit an MHT for any bike route detour and have it approved by the City. All costs of any nature including costs for design, MHT's, signs and detour implementation, shall be included in the work and will not be paid for separately, and no additional payment will be made.

5. The contractor shall install construction traffic control devices where they do not block or impede other existing traffic control devices or sidewalks from pedestrians, disabled persons or bicyclists. The Contractor is forbidden from storing any materials, construction traffic control devices, signs, etc. in the temporary easements for more than 24 hours.

6. Vertical cuts or fills greater than 1 inch resulting from construction operations adjacent to traffic lanes shall be delineated with drum channelizing devices at 40-foot intervals. Where trenching for the installation of utilities is required, temporary Type 7 barrier will be placed adjacent to the travel lane to safeguard the workers and the traveling public.

7. Construction equipment used on this project shall meet the same minimum exhaust requirements as those specified by the manufacturer of the equipment.

8. The Contractor and subcontractors shall equip their construction vehicles with flashing amber lights. All equipment to be used at night shall also be equipped with flashing amber lights. Flashing amber lights on vehicles and equipment shall be visible from all directions.

9. The Contractor shall maintain continuous access to all roadways, side streets, alleyways, driveways, building entryways, docks and bike paths at all times unless otherwise directed by the Engineer. Parking areas temporarily disturbed by construction activities shall be restored to a useable condition during non-working hours. Such temporary parking shall utilize an all-weather surface. The Contract shall develop an Access Maintenance Plan in coordination with, and based on the requirements of, the affected property owners and tenants, and submit it to the Engineer for approval prior to commencement of work in each sub-phase. This plan shall detail all barricades, ramps, signs and temporary means of access required by the property owner or tenants. Prior to commencing any work which affects access to a property the Access Maintenance Plan for that property must be submitted and approved by the Engineer.

10. The Access Maintenance Plan shall be coordinated with all affected owners and tenants. The Access Maintenance Plan shall include documentation of this coordination, including the approval signature of each affected owner or tenant. Should the Contractor be unable to obtain approval and signatures, documentation of the efforts made to obtain said approval and signatures must be submitted. All access shall be maintained on surfaces equal to or better than those existing at the time the access is first disturbed. For short periods of time only as allowed by the Engineer, access may be maintained on an aggregate base course surface.

TRAFFIC CONTROL PLAN – GENERAL

11. The Contractor shall maintain continuous access throughout the project for pedestrians, bicyclists, and disabled persons. When the existing access route is disturbed by construction, a temporary all-weather access shall be provided. All temporary access shall be a minimum of 5 feet wide and meet with American with Disabilities Act (ADA) requirements. Acceptable all-weather surfacing shall be concrete or asphalt surface, or as approved by the Engineer. Delineation of pedestrian access through or around the work area shall be accomplished using temporary plastic fencing.

12. The costs of maintaining access shall not be paid for separately, unless otherwise provided, but shall be included in the work. Utilization of materials to be incorporated into the work may be permitted. However, any degradation or other contamination or destruction shall be corrected at the Contractors expense prior to acceptance.

13. During non-construction periods (evenings, weekends, holidays, etc) all work shall be adequately protected to insure the safety of vehicular and pedestrian traffic, as detailed in the Contractor's MHT. Excavations or holes shall be filled in or fenced while unattended.

14. Whenever the Contractor removes, obliterates, or overlays any pavement markings, he shall replace them on a daily basis prior to opening the affect areas to traffic. All temporary pavement markings shall fully comply with the Standard Specifications and Special Provisions.

15. The Contractor shall not have construction equipment or materials in the lanes that are open to traffic any time unless approved by the Engineer.

16. Two weeks prior to starting a construction sub-phase, the Contractor shall notify the City and County of Denver Traffic Engineer of the date the Contractor intends to start construction.

17. The Contractor shall contact emergency service providers to identify methods to minimize delays and provide access to properties during construction.
18. All personal vehicles and construction equipment parking is prohibited where it conflicts with safety, access, or the flow of traffic. Landscaped areas and roadway shoulders shall be kept clear of parking and storage of all personal and construction equipment except where approved by the Engineer.
19. Traffic shall be carried on a paved surface at all times. The Contractor shall apply final pavement to any milled surface within 5 calendar days of the milling operations.
20. The Contractor shall not place tack coat on any surface to be paved where traffic will be forced to travel upon fresh bituminous materials.
21. The Contractor shall be required to make arrangements with the Regional Transportation District (RTD) prior to closing any existing bus stops within the project limits. Temporary stops will be required as directed by the Engineer and as required by RTD. The Contractor shall notify RTD a minimum of 48 hours prior to disturbing bus stop operations. Contact Pete Muniz at RTD (303) 299-6561 regarding impacts to bus stop access (pedestrian or vehicular). The Contractor shall be responsible for closing existing bus stops, setting up temporary stops and constructing new stops. The Contractor shall relocate bus stops to temporary locations that RTD deems most desirable. Once the permeant bus stop is complete, the Contractor shall contact RTD to coordinate relocation of the temporary stop to its permeant location. The Contractor shall maintain clear access for riders and busses to access open bus stops at all times. All cost incurred by the Contractor to adhere to these requirements will not be paid for separately but shall be included in the cost of the work.

TRAFFIC CONTROL PLAN – GENERAL

22. The Contractor shall relocate existing bus benches to temporary stop locations as directed by the Engineer. The Contractor shall contact Public Works right of way services construction engineering at 303-446-3469 to coordinate removal of transit amenities such as benches, trash cans and shelters.

23. No work that interferes with traffic will be allowed on holidays or any day of a three-day or four-day weekend that includes a holiday. Holidays on which this restriction applies consist of those holidays recognized by the State of Colorado as listed in subsection 101.33. This restriction also applies to home Denver Bronco games and on days that traffic is impacted by the Cinco de Mayo holiday period.

24. All additional lane closures beyond those depicted in the Construction Phasing plan set shall be subject to the approval of the Engineer. Request for each closure shall be made at least 72 hours in advance of the time the lane closure is to be implemented. Lane closures will not be allowed to remain unless being utilized in continuum for the intended propose for which they were set up.

25. The Contractor shall clean the roadway of all construction debris before opening it up to traffic.

26. All flagging stations used at night shall be illuminated with floodlights. Street, highway lights, and "high mast lighting" may be used for flagging station illumination when approved by the Engineer. Floodlights shall be located and directed as not to interfere with the sight of any motorists.

27. Prior to the removal and resetting of any sign, the Contractor and Engineer shall prepare an inventory. Any signs damaged due to the Contractor's operations shall be replaced in kind or repaired by the Contractor at no additional cost to the project.

28. Where trenching shoring is required on Federal Blvd the contractor shall ensure that the shoring method and design will support all adjacent traffic loads on Federal Blvd.

29. Steel drum channelizing devices shall not be used for traffic control.

30. During signal outages, downtimes and changeovers, the contractor shall provide uniform traffic control.

31. Denver Water conduit numbers #1, #3, #12 and #18 exist within the limits of the project. Conduit #12 (48" steel) can only be taken out of service seasonally between October 31st and May 1st. Conduits #1, #3, and #8 can be taken out of service between October 31 and May 1st for short durations of up to 2 days as agreed to with Denver Water. The Contractor shall plan and phase work on the project taking into consideration the limitations and duration of when conduits can be out of service. The Contractor shall contact Denver Water upon notice to proceed to schedule conduits to be out of service and coordinate water line work.

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TRAFFIC CONTROL PLAN – GENERAL

32. The Contractor shall maintain access to all roadways, side streets, walkways, alleyways, driveways, doorways, and hike/bike paths at all times unless otherwise approved by the Engineer. The Contractor shall coordinate with all tenants affected by access closures seven days prior to closure. During construction, driveways shall be open with safe access to each property on the project generally as follows:

    Properties with a single driveway: Either 12 feet or ½ of the existing driveway width, whichever is greater, must remain open at all times.

    Properties with 2 or more driveways: One driveway must be kept open at all times.

33. No construction traffic shall be allowed on neighborhood streets. The contractor shall use only the haul roads identified in the plans on the "construction haul roads" sheet. All other roads in the area shall not be used for hauling.

34. Contractor shall obtain all required access and construction permits from the City & County of Denver prior to initiating work along City right of way. Contractor shall submit Traffic Control Plans (TCP) 2 weeks prior to work for street occupancy permits and street cut permits.

35. All lane closures shall be subject to the approval of the Engineer. Requests for such lane closures shall be made at least 2 weeks 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.

36. Two-way traffic shall be maintained on all streets at all times, via flagging if necessary for closures of less than one day.

37. No phase changes or major shifts to traffic will be allowed to be implemented on Fridays.

38. Unless otherwise noted, all of the Contractor's costs of any nature required to satisfy the requirements in this "Traffic Control Plan – General" shall be included in the contract prices for the project, including any additional traffic control items required for haul routes into the project, and no additional payment will be made. Temporary fence required for protection of the work will not be paid for separately but shall be included in the work.

END OF SECTION REVISION

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UTILITIES

The known utilities within the limits of this project are:

UTILITY	CONTACT/EMAIL	PHONE/FAX
Xcel Energy Application for electric/gas services	Builders Call Line BCLCO@xcelenergy.com	P 1-800-628-2121 F 1-800-628-2521
Xcel Energy – Electric Distribution 1123 West 3rd Ave Denver, CO 80223	Marisa Montoya Marisa.l.montoya@xcelenergy.com Armando Villegas Armando.Villegas@xcelenergy.com Travis Deweese Travis.M.DeWeese@xcelenergy.com	P 303-571-3720 P 303-592-2753 P 303-592-2740
Xcel Energy – Lighting 1123 West 3rd Ave Denver, CO 80223	Branda Sloan Branda.L.Sloan@xcelenergy.com Nick Dunham Nicholas.L.Dunham@xcelenergy.com	P 303-628-2276 P 303-592-2775
Xcel Energy –Gas Operations 1123 West 3rd Ave Denver, CO 80223	Branda Sloan Branda.L.Sloan@xcelenergy.com	P 303-628-2276
CenturyLink 5325 Zuni St., Suite 728 Denver, CO 80221	Maureen Klick maureen.klick@centurylink.com	P 720-578-3720 C 720-333-1235
Comcast 8000 E Illiff Ave. Denver, CO 80231	Kip West Kip_west@cable.comcast.com	P 303-603-2832 P 720-347-9992
Denver Water 1600 W. 12th Ave. Denver, CO 80204	Ray Batts Ray.batts@denverwater.org	P 303-628-6682 C 720-345-1069
Denver Wastewater Management Waste Water 2000 West 3rd Ave. Denver, CO 80202	Ted Christianson Ted.Christianson@devnvergov.org	P 303-446-3722
Denver Wastewater Management Storm Water 2000 West 3rd Ave. Denver, CO 80202	Raul Rodriguez raul.rodriguez@denvergov.org	P 303-446-3471 F 303-446-3647
Metro Wastewater Reclamation District 6450 York Street Denver, CO 80229	Craig Simmonds Csimmonds@mwrd.dst.co.us	P 303-286-3338
Denver Traffic Operations 5440 Roslyn Street, Building E Denver, CO 80216	George Holt George.holt@denvergov.org	P 720-865-4012
Zayo Group 400 Centennial Pkwy, Suite 200 Louisville, CO 80023	Robert Williams	P 303-632-0017

UTILITIES

The work described in these plans and specifications requires full cooperation between the Contractor and the utility owners in accordance with Subsection 105.11 in conducting their respective operations, to complete the utility work with minimum delay to the project.

The Contractor will notify all utility companies, pipe line owners, or other parties affected, and have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction made as soon as practicable.

Private Utility facilities within the limits of the proposed construction are to be relocated or adjusted at the owner's expense unless otherwise provided in the contract. The Contractor shall cooperate with the utility owners in their removal and relocation operations, so that progress is expedited, duplication of work is minimized and service interruptions are avoided.

The plans will indicate those utility items which are to be relocated or adjusted by the utility owner or which are to be relocated or adjusted by the Contractor. The Contractor shall consider in the bid proposal all of the permanent and temporary utility facilities in their present or relocated positions as shown in the Contract and as revealed by site investigation. Utility delays due to changes which are the responsibility of the Contractor will be considered nonexcusable delays. The Contractor and the Engineer shall meet with the utility owners as often as necessary to coordinate and schedule relocations or adjustments. Additional compensation will not be allowed for foreseeable coordination, inconvenience, or damage sustained due to interference from the utility facilities or the removal or relocation operations as indicated in the Contract. Delays shall be dealt with in accordance with the project specifications.

If utility facilities or appurtenances are found that are neither identified in the Contract, nor revealed by site investigation, the Engineer will determine whether adjustment or relocation of the utility is necessary. The Engineer will make arrangements with either the utility owner or the Contractor to accomplish necessary adjustments or relocations when not otherwise provided for in the Contract. Extra work will be considered for payment in accordance with the project specifications. Consideration for delays shall be in accordance with the project specifications.

If water or utility services are interrupted, the Contractor shall promptly notify the owner and shall cooperate in the restoration of service. Repair work shall be continuous until the service is restored. Work shall not be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

PART 1 - CONTRACTOR SHALL PERFORM THE WORK LISTED BELOW:

Coordinate project construction with the performance by the utility owner of each utility work element listed in Part 2 below. Perform preparatory work specified in Part 2 for each utility work element. Provide an accurate construction schedule that includes all utility work elements to the owner of each impacted utility. Provide each utility owner with periodic updates to the schedule. Conduct detailed utility coordination meetings prior to each construction phase to coordinate all requirements and schedules, and provide other necessary accommodations as directed by the Engineer. Notify each utility owner in writing, with a copy to the Engineer, prior to the time each utility work element is to be performed by the utility owner. Provide the notice with the number of days specified in Part 2 immediately prior to the time the utility work must be begin, to meet the project schedule.

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UTILITIES

The Contractor shall note that certain areas within the project are highly congested with existing utilities and expected duration for utility elements listed below are approximate. The Contractor shall work with utility owners to identify required work elements, traffic control and to verify schedules. No added time will be granted to the construction schedule unless approved by the Engineer.

Prior to excavating, the Contractor shall positively locate all potential conflicts with existing underground utilities and proposed construction, as determined by the Contractor according to proposed methods and schedule of construction. The Contractor shall modify construction plans to avoid existing underground facilities as needed, and as approved by the Engineer. Please note that UNCC marks only its members' facilities – Other facilities, such as ditches and drainage pipes may exist, and it is the Contractor's responsibility to investigate, locate and avoid such facilities.

The Contractor shall provide written notices to each utility owner, with a copy to the Engineer, immediately prior to each utility work element on the construction schedule that is expected to be coordinated with construction. The Contractor shall allow the number of work days required for each utility work element in the construction schedule. The number of days expected for construction and number of days of prior notice is specified for each utility owner.

Provide traffic control, as directed by the Engineer, for any utility work by the utility owner expected to be coordinated with construction. However, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner.

Perform each utility work element for every utility owner listed here in Part 1. Notify each utility owner in advance of any work being done by the Contractor to its facility, so that the utility owner can coordinate its inspections for final acceptance of the work with the Engineer.

Xcel Energy Street Lighting and Electric Distribution Work Elements:

The Contractor shall call both Branda Sloan 303-628-2276 and Xcel Energy - Builders Call Line at 1-800-628-2121 or BCLCO@xcelenergy.com to coordinate removals and relocations. Applications should be done 60 days prior to desired removal date.

The Contractor shall install all new street lights, traffic signals, irrigation controllers, ITS equipment and temporary lighting. The Contractor shall install meter housings where new meters are required. The Contractor shall contact Xcel Energy – to request connection to power sources. Request for service needs to be made 30 days in advance of needing power.

The Contractor shall assure that a minimum of 50% of the existing street lighting shall be maintained in operation at all times during construction.

The Contractor shall submit the materials list, with locations, for the proposed light standards for review and approval by Xcel Energy forces prior to ordering materials. Xcel's review is expected to take **30 calendar days** to complete.

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UTILITIES

Xcel Energy Gas:

The Contractor shall call Branda Sloan 303-628-2276 and Xcel Energy - Builders Call Line at 1-800-628-2121 or BCLCO@xcelenergy.com to coordinate removals. Applications should be done 60 days prior to desired removal date.

The Contractor shall notify Xcel Energy 2 days in advance of potholing Xcel Energy facilities.

The Contactor shall coordinate with Xcel Energy for any adjust or relocation of gas lines, gas services, gas manholes and gas meter locations. The Contractor shall contact Xcel Energy **30 days** in advance to coordinate work.

CenturyLink Communications:

Once the Contractor has received notice to proceed, they shall contact in writing the utility owner immediately.

The Contractor shall provide survey staking of rights-of-way and roadway features, including proposed drainage, to ensure proper placement of facilities by CenturyLink forces.

The Contractor shall provide CenturyLink written notice 30 days prior to each utility work element expected to be coordinated with construction

Contractor shall provide traffic control for utility work expected to be coordinated with construction, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the Denver Engineer, a Method of Handling Traffic for utility work to be performed outside of typical project work hours. The utility owner shall obtain acceptance of the Method of Handling Traffic from the Denver Engineer prior to beginning the utility work to be performed outside typical project work hours.

Denver Wastewater:

All work on Denver Wastewater facilities shall be performed by the Contractor.

The Contractor shall encase sanitary sewer lines where shown on the plans.

The Contractor shall remove sanitary sewer cleanouts at approximate Sta 16+20, Property: 710 Federal Blvd as shown on the Plans.

The Contractor shall relocate sanitary sewer cleanout at Sta 23+16 as shown on the plans

The Contractor shall adjust Wastewater manholes along the project to ¼" to ½" below final grade as shown on the plans.

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UTILITIES

Comcast Work Elements:
Once the Contractor has received notice to proceed, they shall contact in writing the utility owner immediately.

The Contractor shall provide the utility owner written notice 45 days prior to each utility work element expected to be coordinated with construction.

The Contractor shall provide survey staking of rights-of-way and roadway features, including proposed drainage, to ensure proper placement of facilities by Comcast forces.

Denver Water Department Work Elements:
All work on Denver Water Department facilities shall be performed by contractors on the current list of Denver Water Department Pre-Qualified Contractors, and shall be done in conformance with standards and specifications of the Denver Water Department after plans and specs have been approved by Denver Water Sales.

When the Contractor encounters a lead service line, the Contractor shall note the location and notify the City and Denver Water of the location.

The Contractor shall replace any existing service lines that are lead or galvanized steel with appropriate size copper line from the new tap (to be installed by Denver Water) to the outside set meter pit. Denver Water forces shall replace existing service lines that are lead or galvanized steel from the meter pit to the first non-lead fitting within each structure (per Denver Water Operating Rule 9.04). The Contractor shall protect existing service lines when excavating for the removal of the existing main. The Contractor shall cut existing service lines from the existing main prior to its removal. Caution shall be taken to not damage the existing service lines and meter pits during removal of the main, any damage to the existing service lines and meter pits shall be replaced by the Contractor at no cost to the project. The Contractor shall coordinate with Denver Water forces to schedule the replacement of service lines.

The Contractor shall relocate the outside-set meters to outside locations as shown in the plans in accordance with Denver Water's current Engineering Standards.

The Contractor shall replace service lines as shown in the plans that are non-lead from the main to the outside set meter.

The Contractor shall coordinate with Denver Water forces where inside-set meters are moved to an outside location. Denver Water forces will relocated inside set meters to outside locations.

New taps 2 inches and smaller from the existing mains will be completed by Denver Water forces as shown on the plans. The Contractor shall expose the main for the Denver Water forces to complete the new tap.

New taps larger than 2 inches will be completed by the Contractor.

The Contractor shall construct the new water main from 7th Ave to 8th Ave and 10th Ave to Holden Pl where shown in the plans. The Contractor shall install new service line taps on the new water main as shown in the plans.

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UTILITIES

The Contractor shall construct new fire hydrants in locations shown on the plans. The Contractor shall construct new 6" fire service water line, or extend existing 6" fire service water lines to new fire hydrant locations as required and make connections to new hydrants as shown in the plans. The Contractor shall remove existing fire hydrants as locations shown in the plans.

The Contractor shall clean and adjust valve boxes to within ¼" to ½" below final grade of the paved surface as shown on the plans.

The Contractor shall adjust water meters to within ¼" to ½" below final grade of the paved surface as shown on the plans. The Contractor shall adjust the yoke if necessary to ensure that it is no more than 18" below final grade.

The Contractor shall remove abandoned water valves and outside meters in locations shown on the plans.

The Contractor shall pothole all existing non-lead service lines where they cross the proposed storm sewer improvements to verify if a conflict exists.

The Contractor shall coordinate all required inspections and operation of valves on conduits with Denver Water Department forces. The Contractor shall notify the Denver Water in writing 5 days immediately prior to required inspections, valve operations, or other water line related work performed by the Contractor.

The Contractor shall coordinate all work outside the ROW or easement with Denver's Engineer.

Denver Water conduit numbers #1, #3, #12 and #18 exist within the limits of the project. Conduit #12 (48" steel) can only be taken out of service seasonally between October 31st and May 1st. Conduits #1, #3, and #8 can be taken out of service between October 31 and May 1st for short durations of up to 2 days as agreed to with Denver Water. The Contractor shall plan and phase work on the project taking into consideration the limitation and duration of when conduits can be out of service. The Contractor shall contact Denver Water upon notice to proceed to schedule conduits to be out of service and coordinate water line work. The Contractor shall take care to avoid disturbing these conduits.

The Contractor shall notify the utility owner in writing one week immediately prior to each utility work element expected to be coordinated with construction.

Denver Wastewater Management Work Elements:

All work on Denver Wastewater Management storm facilities shall be done in conformance with standards and specifications of the City and County of Denver as shown in the plans.

The Contractor shall construct storm sewer pipes, manholes, and inlets, as shown on the plans. The Contractor shall make connections to existing storm sewer facilities as shown on the plans.

The Contractor shall adjust storm sewer manholes up to ¼" to ½" below final grade of the paved surface as shown on the plans.

UTILITIES

Zaya Group Work Elements: Once the Contractor has received notice to proceed, they shall contact in writing the utility owner immediately.

The Contractor shall provide survey staking of rights-of-way and roadway features, including proposed drainage, to ensure proper placement of facilities by Zayo Group's forces.

The Contractor shall provide CenturyLink written notice 30 days prior to each utility work element expected to be coordinated with construction.

PART 2 - UTILITY OWNERS SHALL PERFORM THE WORK LISTED BELOW:

Although the Contractor shall provide traffic control for utility work expected to be coordinated with construction, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the Denver Engineer a Method of Handling Traffic for utility work to be performed outside typical project work hours. The utility owner shall obtain acceptance of the Method of Handling traffic from the Denver Engineer prior to beginning the utility work to be performed outside typical project work hours.

Xcel Energy

The Contractor shall be responsible for the coordination of power source work to be performed by Xcel Energy. The Contractor shall submit an Application for gas and electrical services for every Xcel Energy work element that is to be coordinated with the project. The request is to be processed through Xcel Energy –Builder's Call Line at 1-800-628-2121 or BCLCO@xcelenergy.com and Branda Sloan 303-628-2276. The Contractor shall perform the required coordination to establish the power sources for roadway lighting, traffic signals, VMS signs, CCTV cameras, and temporary lighting as shown on the plans. The Contractor shall perform all work necessary to maintain existing or establish a new power source to the devices called for in the plans and per the standard for any metered sources.

All cost charges from the power service provider, and all necessary materials, labor and coordination required to maintain existing or establish new power sources required for permanent operation of equipment, as shown on the plans, shall be reimbursed from the F/A Furnish and Install Electrical Service.

***Roadway Lighting and Power Source Connections*:**

Xcel Energy shall relocate any aerial electrical feeds that serve any street lighting locations and shall coordinate this work with the Contractor and affected property owners. This work must be coordinated by the Contractor with Xcel Energy and is expected to take **1 working day** at each location to complete.

Xcel Energy forces shall remove the existing light standards, poles, and related aerial electrical feeds to accommodate the proposed construction, as shown on the Plans. Xcel Energy forces shall ensure that the remaining existing roadway lighting is operational.

The Contractor shall submit the materials list, with locations, for the proposed light standards for review and approval by Xcel Energy forces prior to ordering materials. Xcel's review is expected to take **30 calendar days** to complete.

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UTILITIES

After the Contractor has completed the installation of the proposed roadway lighting for each construction phase including conduit and wiring to the power sources, as shown on the plans, Xcel Energy forces shall connect the flat rated power source as shown in the plans. This work is expected to be coordinated with construction and take **3 working days** to complete.

After the Contractor has completed the construction of the proposed traffic signals, and they are operational, Xcel Energy forces shall disconnect the power source to existing traffic signal controller and luminaires as shown on the plans. This work must be coordinated by the Contractor with Xcel Energy and is expected to take **1 working day** at each intersection to complete. For locations with Temporary Signal installations, Xcel Energy forces shall disconnect and reconnect power to the temporary signal controllers.

After the Contractor has completed the removal of the traffic signal heads and removed all signal equipment (including indications, signs, span wire, and all appurtenances) on the traffic signal poles at Federal/8th Ave, and Federal/10th Ave, Xcel Energy forces shall remove the traffic signal poles with attached luminaires as shown on the plans. The Contractor shall remove the traffic signal foundations after Xcel Energy forces have completed removal of the existing traffic signal poles with attached luminaires. This work must be coordinated by the Contractor with Xcel Energy during construction and is expected to take **3 working day** at each intersection to complete.

After the Contractor has completed the installation of the proposed City of Denver traffic signal equipment, including conduit and wiring to the power source, Xcel Energy forces shall connect the metered power source for the proposed (temporary and permanent) traffic signal controllers. This work must be coordinated by the contractor with Xcel Energy during construction and is expected to take **3 working day** at each intersection to complete.

After the Contractor has completed the conduit and wiring of the proposed VMS signs and CCTV cameras, Xcel Energy forces shall connect the metered power sources, as shown on the plans. This work is to be coordinated with construction and take **3 working days** to complete.

Xcel Energy forces shall connect the power source for the proposed irrigation controllers, as shown on the Plans. The irrigation controllers shall be on a separate meter and power feed from the traffic signals or street lighting luminaires. Median irrigation controllers shall be on a separate meter. This work is to be coordinated with construction and take **3 working days** to complete.

Electric Distribution:

The Contractor shall provide survey staking of rights-of way and roadway features, including proposed drainage, to ensure proper placement of facilities by Xcel Energy forces.

After the Contractor has completed earthwork to final grade, Xcel Energy forces shall adjust any previously existing electric junction boxes that are not to be abandoned, to within ½" of final grade of surface as shown on plans. This work must be coordinated by the contractor with Xcel Energy during construction and is expected to take **1 working day** at each location to complete.

At Federal and Severn and at 10th Ave, Xcel Energy shall remove overhead electric lines as shown in the plans, and replace with underground facilities, prior to construction.

After the Contractor has completed earthwork to final grade, the Contractor will install pull boxes as shown in the plans.

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UTILITIES

The Contractor shall provide the utility owner written notice 30 days immediately prior to the need for each utility work element.

***Gas Operations*:**

The Contractor shall be responsible for the coordination of gas work to be completed by Xcel Energy forces as shown on the plans.

After the Contractor has potholed for potential conflicts with gas lines, other utilities and the proposed storm sewer construction, the Contractor shall notify Xcel Energy **three weeks** prior to the needed relocation. The Contractor will expose the lines and Xcel Energy will make adjustments to gas lines as needed during the construction of the proposed storm sewer line. The Contractor shall notify Xcel Energy 2 days in advance of potholing Xcel Energy.

Xcel Energy forces shall relocate gas service lines that conflict with the proposed landscaping and storm sewer as required. Service relocations shall be coordinated to avoid conflicts with proposed tree locations.

Xcel Energy forces shall coordinate the installation and relocation of gas lines throughout the project limits as required.

- Construct new gas line and service connections to the east of the existing line between Sta 25+00 and Sta 33+00. This work is expected to take Xcel Energy **90 days** to complete.
- New gas lines are also anticipated at Sta 36+30; Sta 42+40 to address conflicts with new improvements. This work is expected to take Xcel Energy **5 days** to complete at each location.

Xcel Energy forces shall observe locations where Xcel facilities (gas and underground electric) are potholed.

Xcel Energy forces shall reset or adjust existing gas valves and valve boxes as shown on the plans and remove abandoned gas facilities in locations shown on the plans. This work is expected to be coordinated with construction and take **1 working day** at each location to complete. The Contractor shall inform Xcel Energy 30 days in advance of the proposed work.

The Contractor shall provide the utility owner written notice 30 days immediately prior to each utility work element expected to be coordinated with construction. The Contractor shall notify the utility owner 30 days prior to required verification of abandoned gas lines.

CenturyLink Work Elements:

CenturyLink forces shall relocate existing overhead communication facilities, at approximate Station 35+98 RT (along W. 10th Ave), to accommodate roadway widening, as shown on the plans. This work is to be completed prior to construction. The cost of this relocation will be at the cost of CenturyLink.

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UTILITIES

CenturyLink forces shall relocate existing underground communication facilities, in conflict with proposed storm sewer, at approximate Stations: 28+80, 29+00, 29+45, and 42+35. This work is to be coordinated with construction and take **5 working days** at each location. This work will be at no cost to the project.

The Contractor shall provide survey staking of rights-of-way and roadway features, including proposed drainage, to ensure proper placement of facilities by CenturyLink forces.

CenturyLink forces shall adjust CenturyLink manholes to ¼" to ½" below final grade. This work is to be coordinated with construction and take **1 working day** at each location. The adjusting of manholes will be at the cost of CenturyLink.

The Contractor shall provide the utility owner written notice 30 days immediately prior to each utility work element expected to be coordinated with construction.

Although the Contractor shall provide traffic control for utility work expected to be coordinated with construction, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the Denver Engineer, a Method of Handling Traffic for utility work to be performed outside of typical project work hours. The utility owner shall obtain acceptance of the Method of Handling Traffic from the Denver Engineer prior to beginning the utility work to be performed outside typical project work hours.

Denver Wastewater:

All work on Wastewater facilities shall be performed by the Contractor.

Wastewater may perform inspections of Wastewater facilities.

Comcast Work Elements:

Comcast forces shall convert existing overhead communication and fiber facilities, at approximate Station 35+98 RT (along W. 10th Ave), to a buried facility, to accommodate roadway widening and proposed drainage facilities, as shown on the plans. **This work is to be completed prior to the start of the project.** Comcast forces shall coordinate this work with Xcel Energy and CentryLink. The cost of this work will be the responsibility of Comcast.

Comcast forces shall adjust Comcast manholes along the project to within ¼" to ½" below finished grade. **This work is to be coordinated with construction and take 1 working day at each location.** The cost for adjusting manholes will be the responsibility of Comcast.

Once the Contractor has received notice to proceed, they shall contact in writing the utility own immediately.

The Contractor shall provide survey staking of rights-of-way and roadway features, including proposed drainage, to ensure proper placement of facilities by Comcast forces.

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UTILITIES

The Contractor shall provide the utility owner written notice 45 days immediately prior to each utility work element expected to be coordinated with construction.

Although the Contractor shall provide traffic control for utility work expected to be coordinated with construction, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the Denver Engineer a Method of Handling Traffic for utility work to be performed outside of typical project work hours. The utility owner shall obtain acceptance of the Method of Handling Traffic from the Denver Engineer prior to beginning the utility work to be performed outside typical project work hours.

Denver Water Department Work Elements:

Denver Water forces will provide tapping of the existing mains at 2 inches and smaller taps locations, after the Contractor has exposed the main. This work is expected to take 1 day at each location.

Denver Water forces will operate (open and close) all valves on conduits. Denver Water forces will provide forces to operate valves within 48 hours of notice from the Contractor.

Denver Water forces will inspect work performed by the Contractor on Denver Water facilities listed in Part 1 above.

Denver Water forces, in coordination with the Contractor, will relocate inside-set meters to an outside location in accordance with Denver Water's current Engineering Standards.

The Contractor will replace any lead service line it cuts with a copper service line from the water main to the inlet side of the water meter. Denver Water forces will be responsible for flushing the service line at the customer's structure at the approximate time the service line is replaced in accordance with then current best management practices. The Contractor and Denver Water will coordinate on a schedule, so that Denver Water may flush the Customer's service line as close as practicable to the time when the service line is replaced.

For each led service line encountered, Denver Water will determine whether replacement of the lead service line from the meter to the structure is necessary. If Denver Water determines that replacement is necessary, Denver Water will be responsible for preforming the construction work and costs required to replace the led service line from the meter to the structure.

Denver Water forces will be responsible for outreach, notices, and providing filters to all affected parties that have lead services.

Denver Water forces will be responsible for performing water quality tests when lead service lines are replaced.

Denver Water will bear the cost of creating and distributing educational materials, water quality tests, and water filters where lead service lines are encountered.

Denver Water forces will provide temporary water services, if required, during periods of service outages.

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UTILITIES

Although the Contractor shall provide traffic control for utility work expected to be coordinated with construction, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the Denver Engineer, a Method of Handling Traffic for utility work to be performed outside of typical project work hours. The utility owner shall obtain acceptance of the Method of Handling Traffic from the Denver Engineer prior to beginning the utility work to be performed outside typical project work hours.

Denver Wastewater Management Work Elements:
All work on Denver Wastewater facilities shall be performed by the Contractor.

Denver Wastewater will perform inspections of Wastewater facilities and desired by Wastewater.

Zayo Group Work Elements:
Zayo Group shall adjust Zayo's handholes along the project to within ¼" to ½" below finished grade. This work is to be coordinated with construction and take 1 working day at each location. The cost for this adjusting handholes will be the responsibility of Zayo.

Once the Contractor has received notice to proceed, they shall contact in writing the utility own immediately.

The Contractor shall provide survey staking of rights-of-way and roadway features, including proposed drainage, to ensure proper placement of facilities by Comcast forces.

GENERAL:
The Contractor shall comply with Article 1.5 of Title 9, CRS ("Excavation Requirements") when excavating or grading is planned in the area of underground utility facilities. The Contractor shall notify all affected utilities at least two (2) business days, not including the actual day of notice, prior to commencing such operations. The Contractor shall contact the Utility Notification Center of Colorado (UNCC) by calling 811 or 1-800-922-1987, to have locations of UNCC registered lines marked by member companies. All other underground facilities shall be located by contacting the respective owner. Utility service laterals shall also be located prior to beginning excavation or grading.

The location of utility facilities as shown on the plan and profile sheets, and herein described, were obtained from the best available information.

The Contractor shall provide advance notification to all business and property owners whose utility services will be disrupted during construction, and shall coordinate the construction schedule to minimize service disruptions.

All costs incidental to the foregoing requirements will not be paid for separately but shall be included in the work.

END OF SECTION REVISION

PARTNERING

The City and County of Denver actively encourages partnering and invites the Contractor and his subcontractors and suppliers to participate in a voluntary partnering agreement for this project.

The following information summarizes the partnering process.

This partnership will be structured to draw on the strengths of each organization to identify and achieve mutual goals. The objectives are effective and efficient Contract performance with reciprocal cooperation, and completion within budget, on schedule, and in accordance with the Contract.

This partnership will be bilateral in make-up and all costs associated with this partnership will be agreed to by both parties and will be shared equally. The Contractor shall assume full responsibility for all costs associated with partnering during the implementation of the partnering process. The City will reimburse the Contractor for the agreed amount through the contract via Force Account F/A Partnering.

The City Project Manager will contact the Contractor within ten days after the award of this project to ask if the Contractor wants to implement this partnership initiative. If the Contractor agrees, the Contractor's on-site project manager shall meet with the City's project manager to plan a partnering development and team building workshop. At this planning session, arrangements shall be made to determine the facilitator and the workshop, attendees, agenda, duration, and location.

The workshop shall be held prior to the commencement of any major work item and preferably before the preconstruction conference. The following persons shall attend the workshop: City' Project Manager and key project personnel; the Contractor's on-site project manager and key project supervision personnel; and the subcontractors' key project supervision personnel. The following personnel shall also be invited to attend as needed: project design engineer, key local government personnel, suppliers, design consultants, maintenance foreman, environmental manager, health and safety officer, materials management plan supervisor, CABI's, CDOT local agency manager and key utility personnel. The Contractor shall also have Regional or District managers and Corporate or State level managers on the partnering team.

Follow-up workshops may be held periodically throughout the duration of the Contract as agreed by the Contractor and the Engineer at the initial workshop. A closeout workshop shall be held to evaluate the effectiveness of the partnership.

The establishment of a partnership charter, which identifies the workshop participants' mutual goals on the project, will not change the legal relationship of the parties to the Contract or relieve either party from any terms of the Contract.

Appendix A

Pinyon Environmental, Inc.

Corporate Headquarters
9100 West Jewell Avenue, Suite 200 Lakewood, CO 80232
TEL 303 980 5200 FAX 303 980 0089
www.pinyon-env.com

July 5, 2017

Final Materials Management Plan Rev2.0

Federal Boulevard Improvements Project
Federal Boulevard between West 7th Street and West Holden Place
Denver, Colorado

Prepared For:

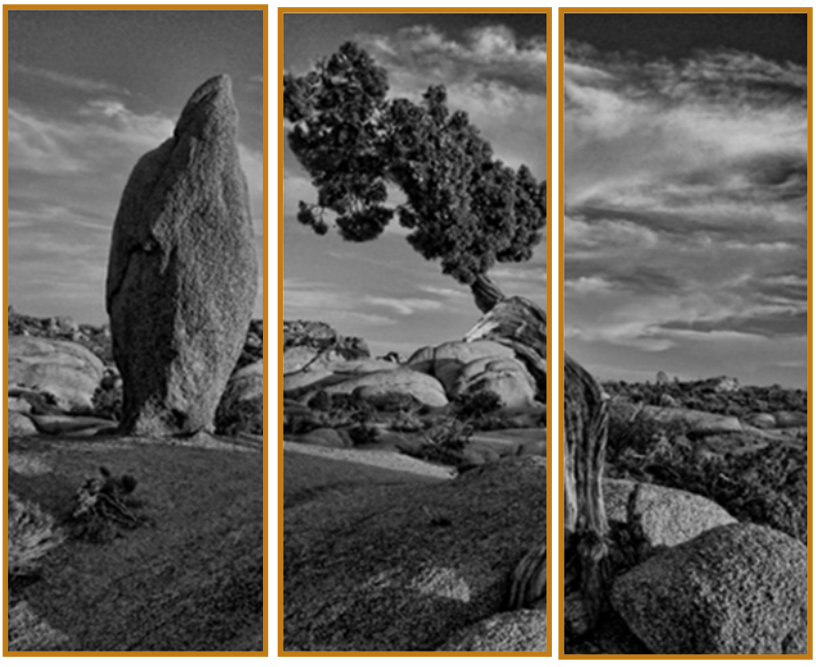
City and County of Denver
Division of Environmental Quality- Department of Environmental Health
200 West 14th Avenue, Suite 310
Denver, Colorado 80204

On Behalf Of:

Tsiouvaras Simmons Holderness, Inc.
5690 DTC Boulevard, Level 3, Suite 345W
Denver, Colorado 80111

Pinyon Project No.:

1/11-670-02.8001



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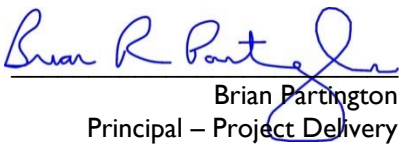
Prepared by:

Russ Cirillo, P.E.
Technical Group Manager - Remediation
Reviewed by:



Brian Partington
Principal – Project Delivery

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Tables

Note: Table numbers are identified by the number report section they are presented in, followed by the sequential table number within the section.

Figures

Appendices

1. Introduction

Pinyon Environmental, Inc. (Pinyon), was retained by Tsiouvaras Simmons Holderness, Inc. (TSH), to prepare this Materials Management Plan (MMP) for general improvements to a section of Federal Boulevard from West 7th Avenue to West Holden Place to be completed for the City and County of Denver. Based on the conclusion of the Phase II subsurface investigation, special provisions may be required for suspect materials that warrant special handling (i.e., petroleum-impacted soils and subsurface urban fill material/buried building material). This MMP specifically addresses handling and disposal of contaminated materials and other suspect materials encountered during construction activities for the Site. This MMP has been developed to assist field construction personnel in preparing for identification and management of soil and/or groundwater that may be impacted by suspect materials.

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. This draft MMP has been prepared to ensure, when properly implemented by the future-selected Contractor (Contractor), that work activities will be completed in such a way as to protect human health and the environment. Further, this MMP has been prepared to minimize potential delays, and to develop approved standard procedures that will be implemented as needed in the event that suspect materials are encountered during construction. It is the responsibility of the Contractor to customize, finalize, and implement the MMP; follow all appropriate regulations, obtain the proper permits, and utilize field personnel trained to identify potential contamination. In the event that any discrepancy is noted between this MMP and any applicable regulation, the regulation will take precedence, unless a variance has been previously approved by the regulatory.

1.1 Proposed Action

The City and County of Denver has planned general improvements for a section of Federal Boulevard from West 7th Avenue to West Holden Place (the Project). Improvements to Federal Boulevard will include adding a third northbound lane between West 7th Avenue and West 10th Avenue, as well as upgrades to pedestrian facilities and intersections between West 7th Avenue to West Holden Place. Federal Boulevard will be widened to the east in order to accommodate the additional lane capacity. Project activities will include excavation for roadway widening, sidewalk construction, and utility reconstruction (expected excavation depths up to 8 feet bgs), and signal pole installation (expected excavation depths up to 18 feet bgs). Upgrades to pedestrian facilities, intersection improvements, and utility relocations will result in partial acquisitions and/or temporary and permanent easements throughout the corridor (i.e., east and west sides of Federal Boulevard).

1.2 Key Parties and Responsibilities

The Contractor is responsible for providing this MMP to its staff and subcontractors and for compliance with the MMP. Through implementation of this MMP, the City and county of Denver will be immediately notified

of potential environmental-related findings pertaining to construction activities at the Site. The key parties, their contact information and project responsibilities, are outlined below:

Organization	Role/Responsibility	Contact Information
City and County of Denver Department of Public Works	City Project Manager	Jim Geist Phone: 720-913-4504 Email: james.geist@denvergov.org
Tsiouvaras Simmons Holderness, Inc. (TSH)	Consulting Engineer	Randall Lapsley, PE Phone: 303-771-6800 Email: randall.lapsley@tshengineering.com
City and County of Denver, Department of Environmental Health (DEH)	Environmental Quality Technical Oversight	Agatha Linger Phone: 720-865-5356 Email: Agatha.Linger@denvergov.org If no immediate response, call 720-460-1706
Construction Contractor	Health and Safety Officer/ Construction	TBD
TBD	MMP Supervisor/ Environmental oversight quality assurance to identify potentially contaminated soil and potential asbestos	TBD

1.3 Site Description

Current land use within the Project area is a variety of commercial and light industrial businesses. The project area is currently and has historically been occupied by various gasoline stations, automotive service facilities, manufacturing and processing facilities, and a bus terminal. Based on the site topography, the hydrogeologic relationship of the South Platte River (located to the east), and information collected during Phase II Environmental Site Assessment (ESA) work, groundwater flow is expected to mimic the topography of the Site; this indicates that the flow direction may be towards the northwest. Groundwater is expected to occur between 24 feet bgs at the southern portion of the project and greater than 60 feet bgs at the northern portion of the project based on measurements collected during previous investigations (Pinyon, 2016). Given the planned depths of excavation for roadway widening, utility relocation, and signal installation, encountering groundwater during project construction is not anticipated except at discrete locations where light poles/traffic signal poles may be installed in the southern portion of the Project area where shallower depths to groundwater were measured.

1.4 Previous Environmental Documentation

Pinyon previously completed Phase I and Phase II ESA work for the properties in the corridor. Phase I documents identified recognized environmental conditions (RECs) resulting from historical and current land

uses. Based on these identified RECs, targeted Phase II ESA (Appendix A) work was completed in order to provide additional information regarding subsurface conditions that may be encountered during Project work. The results of the Phase I and Phase II ESA work are highly integrated into the health and safety and material management protocols outlined in this MMP.

Based on a review of previous environmental documents and the proposed improvements for the project, the following environmental conditions were identified as having a potential to impact the project:

- PAH impacts were identified at multiple locations within the project corridor including 749, 753, 759 (PE-8), 750 (RW-9), 950 (RW-25), 970 (RW-28), and 990 (RW-31).
- Historical urban fill was observed at 710 (RW-2), 750 (RW-9), 970 (RW-28), and 990 (RW-31). Soil with suspect Regulated Asbestos Contaminated Soils (RACS) was identified during sampling within the 750 (RW-9) property. Urban fill has the potential to include asbestos-containing materials (ACMs), as well as impacts from heavy metals and PAHs. Locations where ACMs may be present are assumed to require management as RACS; therefore, RACS will be used within this document to describe areas where asbestos may be present in the subsurface materials.
- Diesel-range organics and hexavalent chromium were identified at 970 (RW-28).
- Groundwater selenium and/or arsenic concentrations at 710 (RW-2), 2970 (RW-6), 816 (RW-14), 830 (RW-14), 950 (RW-25), and 970 (RW-28) indicate that a Remediation Activities Discharging to Surface Water Permit would likely be necessary if a permit to discharge groundwater is pursued.

Although Pinyon has assumed that it is unlikely that water will be encountered during this project except as related to the discrete locations where caissons may be drilled for street lights and/or signal poles, the procedures for handling potentially impacted groundwater have been included in this MMP.

A summary of the identified RECs is provided in Table 1-1.

Table 1-1 Summary of Potential Environmental Conditions by Property (Pinyon, 2016)

Street Number	Right of Way (ROW)	Proposed depth of disturbance (feet)	Depth to Groundwater (feet bgs)	Identified Constituents of Concern (Pinyon, 2016)
710	RW-2	8 feet for utility relocation	33.83-41.64	*Soil*: No constituents of concern were identified *Fill*: Trash, building debris and potential RACS *Groundwater*: Selenium and lead
2970	RW-6	8 feet for utility relocation	31.80-33.69	*Soil*: No constituents of concern were identified *Fill*: Not observed *Groundwater*: Arsenic and selenium
749, 753, and 759	PE-8	8 feet for utility relocation	No groundwater data	*Soil*: PAHs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene *Fill*: Not encountered *Groundwater*: Not sampled

Street Number	Right of Way (ROW)	Proposed depth of disturbance (feet)	Depth to Groundwater (feet bgs)	Identified Constituents of Concern (Pinyon, 2016)
750	RW-9	10 feet for utility relocation, 18 feet for signal pole installation	23.99	*Soil*: PAHs including benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, lead *Fill*: Building debris and confirmed RACS *Groundwater*: No constituents of concern were identified
816	RW-14	15 feet for utility relocation, 18 feet for signal pole installation	25.91	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: Arsenic
830		15 feet for utility relocation	32.59	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: Selenium
888	RW-19	14 feet for utility relocation	33.87	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: No constituents of concern were identified
900	RW-23	10 feet for utility relocation	> 54.96	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: Not sampled
950	RW-25	12 feet for utility relocation	60.94	*Soil*: PAH including benzo(a)pyrene *Fill*: Not encountered *Groundwater*: Selenium
970	RW-28	12 feet for utility relocation	60.21	*Soil*: Hexavalent chromium; lead; PAHs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene; diesel range organics *Fill*: Building debris and potential RACS *Groundwater*: Selenium
990	RW-31	14 feet for utility relocation, 13 feet for signal pole installation	> 60.03	*Soil*: Hexavalent chromium, lead, benzo(a)pyrene *Fill*: Building debris and potential RACS *Groundwater:* Not sampled.

Street Number	Right of Way (ROW)	Proposed depth of disturbance (feet)	Depth to Groundwater (feet bgs)	Identified Constituents of Concern (Pinyon, 2016)
995	RW-32	10 feet for utility relocation, 18 feet for signal pole installation	No groundwater data	*Soil:* No constituents of concern were identified *Fill:* Not encountered *Groundwater:* Not sampled.

Notes:
RW or ROW – Right of Way
RACS – Regulated Asbestos Contaminated Soils

2. Health and Safety

Because of the potential to encounter suspect materials, there is a possibility for increased risk to the health of workers during excavation within the Project area. Project personnel must be made aware of the potential hazards and worker safety and awareness is of the highest priority. Therefore, a Health and Safety Plan (HASP) must be developed by the Contractor.

The Contractor will be required to employ the proper personnel, monitoring equipment, and personal protective equipment (PPE) to provide a safe working environment for its employees, consultants and sub-contractors. The Contractor's field personnel must conduct work in Level D PPE until conditions arise that require additional protection. The decision to require additional protection is the responsibility of the Contractor's Health and Safety Officer (HSO) and should be evaluated based on observation of worker conditions. An MMP Supervisor will be designated and it is the responsibility of the MMP Supervisor to provide the HSO with information regarding environmental conditions, as available, to assist in that decision. The provisions of this MMP are summarized below, and will be incorporated into the HASP. However, in no way shall the HASP be limited to these provisions.

- The Contractor must develop a HASP in accordance with 29 Code of Federal Regulations (CFR) 1910 and 29 CFR 1926 for the project.
- Workers and managers associated with intrusive site activities will be required to undergo a one-time health and safety orientation meeting at the start of the project, to include a brief onsite description of site conditions. This meeting must include two-hour asbestos awareness training conducted by a trained asbestos professional (i.e., Certified Asbestos Building Inspector).
- The general contractor may share its Health and Safety Plan with its subcontractors or require each subcontractor to prepare its own plan.
- Horizontal drilling is planned under Federal Boulevard and workers will be entering a subsurface confined space to set up and possibly operate the equipment. Although soil concentrations are within regulatory limits (based on historical data), activities generating dust from the soil, and general air quality associated with down-hole operations should be evaluated by a health and safety professional.

3. Environmental Responsibilities

3.1 Contractor Responsibilities

The Contractor will be responsible for the following:

- Designating an HSO and MMP Supervisor
- Providing necessary equipment and personnel are provided to implement the MMP
- Coordinating review of MMP requirements with the MMP Supervisor, DEH, City Project Manager and the Engineer prior to beginning work
- Providing asbestos awareness training to Project personnel who will conduct soil work
- Ensuring that asbestos awareness training is provided to workers and documented by a State Certified Asbestos Building Inspector (CABI)
- Ensuring that subcontractors adhere to the MMP during Project work
- **Oversight and documentation of Regulated Asbestos Containing Soils (RACS) shall be conducted by a Certified Asbestos Building Inspector (CABI) who meets the training requirements of Section 5.5.3(D) of the Regulation Pertaining to Solid Waste Work Sites and Facilities. A Minimum of one CABI will be present full time within the project corridor when general excavation activities are occurring. When historical urban fill or debris is encountered, a CABI must be present during excavation at all times and at each work location where these materials have been identified. It is the responsibility of the general contractor and CABI to ensure that the subcontractor performing RACS disturbance is capable of meeting the state requirements if RACS is managed during the project. Waste that can clearly be identified as only landscaping-type waste does not require CABI oversight. All CABIs must have worked on at least three different asbestos-in-soil projects and with a minimum of 40 hours of experience as CABI. Depending on the project schedule, a minimum of one CABI will be overseeing excavation work and it may be necessary to engage multiple CABIs if areas of known historical fill or debris are identified.**
- Ensuring that proper procedures for material reuse or disposal are followed. This includes ensuring that suspect material that has been disturbed is not reused on-site unless it meets the designated reuse criteria or is disposed in accordance with applicable regulations and not in storm drains, sanitary sewers, streams, irrigation facilities or waterways.
- Ensuring that non-salvageable, non-hazardous solid waste materials excavated by the Contractor are removed from the Site and disposed of at the Denver-Arapahoe Disposal Site (DADS) in accordance with local, state and federal laws.
- Ensuring that the MMP Supervisor is qualified to verify implementation of this MMP
- Contacting the Project Manager and Engineer for conditions resulting in schedule or budget impacts to the project.

3.2 MMP Supervisor Requirements and Training

Prior to implementation of the MMP, the Project team will retain an MMP Supervisor to independently verify that the requirements of this plan are followed. The MMP Supervisor must be a competent individual with at least two years of experience in the field identification of suspect material and potential environmental hazards (e.g. abandoned underground storage tanks, asbestos, lead-based paint or lead-containing materials), as well as appropriate characterization, management, and disposal methods for impacted materials. The MMP supervisor will have a minimum training requirement of 40-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations Training and current 8-hour OSHA annual update. It is the responsibility of the MMP supervisor to:

- Complete daily field notes detailing environmental conditions and responses to suspect materials that are identified.
- Provide regular updates to City and County of Denver (CCD).
- Ensure adherence to the MMP by identifying suspect materials and applying proper procedures outlined herein.
- Verify or perform field screening of soil in adherence to this plan (see Section 4.0).
- Notify CCD immediately of any unexpected environmental conditions or potentially impacted material.
- If RACS is discovered, a 24-hour notification must be filed and copied to CCD project management and DEH.
- Be on-site to verify Project operations on an as-needed basis when potentially impacted media have been encountered.
- Track and/or sign tickets and manifests for material hauled offsite for either reuse or disposal.
- Complete logs that thoroughly detail Project Quality Assurance (QA) activities.

3.3 Health and Safety Officer Requirements

Prior to the initiation of Project work, the Contractor will designate a HSO. The HSO must:

- Complete health and safety monitoring during subsurface work
- Evaluate the appropriate level of PPE based on health and safety monitoring to be completed during subsurface work
- Ensure that Project activities and personnel adhere to the HASP set in place by the Contractor

3.4 Tier I – Front-Line Workers

Tier I workers include personnel that would be responsible for mitigating suspect materials and include equipment operators and laborers actually handling materials in accordance with this MMP. These workers must:

- Complete training on identification of suspect materials by the MMP Supervisor, including asbestos awareness training conducted by a state certified CABI.
- Complete work as directed by the MMP Supervisor, and in accordance with this MMP and HASP requirements
- Complete work in accordance with the requirements of the Occupational Health and Safety Administration (OSHA), 29 CFR 1910.120. The level of training in accordance with CFR 1910.120 shall be the decision of the HSO.

3.5 Tier 2 – Excavation Workers

Tier 2 workers include personnel that could encounter potentially impacted materials during the course of work, but will not be responsible for management of these materials. These employees include, but are not limited to front-line equipment operators, foremen, and operators that will complete typical excavation activities during the project, but will not complete handling of these materials after discovery. These personnel must:

- Complete training on identification of suspect materials by the MMP Supervisor, including asbestos awareness training conducted by a state certified CABI.
- Complete work as directed by the MMP Supervisor, and in accordance with this MMP and HASP requirements
- Immediately stop work in the event that potentially suspect materials are identified, and contact the MMP Supervisor of the discovery.
- Complete work in accordance with the requirements of the Occupational Health and Safety Administration (OSHA), 29 CFR 1910.120. The level or training in accordance with CFR 1910.120 shall be the decision of the HSO.

3.6 Tier 3 – Other Workers

Tier-3 workers include personnel that will not complete sub-surface work activities. As the potential for these workers to encounter impacted materials on this project is low, MMP training requirements do not apply.

4. Soil Evaluation Criteria

Colorado Department of Public Health and Environment (CDPHE) Groundwater Protection Values, EPA Regional Screening Levels (Appendix B) and other state/federal guidance will be used for comparison to soil data. In addition to the City's guidance for third-party reuse (Appendix C), the following guidance is applicable for evaluating soil concentrations for varying exposure scenarios:

CDPHE Groundwater Protection – These are often the most protective values and were developed to protect groundwater; these values are the maximum chemical concentration in soil that will not leach into groundwater. The CDPHE-Hazardous Materials and Waste Management Division Groundwater Protection Values Soil Cleanup Table (Appendix B) values will be used for comparison to soil data.

EPA RSL Residential Protection – These are the second most protective values and are typically the soil concentrations that would be considered appropriate for reuse in residential areas without restriction (except where values do not meet groundwater protection values as described above). These are the Residential Regional Screening Levels (RRSLs, Appendix B).

EPA IRSL Worker Protection – Potentially impacted soils with concentrations greater than the IRSL will not be reused on site. Materials in this category will be taken to the DADS landfill. Alternative off-site uses of soil, if viable, will require DEH approval. These are the Industrial Regional Screening Levels (IRSLs, Appendix B).

Arsenic Standards (exception to RSLs) - In Colorado, arsenic occurs naturally, and often at concentrations greater than the RSLs. The CDPHE has state-specific guidance related to evaluating arsenic concentrations in soil, specifically regarding screening data collected from sites where historical use does not indicate the potential for arsenic impacts (CDPHE, 2011a). The guidance is based on the collection of over 2,700 samples from 44 counties in Colorado. The average concentration of arsenic in soils based on this sampling was 11 milligrams per kilogram (mg/kg). The CDPHE has adopted a policy that if arsenic concentrations are lower than 11 mg/kg, and releases of arsenic could not have occurred at the site, the CDPHE will require no further action to address arsenic in soil.

Hazardous Waste – A material can be defined as hazardous based on definition (i.e., EPA F-Listed wastes) or based on characteristics such as corrosivity, ignitable, reactivity, or toxicity characteristics. A material is defined as hazardous if any of the following criteria are met:

- The material contains a listed hazardous waste (discussed in 6 CCR 1007-3 Part 261 Subpart D).
- The pH is less than or equal to 2.0 or greater than or equal to 12.5; this material would be considered corrosive
- The flashpoint is less than 140 degrees Fahrenheit; this material would be considered ignitable
- The material is reactive.
- Toxicity Characteristic Leaching Procedure (TCLP) results exceed the hazardous waste threshold.

20 Times Rule - Waste Management (the operator of the Denver-Arapaho Disposal Site [DADS]) will accept solid material where concentrations as determined by the TCLP method are less than 20 times the EPA Toxicity Maximum Concentrations of Contaminants (included as Appendix B); this is referred to as the "20 Times Rule". PCB is an exception to this rule, as discussed in Section 6.3. As an example, the regulatory level for lead

provided by the EPA Toxicity Maximum Concentrations of Contaminants is 5.0 milligrams per liter (mg/L) when analyzed by TCLP. The Waste Management acceptable limit, when analyzed by totals analysis, would then be less than 100 mg/kg, using the 20 Times Rule. If concentrations of any contaminant exceeds 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 would require disposal at a hazardous waste disposal site in accordance with CDPHE requirements.

RACS - Oversight and documentation of RACS shall be conducted by a CABI who meets the training requirements of Section 5.5.3(D) of the Regulation Pertaining to Solid Waste Work Sites and Facilities. When historical urban fill or debris is encountered, the Contractor will engage a full-time CABI at each excavation location where historical the material has been identified. The CABI will utilize the guidance provided in the Project Specific RACS Management Plan (PSRMP) in Appendix D and knowledge of state regulations to evaluate whether a RACS area will be designated. The PSRMP will be completed by the contractor, and will be placed in Appendix D following finalization.

5. Soil Handling Procedures

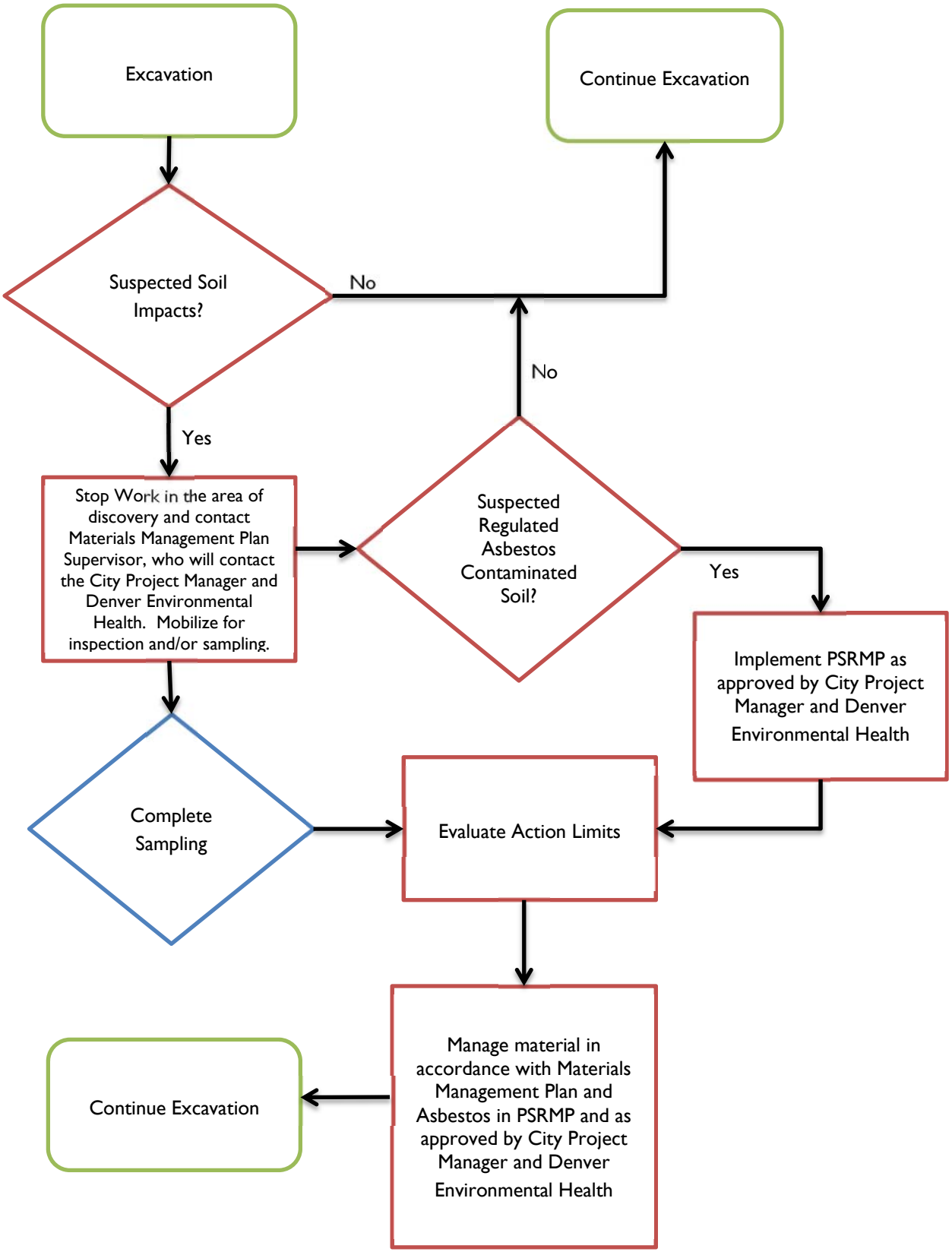
Project activities include minimum excavations up to depths of approximately18 feet bgs; excavation may occur in areas where impacted soil could be encountered. Additionally, because of the heterogeneous nature of the soil, it is important that the Contractor be aware of the possibility of encountering unknown or suspect materials and know how to manage materials. Detailing the proper procedures for handling these materials is a key purpose of this MMP.

If unknown/unanticipated conditions are encountered during the project, the Contractor must immediately stop work in the area of the discovery until the MMP supervisor and DEH evaluate how to proceed per the requirements of this MMP. **If suspect materials, historical urban fill, or debris is encountered, a monitoring technician and/or CABI must be contacted to provide field screening and/or visually assess the materials. RACS must be characterized and managed accordance with the PSRMP (Appendix D).** The Contractor must immediately notify the MMP Supervisor and DEH of the discovery. Following discussions with the MMP supervisor and DEH, additional characterization, remediation, and/or analyses may be required. Work may continue in other areas of the Project while the discovery is resolved. The following sections provide detail on Project-specific procedures (for known materials based on previous evaluation and identification of suspect materials within the Project area) and general procedures (for unexpected or unknown materials that may still be encountered).

Previous subsurface investigations have identified areas where soils have been impacted by past uses. Several types of impacted media are expected to be encountered during Project activities, including soil impacted with heavy metals, PAHs, RACS and subsurface urban fill material, as summarized in Table 1-1.

5.1 Process Flow

The following process-flow chart presents the general process that will be followed during excavation activities.


Excavation
Continue Excavation
Suspected Soil Impacts?
No
Yes
No
Stop Work in the area of discovery and contact Materials Management Plan Supervisor, who will contact the City Project Manager and Denver Environmental Health. Mobilize for inspection and/or sampling.
Suspected Regulated Asbestos Contaminated Soil?
Yes
Implement PSRMP as approved by City Project Manager and Denver Environmental Health
Complete Sampling
Evaluate Action Limits
Manage material in accordance with Materials Management Plan and Asbestos in PSRMP and as approved by City Project Manager and Denver Environmental Health
Continue Excavation

5.2 Field Screening

Debris/Historical Urban Fill Materials - Visual monitoring of excavated soils should be completed during project construction. **Debris/historical urban fill material that is encountered will be assessed for the presence of suspect RACS by a CABI.**

Landfill Gas- No landfill gases (methane, carbon dioxide, or hydrogen sulfide) were identified during the previous investigation; therefore, field monitoring for landfill gasses will only be completed as required by the site-specific HASP for worker health and safety. If monitoring for landfill gases is required by the Health and Safety Officer, a Landtec GEM (or equivalent) handheld landfill gas monitor or combustible gas indicator (CGI) will be used to evaluate methane and/or the lower explosive limit, respectively.

Staining/Odors – Project personnel will assess excavated soils for visual and olfactory indications of potential impacts. Soils where visual or olfactory impacts are observed must be screened with field instrumentation to allow it to be designated for unrestricted use or stockpiled and managed. If potentially impacted soil is identified, excavation within proximity to the impacted area will then only continue under the observation of the Monitoring Technician or MMP Supervisor. The utmost care should be taken to separate "clean" soils from potentially impacted soils. Once the Monitoring Technician or the MMP Supervisor confirms that excavation has transitioned into clean soils and potentially impacted material is no longer being excavated, the stockpiled material will be sampled for characterization and waste disposal purposes as described in Section 7.

Field Instruments – Field instruments will be utilized on an as-needed basis, particularly if petroleum- or solvent-impacted soil is suspected. A photoionization detector (PID) or flame ionization detector (FID) (related to heavy petroleum hydrocarbons such as oil or grease) may be used in the field to screen for non-specific volatile organic compounds (VOCs). If PID/FID concentrations exceed 50 parts per million (ppm), sampling will be required.

5.3 Soil Sampling

Project corridor properties or ROW not described in this document (ie. not investigated as part of the Phase II ESA) are assumed to not require sampling for on-site reuse unless suspect materials are identified during excavation activities or off-site disposal is necessary. Previous subsurface investigation results were used to identify areas where environmental conditions are expected to be encountered during Project work and to inform sampling and analysis requirements for each property (Table 5-1). Table 5-1 indicates the property address number (and corresponding ROW), the required number of samples to be collected at each property, the sample analysis and rationale, and any additional monitoring requirements. For ROW locations refer to the project plans.

Samples described below are four-point composite samples and will be collected from stockpiled soils. Sample collection will be performed in a manner that is representative of the majority of soil to be handled at each property.

Table 5-1 Summary of Soil Sampling Requirements by Property

Street Number	Right of Way (ROW)	On-Site Reuse	Off-Site Disposal	Field Monitoring	Rationale
710	RW-2	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample in accordance with the original list of potential RECs (reference Phase II ESA in Appendix A).	DADS: No sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials, **a CABI must be contacted if urban fill materials or debris is observed to evaluate if RACS are present.**	Various metals were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.
2970	RW-6	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample in accordance with the original list of potential RECs (reference Phase II ESA in Appendix A).	DADS: No sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials**, a CABI must be contacted if urban fill materials or debris is observed to evaluate if RACS are present.**	Various metals, phenanthrene, and acetone were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.

Street Number	Right of Way (ROW)	On-Site Reuse	Off-Site Disposal	Field Monitoring	Rationale
749, 753, and 759	PE-8	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample for PAHs by EPA Method SW8270SIM.	DADS: No sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials**, a CABI must be contacted if urban fill materials or debris is observed to evaluate if RACS are present.**	Various metals and PAHs were detected at concentrations above the lab detection limit. None of the metals exceeded the EPA RRSL or IRSL, but benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected at concentrations exceeding the EPA RRSL, but less than the IRSL.
750	RW-9	If other suspect materials are encountered, stockpile and sample for PAHs by EPA Method SW8270SIM; Total lead analysis by EPA Method SW6010C. Lead analysis by TCLP if the total lead concentration exceeds the 20 times rule.	DADS: Lead analysis by TCLP. No other sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil, urban fill and debris must be monitored by a **CABI to evaluate the presence of previously confirmed RACS.**	Various metals, PAHs, DRO and acetone were detected at concentrations above the lab detection limit. None of the metals or acetone exceeded the EPA RRSL or IRSL, but benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected at concentrations exceeding the EPA RRSL, but less than the IRSL. TCLP-Lead was 0.190 milligrams per liter (mg/L), which is below the 5 mg/L standard for hazardous waste. There is a potential to encounter urban fill material. RACS has been confirmed through soil sampling.

Street Number	Right of Way (ROW)	On-Site Reuse	Off-Site Disposal	Field Monitoring	Rationale
950	RW-25	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample for PAHs by EPA Method SW8270SIM.	DADS: No sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials**, a CABI must be contacted if urban fill materials or debris is observed to evaluate if RACS are present.**	Various metals, phenanthrene, and acetone were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL. Benzo(a)pyrene was detected at concentrations exceeding the EPA RRSL, but less than the IRSL.

Street Number	Right of Way (ROW)	On-Site Reuse	Off-Site Disposal	Field Monitoring	Rationale
970	RW-28	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample for Metals by EPA Methods SW6010C/ 7141C, 7196A; PAHs by EPA Method SW8270SIM; Metals analysis for individual metals by TCLP is the total concentration of a metal exceeds the 20 times rule.	DADS: Lead analysis by TCLP. No other sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials**, a CABI must be contacted if urban fill materials or debris is observed to evaluate if RACS are present.**	Various metals, PAHs, and DRO were detected at concentrations above the lab detection limit. Hexavalent chromium, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene were detected above the EPA RRSL, with benzo(a)pyrene also exceeding the EPA IRSL. DRO was detected at a concentration greater than the OPS "TPH threshold". TCLP-Lead was 0.292 mg/L, which is below the 5 mg/L standard for hazardous waste. There is a potential to encounter urban fill material due to historical property use as an urban fill area; urban fill material was encountered although it was not identified as containing asbestos.

Street Number	Right of Way (ROW)	On-Site Reuse	Off-Site Disposal	Field Monitoring	Rationale
990	RW-31	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample for Metals by EPA Methods SW6010C/7141C; PAHs by EPA Method SW8270SIM; Metals analysis for individual metals by TCLP is the total concentration of a metal exceeds the 20 times rule.	DADS: Lead analysis by TCLP. No other sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are identified. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials to evaluate if RACS are present.	Various metals, PAHs, and DRO were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL or threshold value (DRO only). Hexavalent chromium, lead, and benzo(a)pyrene were detected above the EPA RRSL, with lead also exceeding the EPA IRSL. TCLP was analyzed for lead. TCLP-Lead was 3.23 mg/L, which is below the 5 mg/L standard for hazardous waste. There is a potential to encounter urban fill material due to historical property use as an urban fill area; urban fill material was previously encountered although it was not identified as containing asbestos.
995	RW-32	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample in accordance with the original list of potential RECs (reference Phase II ESA in Appendix A).	DADS: No other sampling required unless uncharacterized suspect materials are encountered. Sample in accordance with DADS requirements if uncharacterized materials are encountered. Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials to evaluate if RACS are present.	Various metals were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL. There is a potential to encounter urban fill material due to historical property use as an urban fill area, although urban fill material was not previously encountered.

Street Number	Right of Way (ROW)	On-Site Reuse	Off-Site Disposal	Field Monitoring	Rationale
Other properties*	-	No special handling or samples are required unless suspect materials are encountered. If suspect materials are encountered, stockpile and sample in accordance with the original list of potential RECs (reference Phase II ESA in Appendix A).	DADS: Sample in accordance with the original list of potential RECs (reference Phase II ESA in Appendix A). Non-city owned property: Sample in accordance with Appendix C	Visual and olfactory observations for chemical impacts. Disturbed soil should be monitored for the presence of urban fill materials to evaluate if RACS are present.	No RECs were identified at these properties requiring evaluation
Properties with PID screening samples above 50 PPM	-	Grab or composite representative of the majority of soil to be handled at the property.	VOCs by EPA RCRA 8 Method 8260C; PAHs by EPA Method 8270C; PCBs by EPA Method 8082	PID (or FID)	Concentrations above 50 PPM may indicate potential impacts
Special Waste	-	See Section 5.0	See Section 5.0	Visual observations	Observed special waste require additional evaluation per Section 5.0

Notes:
TCLP *Toxicity Characteristic Leachate Procedure*
PAH *Polycyclic Aromatic Hydrocarbon*
PPM *Parts Per Million*
RRSL *Residential Regional Screening Level*
IRSL *Industrial Regional Screening Level*
**Other Properties include those not investigated during the Phase II ESA and properties where environmental concerns were not identified during the Phase II ESA.*

5.4 General Soil Stockpiling Requirements

Soil from properties where analytes were previously detected above RRSLs must be temporarily stockpiled on 6 mil plastic sheeting and covered pending receipt of the results of laboratory analysis in accordance with the soil sampling protocols identified in this document. Stormwater best-management practices (BMPs) as identified in the Storm Water Management Plan (SWMP) will be applied to the stockpiles of potentially impacted material to prevent contact with stormwater runoff and erosion. Stockpiles of potentially impacted soil will be limited to a maximum of 500 cubic yards each. All other soils must be handled in accordance with the SWMP.

5.5 Urban Fill Areas

Historical urban fill areas are a recognized environmental condition at multiple properties throughout the corridor. Historical urban fill was observed at 710 (RW-2), 750 (RW-9), 970 (RW-28), and 990 (RW-31). Soil

with confirmed RACS was identified during sampling within the 750 (RW-9) property. Additional properties have been identified (Table 5-1) where urban fill is likely to be encountered based on historical property use where, although asbestos was not specifically identified, the presence of urban fill materials indicates that RACS may be encountered during subsurface work. **All historical urban fill and debris, unless clearly identified as only landscaping materials, regardless of location, must be screened by a CABI for potential RACS.**

5.6 Regulated Asbestos-Contaminated Soils (RACS)

Oversight and documentation of RACS shall be conducted by a CABI who meets the training requirements of Section 5.5.3(D) of the Regulation Pertaining to Solid Waste Work Sites and Facilities. A Minimum of one CABI will be present full time within the project corridor when general excavation activities are occurring. When historical urban fill or debris is encountered, a CABI must be present during excavation at all times and at each work location where these materials have been identified. All RACS management will be performed by a contractor or subcontractor capable of meeting the requirements in the PSRMP (Appendix D) as documented by a CABI. Waste that can clearly be identified as only landscaping-type waste does not require CABI oversight. If suspect RACS is discovered, the critical requirement is to avoid generating or being in direct contact with airborne dust and work shall stop immediately. Notification must be made to the MMP Supervisor and DEH immediately.

RACS must be characterized and managed accordance with the PSRMP (Appendix D). The wording in the PSRMP will be approved and will comply with the substantive requirements of the regulation prior to amendment. It shall remain in effect until amended and approved and may be used to comply with the amended Section 5.5 of the Solid Waste Regulations that address RACS. The Contractor will be ultimately responsible for adhering to the most current version of the PSRMP.

6. Special Wastes

Although not anticipated, other special wastes could include items such as drums, chemical or fuel containers, slag, coal, ash, biological waste, potential polychlorinated biphenyls- (PCBs) containing electrical equipment (transformers, light ballasts, voltage regulators, capacitors and circuit breakers), batteries, tar, and sludge. These materials may be present in small quantities and can be difficult to characterize. Upon identification of special wastes, excavation at that location will cease until additional assessment by the MMP Supervisor can be completed, and DEH is contacted. The MMP Supervisor will attempt to assess special wastes based on prudent and safe observation of the following:

- Handling of any special wastes will only be conducted under the direction of the MMP Supervisor and will be minimized whenever possible.
- If it is safe to move, special waste will be containerized or be placed on polyethylene plastic sheeting and covered, until additional assessment has been completed by the MMP Supervisor (the time frame will allow for laboratory testing and obtaining a profile and manifest for disposal).
- The special waste will remain covered or containerized until final removal.
- Stockpile requirements as described in Section 5.4 will apply and stockpile areas will be secured to prevent contact with unauthorized personnel and the public.
- The material will be characterized by the MMP and manifests will be obtained before it is disposed of off-site, and the material will be disposed of as soon as possible. If additional assessment of this material indicates that the material does not meet applicable regulatory requirements for disposal as a non-hazardous waste, the MMP Supervisor will arrange for off-site disposal at a licensed hazardous waste facility, or other appropriate disposal site.
- Special wastes that are generated will be managed in accordance with applicable local, state and federal regulations.
- Where potentially impacted material is determined to be non-hazardous by the MMP Supervisor, the material may be disposed of as non-hazardous solid waste at DADS.

6.1 Drums or Waste Containers

When drums or waste containers are identified, the Contractor will make note of the any of the following conditions and notify the MMP supervisor and DEH.

- Indications of unsafe conditions, including swelling drums, leaking, fumes, odors, etc.
- Markings and or labels on containers/drums, condition of the containers/drums (e.g., rust, holes, damage, corrosion) and other indications of contents.
- Pressurized/swelling drums, suspected explosives, potentially shock-sensitive materials or other potentially dangerous items will not be handled until a person with appropriate experience with these situations has been consulted.

6.2 Slag, Coal, Ash

Slag, coal, or ash cannot be reused on the project and will be disposed at DADS unless the waste does not meet the DADS waste acceptance criteria (ie. fails TCLP analysis). These materials should be sampled in accordance with the requirements to dispose of the material at the DADS landfill. If the material cannot be accepted at the DADS landfill, additional sampling may be required by the alternate receiving facility. Ash is frequently associated with RACS and must be managed in accordance with the PSRMP (Appendix D).

6.3 Electrical Equipment (PCBs)

If any potential electrical equipment (including transformers, light ballasts, voltage regulators, capacitors and circuit breakers) suspected of containing PCBs is identified, it will be segregated, analyzed, and depending on PCB concentrations, transported off-site for disposal at a PCB-permitted disposal facility, if necessary. Until testing is completed, any electrical equipment visually identified during excavation will be assumed to contain PCBs. Equipment where the absence of PCBs has been verified may then be disposed as solid waste, or recycled. Waste Management will accept materials where PCB concentrations are less than 50 parts per million. If this material will be disposed at DADS, the MMP Supervisor will work with DEH to complete a WM PCB Certification, which must include copies of analytical reports confirming the PCB concentrations.

6.4 Biological Waste

Biological waste includes the following types of waste specified in Colorado Solid Waste Regulations 6 CCR 1007-2, Section 13:

- Biohazardous waste
- Blood and body fluids
- Infectious waste,
- Medical waste
- Pathological waste
- Pharmaceutical waste
- Potentially infectious waste

Biological wastes are regulated as solid waste under Colorado Solid Waste Regulations 6 CCR 1007-2 Section 13. Biological wastes should not be handled and work should be shut down upon discovery of biological waste. The contractor will contact the MMP Supervisor and DEH and wait for the appropriate support personnel and evaluation prior to continuing work.

7. Reuse Criteria

It is expected that most soils encountered during construction of this project will fall into the unrestricted and/or restricted reuse categories; however, some soil may not be reusable on the Project. Details regarding various categories of soil use are presented in Sections below.

7.1 General Reuse Requirements

Additional requirements for specific types of soil use are described in the sections below in this document; however, some general requirements that apply to all reuse categories are described in this section including:

- Groundwater Protection Values must be met.
- If the soil would be reused at a third party property, procedures and guidance described in Appendix C (*Guidance for Third Party Reuse of Excess Soil from City Projects*) will be followed.
- If there is no place to reuse this soil on-site and the material is characterized as non-hazardous and meets the waste acceptance criteria, it may be disposed at DADS without DEH approval or at alternate off-site locations with DEH approval.
- Soil that is proposed for reuse at a City-owned park must meet the requirements defined for Unrestricted Reuse materials; therefore, only soils that meet the criteria defined in Section 7.3 will be approved for reuse within a City-owned park.
- Soil that is not to be disturbed by planned construction on the project will remain in-place, regardless of its reuse classification. Characterization and remediation of soils not directly disturbed by project activities are beyond the scope of the Reconstruction of Federal Boulevard project.

7.2 Use of Soil with Debris

Soil with debris cannot be reused on the project. Soil with debris that is characterized as non-hazardous and meets waste acceptance criteria will be taken to DADS landfill. If DADS cannot receive the waste, alternative facilities can be considered, but must be approved by DEH.

7.3 Unrestricted Reuse Soil

Soil with constituents of concern at concentrations within EPA RRSLs may be reused at residential, commercial, or industrial locations (either on- or off-site), assuming:

- The receiving facility has knowingly agreed to accept this material
- The receiving facility has been provided and understands the analytical data
- Soil is free of construction/demolition debris and RACS

7.4 Non-Hazardous and Solid Waste Disposal

Solid waste including historical urban fill and debris, and non-hazardous waste including geotechnically unsuitable soils or soils with constituents of concern at concentrations above EPA RRSLs (not characterized as

hazardous or liquids, see Section 7.5), must be transported off-site to DADS. **These materials may not be reused on-site.**

DADS will accept solid material where concentrations as determined by the Toxic Characteristic Leach Procedure (TCLP) are less than 20 times the toxicity characteristic maximum concentration, this is referred to as the "20 times rule" (see section 7.2). The EPA TCLP Maximum Concentrations of Contaminants are provided as Appendix B. At properties where lead was detected at concentrations above 100 milligrams per liter (mg/L) additional analysis of lead by TCLP indicated that lead was within the 5.0 mg/L regulatory limit; however, soils with constituents of concern exceeding the 20 times rule during the project will also require TCLP evaluation. It is expected that if soils encountered on this project exceed the IRSL, they will likely be eligible for disposal as a non-hazardous waste

Note: Certain waste streams are specifically excluded in the Solid Waste Regulations (CDPHE, 2011b). The MMP Supervisor (and as approved by CCD) will be responsible for ultimate classification for disposal.

7.5 Hazardous Waste Disposal

If sample analysis indicates that the soil is designated as hazardous waste, the soil will be containerized immediately in a lined roll-off box, labeled, and transported to a designated storage area (either on-site or off-site) pending off-site disposal at a hazardous waste disposal facility. Waste manifests must be completed for the material prior to transportation to the disposal facility in accordance with state and federal regulations. Once identified as hazardous waste, this material may not be stored on-site longer than 90 days.

The Deer Trail Landfill operated by Clean Harbors Environmental at 108555 East Highway 36 in Deer Trail, Colorado is the only facility within Colorado licensed to accept hazardous waste. The next closest licensed hazardous waste disposal facilities are located in Nebraska, Utah and Texas. Manifestation and transportation of these waste materials on public highways, streets, or roadways will be in accordance with 49 Code of Federal Regulations (CFR) and any applicable Department of Transportation regulations.

8. Construction Water Handling Procedures

Construction water may consist of stormwater, surface water, groundwater, and leachate and will be addressed using the following procedures. Groundwater and leachate are not expected to be prevalent during this project.

8.1 Stormwater

The Contractor is required to obtain a Colorado Discharge Permit System (CDPS) permit for stormwater discharges associated with construction. The Contractor (or design engineer) shall prepare a stormwater management plan (SWMP) for construction of this project as required by the permit. As part of this SWMP, the Contractor is responsible for water control facilities as required to promptly remove and properly dispose of stormwater that may impact the Project area. The SWMP management must include procedures for implementing and tracking stormwater best-management practices (BMPs) throughout the Project area for the duration of construction. The Contractor is responsible for delegating the responsibility of overseeing or performing routine inspections of storm water management practices, and regulatory reporting/correspondence to ensure compliance with the CDPS permit.

8.2 Groundwater

Although it is considered to be unlikely to encounter groundwater during this Project, groundwater that may be encountered during subsurface construction activities will require sampling and analysis prior to discharge as part of the CDPHE-WQCD permitting process. Water from dewatering operations shall not be directly discharged into any waters of the State, including wetlands, irrigation ditches, canals, or storm sewers, unless allowed by a permit. Unless prohibited by law or otherwise specified in the Contract, the water from dewatering operations shall be contained in basins in locations approved by the engineer, treated for discharge in accordance with the CDPHE-WQCD permit(s), or shall be hauled away from the project for proper disposal in accordance with applicable laws and regulations.

Evaluation of water disposition will be conducted in coordination with the MMP Supervisor and the City. If results of sampling indicate that groundwater has been impacted at concentrations exceeding the appropriate CDPHE standard, **the Contractor must understand that the CDPHE will not allow this water to be discharged without appropriate permitting and/or treatment.** Previous sampling has confirmed the presence of selenium-impacted groundwater at the 2790 (RW-6) address within the southern portion of the Project area; selenium was detected at levels that exceeded the Colorado Groundwater Regulation 41 Agricultural Standard.

In the event that groundwater is encountered, the Contractor will implement the most cost effective method of groundwater handling and disposal that meets all state and federal regulations. If the Contractor intends to treat groundwater for discharge into a water of the State, it is likely that the Contractor will need to apply for and obtain a Remediation Activities Discharge to Surface Water permit COG315000 (Appendix E). If so, this application must be submitted at least 45 days prior to the anticipated date of discharge, and must be considered complete by the CDPHE before the CDPHE review and approval process begins. An application for remediation would need to concisely show how the Contractor intends to treat the water to meet the surface-water standards applicable for the discharge. It is the responsibility of the Contractor to obtain all applicable CDPHE-WQCD permits for dewatering and discharge of groundwater, and to abide by the requirements of the permit(s). In the case that dewatering activities are required and a permit is obtained, the contractor must prepare a Remediation Activities Management Plan (RAMP) prior to any discharge activities taking place. In accordance with permit procedures, the Contractor shall fill out and submit monthly DMRs to CDPHE-WQCD

for the life of the permit, even if discharge activities are not conducted. Copies of monthly submittals shall be provided to the City.

The following are some general provisions; however, any requirements noted on the permit(s) take precedence over this MMP.

- Untested groundwater or groundwater that does not meet the discharge standards will not be discharged onto the ground, or into sanitary or storm sewers.

- Groundwater that does meet discharge standards as evaluated by the MMP Supervisor may be discharged in accordance with applicable federal, state and local regulations, or may be used on-site for moisture treatment of engineered fill material, or for dust suppression (assuming it meets Colorado Ground Water Standards). Use of groundwater for moisture treatment or dust suppression must be confirmed to be in compliance with water rights before implementation.

- Where chemical concentrations in groundwater are above permit limits, the water will be either be permitted and treated on-site or transported off-site and disposed at a licensed treatment facility.

- The MMP Supervisor will discuss treatment and/or disposal options with the City, and the City will provide direction to the Contractor, who will be responsible for water treatment and/or disposal in accordance with the Contractor's approved permits.

8.3 Leachate

Materials excavated from below the groundwater table have the potential to generate liquids; however, groundwater is unlikely to be encountered during the Project and it is unlikely that excavated material will generate significant liquids. However, if saturated materials are encountered, stockpile areas will be constructed to drain material before re-use as engineered fil, or transport for off-site disposal.

Generated liquids will drain to a central sump which must be of sufficient capacity to prevent overtopping. The sump will be excavated into the ground and sloped to a central location. It will also be lined with 10-mil polyethylene sheeting; a layer of gravel will be implemented to hold the sheeting in place and will extend beyond the edge of the sheeting. A berm will be placed around the sump to prevent surface water from commingling with the generated leachate water. Liquids accumulated within the sump will be submitted for analysis by the Contractor and coordinated with the MMP Supervisor. If constituents in the water exceed the surface water standards or CDPHE-WQCD permit limits (if applicable), the water must either be disposed at a licensed disposal facility with appropriate waste profiles and manifests or be treated to meet those standards before discharge (in accordance with the discharge permit). Solid wastes generated during this process must also be evaluated in accordance with sampling procedures prior to disposal; if this material will require disposal off-site, it must pass the paint filter test (U.S. EPA Method 9095A) prior to disposal at a licensed solid waste disposal facility.

9. Additional Requirements

9.1 Dust

In accordance with 5 CCR 1001 – Air Quality Control Commission (AQCC) Regulations, the Contractor will obtain an Air Pollution Emissions Notice (APEN) and Application for Construction Permit. The Contractor will implement best management practices to minimize dust, such as the following:

The Contractor will take reasonable measures to prevent particulate matter from becoming airborne and to prevent the visible discharge of fugitive particulate emissions beyond the property boundary on which the emissions originate. The Contractor shall provide sufficient quantities of equipment and personnel for dust control sufficient to prevent dust nuisance on and about the Project area. Blowing dust and airborne particulates shall be controlled by wetting or other means, if approved by the MMP Supervisor and Project Manager. Dust control agents shall be applied in accordance with manufacturer's recommendations. The measures taken must be effective in the control of fugitive emissions at all times on the site, including periods of inactivity such as evenings, weekends, and holidays as well as any other periods of inactivity.

9.2 Decontamination of Heavy Equipment

Equipment that has come into contact with potentially impacted waste as identified by the MMP Supervisor will be decontaminated prior to leaving the project site to prevent impacted material and/or soil with nuisance weed seeds from being spread off-site. Gross removal of material from equipment will be completed using hand tools such as shovels, brooms and brushes. If the MMP Supervisor finds it necessary, more thorough decontamination may be required such as pressure washing. Spent decontamination water will be collected in basins and pumped into water containers. The Contractor will be responsible for analyzing the waste-water and working with the MMP supervisor and City to evaluate final disposal options in accordance with applicable federal, state and local regulations. A minimum of 10-mil polyethylene line shall be placed beneath equipment needing decontamination to collect residual materials and prevent unauthorized dispersal of liquids.

9.3 Site Security

The Contractor will be responsible for maintaining effective access control for the Project.

9.4 Monitoring Wells

Multiple monitoring wells were installed during previous subsurface investigations and have been abandoned on site. Active monitoring wells are not anticipated; however, if active groundwater monitoring wells are encountered, special care will be taken so as not to disturb their structural integrity. If this is not possible, then well will be properly abandoned and replaced after construction (if needed) as coordinated and conducted by the MMP Supervisor. DEH shall be notified and will coordinate abandonment of monitoring wells.

9.5 Complaints

Any complaints received by the Contractor will be immediately reported to the CCD Project Manager. Additionally, any environmental-related complaint, such as noise, odor, or dust, will be immediately reported to DEH. Complaints must be addressed within 24 hours.

10. Imported Materials

Any soils, including embankment and/or topsoil, brought to the Site must meet the Unrestricted Reuse Criteria.

For each source of imported embankment or topsoil:

- The Contractor shall assure and certify that unacceptable concentrations of constituents in the analyses described below in Section 10.1, including but not limited to those defined in the 40 CFR Part 261 Subparts C and D, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 101(14) as amended, are not incorporated into the project as a result of importing embankment or topsoil materials.

- The Contractor shall submit such certification to DEH and the Project Manager, signed and stamped (or sealed) by one of the following:

    - A qualified environmental consultant

    - Certified Industrial Hygienist (CIH)

    - Certified Hazardous Materials Manager (CHMM)

    - Registered Professional Engineer (PE)

    - Certified Safety Professional (CSP)

    - Registered Environmental Manager (REM)

- Additionally, the material must be visually evaluated by a Certified Asbestos Building Inspector, and be determined free of any confirmed or suspected RACS, solid waste, debris, and demolition materials.

If Contractor source material for embankment or topsoil, originating outside of the project limits, is placed at the project and was not cleared through the sampling protocols described in Section 10.1, the Contractor shall remove the material from the project, dispose of it in accordance with applicable laws and regulations, and make necessary restoration. This work will be the sole burden of the Contractor.

The cost of complying with these requirements, including sampling, testing, and corrective action by the Contractor, will not be paid for separately, and shall be included in the work.

10.1 Sample Analysis and Frequency

Representative samples of proposed import fill shall be collected at a frequency of one sample for every 2,000 cubic yards. Samples shall be analyzed for the following constituents:

- VOCs by EPA Method 8260

- PAHs by EPA Method 8270

- RCRA eight metals using EPA Method 6010/6020/7471

- Pesticides/PCBs using EPA Method 8082

The City DEH may adjust the frequency of sample analysis, and analysis requirements, at its discretion.

10.2 Imported Fill Documentation

Certification documentation shall be provided to the City Project Manager and DEH for approval prior to being brought to the project site.

11. Reporting

Upon project completion, the MMP Supervisor will prepare a summary report detailing the work performed at the project specifically related to the implementation of this MMP. The report will include the following:

Detailed documentation of the on- or off-site disposition will be maintained by the MMP Supervisor. Documentation will include:

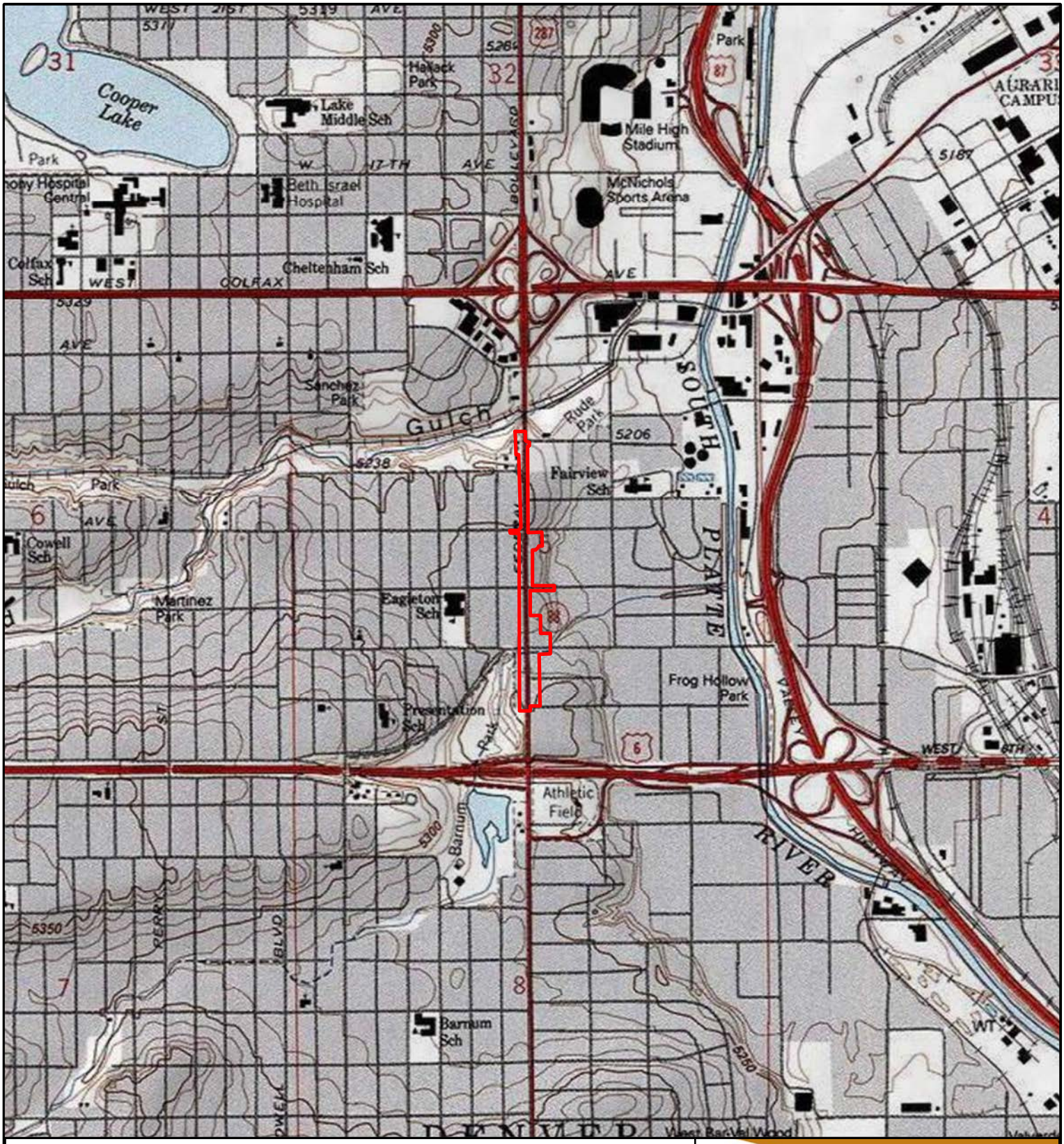
- Maps showing the locations of site features related to this MMP, including sample locations, location of wastes discovered, and any other important features identified during the course implementation of this MMP
- Field Screening and analytical data
- Summary and copies of analytical results/reports
- Summary of quantities materials that were managed and the procedures used
- Location and manner (ie., embankment fill, surface soil, etc.,) of soil use including any cover materials (soil, asphalt, etc.,)
- Representative site photographs showing soil reuse areas
- A reference to the proximity to groundwater (must meet requirements described in Section 7.1)
- Documentation or approvals for reuse of materials containing debris or soil categorized as Restricted Reuse
- Waste profiles and waste manifests for all solid waste, soil, water or other material transported off-site for disposal
- Any other documentation detailing important features related to this project

12. References

CDPHE, 2011a. "Risk Management Guidance for Evaluating Arsenic Concentrations in Soil." Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, June 2011.

CDPHE, 2011b. "Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 CCR 1007-2, Part 1." Prepared by the Colorado Department of Public Health and Environment, Hazardous Waste Unit, August 22, 2011.

Figures



Legend

Approximate Site Boundary

N

USGS 7.5' Topographic Map
Fort Logan, Colorado 1965 (revised 1994)

0 750 1,500 Feet

Pinyon Environmental, Inc.

SITE LOCATION

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 1
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/19/2016

Document Path: Z:\PROJECTS\2016\11600702 CCOD Federal Blvd Phase II\Figures\ArcMap\MXDs\Federal Blvd_Site Location.mxd

Appendix A Phase II Environmental Site Assessment

Pinyon Environmental, Inc.

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October 20, 2016

Revision 2.1

Final Phase II Environmental Site Assessment

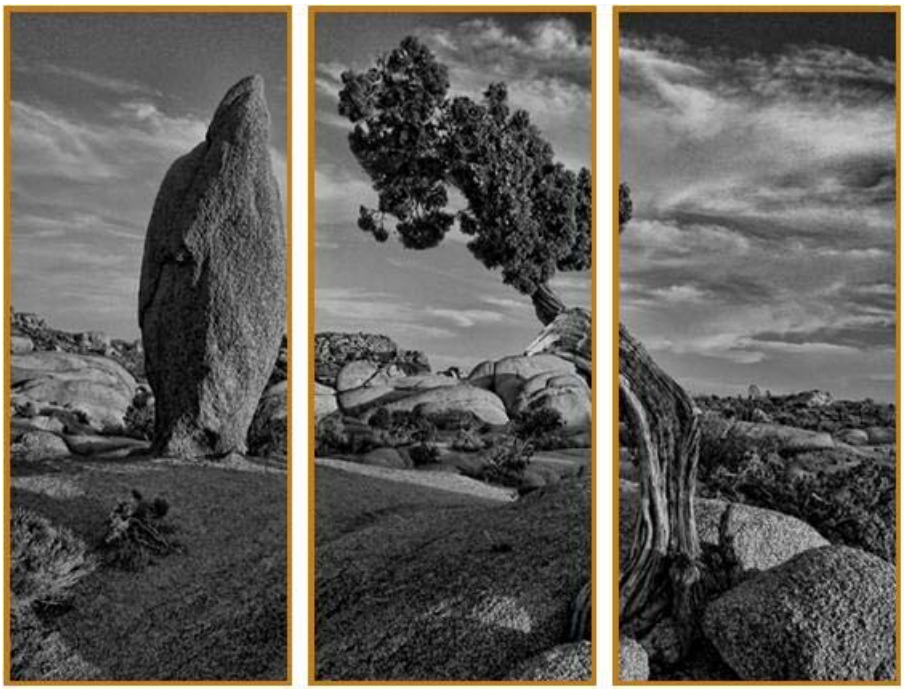
Federal Boulevard Improvements Project, West 7th Avenue to West Holden Place Denver, Colorado

Prepared For:

City and County of Denver
Division of Environmental Quality – Department of Environmental Health
200 West 14th Avenue, Suite 310
Denver, CO 80204

Pinyon Project No.:

1/16-007-02.2104



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Pinyon Project No.:

1/16-007-02.2104

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Tables

Note: Table numbers are identified by the number report section they are presented in, followed by the sequential table number within the section.

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Figures

Appendices

1. Introduction and Purpose

Pinyon Environmental, Inc. (Pinyon), has completed a Phase II Environmental Site Assessment (ESA) to support the City and County of Denver (CCOD) Federal Boulevard Improvements Project, West 7th Avenue to West Holden Place (project), located in Denver, Colorado (Figure 1). This Phase II ESA Report includes information and details regarding the Drilling Events 1, 2. and 3/3R. It also includes groundwater monitoring data from Groundwater Sampling Event 1 and 2. The geophysical survey, installation of monitoring wells, groundwater sampling, top of casing elevation survey, well abandonment and disposal of investigation derived waste are complete.

In general, improvements to Federal Boulevard will include adding a third northbound lane between West 7th Avenue and West 10th Avenue, as well as upgrades to pedestrian facilities and intersections between West 7th Avenue and West Holden Place. Federal Boulevard will be widened to the east in order to accommodate the additional lane capacity. Pinyon understands that the project is in the process of appraisal and right-of-way (ROW) negotiations for the properties to the east of Federal Boulevard that will be acquired as part of the project. At the time of this ESA report, there is a potential that 710 Federal Boulevard will be acquired in full.

Upgrades to pedestrian facilities, intersection improvements, and utility relocations will result in partial acquisitions and temporary and permanent easements throughout the corridor (i.e., east and west sides of Federal Boulevard).

1.1 Site History

At the request of the CCOD, Pinyon completed Phase I ESA documentation for the properties that may be fully or partially acquired for the project (Pinyon 2015a through 2015h). Given the historical and current uses throughout the corridor, a number of recognized environmental conditions (RECs) were identified in the Phase I ESA reports. This Phase II ESA was completed to evaluate the presence and extent of impacts caused by the identified RECs (if applicable), and as liability protection prior to CCOD's purchase of these properties. In addition, the site investigations will help guide health and safety and materials management decisions during implementation of project activities (e.g., construction).

The project area is currently and has historically been occupied by various gasoline stations, automotive service facilities, manufacturing and processing facilities, and a bus terminal. A summary of the identified RECs is provided in Table 2-1.

2. Methods

The methodology utilized in this investigation is summarized below:

- Prior to starting field activities, Pinyon prepared a site-specific Health and Safety Plan (HASP) which identified potential health and safety hazards as well as accident prevention methods (Appendix A).

- Pinyon contacted the Utility Notification Center of Colorado (UNCC) to mark public buried underground utilities in areas proposed for subsurface investigations.

- Pinyon retained Underground Consulting Services, LLC (UCS), a private utility locator, to identify private utilities in areas proposed for subsurface investigations. Additionally, each boring was hand augered to five feet below ground surface (bgs) to ensure shallow utility clearance.

- Pinyon retained Olson Engineering, Inc. (Olson), to complete a geophysical survey to evaluate the potential presence of underground storage tanks and associated piping at the 710 Federal Boulevard (RW2) and 2970 West Severn Place (RW6) properties (Appendix B). Pinyon used the results of the findings to select the soil boring/groundwater monitoring well locations on these two properties.

- Pinyon completed and submitted Colorado Division of Water Resources (CDWR) *Notice of Intent to Construct Monitoring Hole(s)* applications prior to installing the groundwater monitoring wells and *Well Construction and Test Report* forms after installing the wells to CDWR. *Well Abandonment Report(s)* were prepared and submitted to CDWR following well abandonment (Appendix C)

- An access agreement was completed with each of the current property owners prior to subsurface and site preparation activities. In cases where an access agreement was not negotiated between the property owner and Pinyon, a Purchase and Sale Agreement was in place between the CCOD and property owner, which included access for environmental assessment activities.

- The original scope of work included up-to seven shallow soil borings from building interiors. The interior borings were removed from the plan per request by CCOD.

- A total of 17 soil borings have been completed throughout the project area: RW2SB01, RW2SB02, RW2SB03, RW2SB04, RW2SB05, RW6SB01, RW6SB02, PE8SB01, RW9SB01, RW14SB01, RW14SB02, RW19SB01, RW23SB01, RW25SB01, RW28SB01, RW31SB01, RW32SB02. A total of 15 of these borings were converted into temporary groundwater monitoring wells in order to evaluate RECs and ownership liability risk. The locations were selected based on the RECs identified during the Phase I ESAs, in conjunction with the proposed construction activities. In areas with adjoining property RECs, the boring locations were placed in order to obtain data for both properties (e.g., a downgradient well for property A is the up-gradient well for property B) (Figure 2, Pages 1 and 2).

- The soil borings converted to temporary monitoring wells were advanced to total depths of approximately five feet below the groundwater interface (or to the depths that were specified in the proposal and from conversations with CCOD), or refusal, whichever was first.

- Pinyon sub-contracted Vista GeoScience (Vista) to complete the drilling and well installation activities using a direct-push drill rig capable of turning solid-stem augers. Soil samples, for the direct-pushed intervals, were collected in plastic sleeves, on a continuous basis. The soil cores were visually described according to the Unified Soil Classification System. Information regarding subsurface conditions were recorded on a boring log (Appendix D). Solid-stem auger methods were used when deeper depths were not achievable using the direct-push system. Soil samples were not collected for the augered intervals; however, lithology was noted from the surface-expressed soil cuttings.

- Naming convention as agreed upon by Pinyon and CCOD is as follows:
    - Soil Borings (SB): Right of Way (ROW), SB, Identification (ID) (ex: RW6SB01)
    - Soil Samples (SS): ROW, SS, ID (ex: RW6SS01)
    - Groundwater (GW) Well and Samples: ROW, GW, ID (ex: RW6GW01)
- Soil samples collected during drilling were field screened for non-specific volatile organic compounds (VOCs) using a photoionization detector (PID) and Pinyon Standard Operating Procedures (SOPs). Borings associated with suspected or known former landfills were screened for landfill gases using a Landtec Gem2000 Landfill Gas Meter. These measurements are recorded on the boring log (Appendix D).
- One soil sample was selected from each soil boring for laboratory analysis. From each boring, the soil sample selected for laboratory analysis was collected based on the following decision rule, in order: the sample with the highest headspace measurement; the sample that exhibited the most obvious notable visual or olfactory impacts (i.e., "looks bad, smells bad"); or the sample from just above the groundwater interface.

  Two soil samples were selected from each boring at 710 Federal Blvd/RW2 for laboratory analysis in order to evaluate potential shallow UST and potential deeper landfill impacts (with CCOD concurrence). The same decision rules were applied for these borings with the added stipulation that one sample was from a shallower depth and one from a deeper depth.

  The soil samples were placed in laboratory-supplied containers, placed on ice in coolers to preserve the samples, and submitted, in accordance with Pinyon's SOP, to Origins Laboratory, Inc. (Origins), in Denver, Colorado, for the following analyses, or subset thereof, depending on the RECs identified at the property (see Table 2-1 for analytical procedures by property):

    - VOCs by U.S EPA Method 8260C
    - Gasoline and diesel-range organics (GRO/DRO) by U.S. EPA Method 8015C
    - Polycyclic aromatic hydrocarbons (PAHs) using U.S. EPA Method 8270D SIM
    - Eight Resource Conservation and Recovery Act (RCRA 8) metals by U.S. EPA Method 6010C/7471A
    - Hexavalent chromium by U.S. EPA Method 7196A and copper by U.S. EPA Method 6020B
    - Asbestos (by Polarize Light Microscopy [PLM]) where suspect regulated asbestos contaminated soil (RACS) containing debris (e.g., building debris) was identified in soil samples collected (submitted to Reservoirs Environmental, Inc. of Denver, Colorado)
    - Toxicity Characteristic Leaching Procedure (TCLP) by U.S. EPA Method 6010C (as needed)
- Following sample collection, the two soil borings, PE8SB01 and RW32SB01, which were not converted into temporary monitoring wells were backfilled with bentonite chips and returned to original ground surface condition.
- Before and after each boring, all reusable equipment that came into contact with potentially impacted soil was decontaminated using a liquinox solution in a first bucket, and then a clean rinse in a second bucket.
- After drilling activities, Vista constructed temporary groundwater monitoring wells in 15 of the 17 borings. Ten feet of one-inch diameter factory-slotted polyvinyl chloride (PVC) screen was placed in the bottom of the boring and blank casing threaded onto the screen and extended to the ground surface or slightly below ground surface. At each location, the wells were completed with 10/20 silica sand from the bottom of the boring to approximately two feet above the top of the screen, and hydrated bentonite was placed from the top of the sand layer to approximately one foot below the ground surface. As the wells were semi-

temporary, traffic covers were not installed, but rather the PVC was capped flush with the pavement and sand/gravel extended to the surface to prevent damage to the wells.

- Following installation, the depth to water and the total depth of each monitoring well were measured with an electric water level indicator (Table 3-2). Each well was purged of five well volumes, using a disposable bailer, to remove residual fine sediment from the drilling process (well development) and to facilitate a good connection between the groundwater in the annular space of the well and the aquifer surrounding the well.

- Following monitoring well development, the wells were allowed to recharge and a groundwater sample was obtained from each of the wells, using disposable bailers. Groundwater quality parameters were monitored (pH, conductivity and dissolved oxygen), and after stabilization (defined as parameters changing less than 5%), groundwater samples were collected.

- Groundwater samples were submitted, in accordance with Pinyon's SOPs, to Origins for laboratory analysis of:

    - VOCs by U.S. EPA Method 8260C
    - GRO/DRO by U.S. EPA Method 8015C
    - PAHs using U.S. EPA Method 8270SIM (placed on hold, not analyzed)
    - Dissolved (field filtered using dedicated in-line filter for each sample) RCRA 8 metals by U.S. EPA Method 6010C/7470A

- Investigation derived waste (IDW) consisting of soil, groundwater and decontamination water was temporarily stored at the 2970 West Severn Place property in labeled drums while pending disposal. Non-hazardous IDW soil was profiled, transported and disposed of at the Denver Arapahoe Disposal Site (DADS). IDW liquid was profiled, transported and disposed of at the Conservations Services, Inc. (CSI). Pickup of the IDW occurred on August 12, 2016. Pinyon handled waste profiling and manifest preparation for IDW soil at the request of CCOD.

- The locations of all well casings were surveyed using a hand-held global position system (GPS), and the elevations of the top of well casings were surveyed to a relative benchmark by a licensed surveyor, Bell Surveying Company, on June 15, 2016 (Appendix E). These data, along with the depth to groundwater data, are utilized to evaluate groundwater-flow direction (Figure 3).

- The groundwater monitoring wells were abandoned with confirmation from CCOD, on July 11, 2016. The wells were abandoned in accordance with the CDWR rules and reporting requirements.

- Depth to groundwater was gauged for each of the monitoring wells, following the installation of the final wells (after development and following recharge), to compensate for seasonal fluctuations.

2.1 Sample Analyte Rationale

The following table presents information regarding the boring ID, RECs, and analytical requirements. For the purpose of this report, locations where environmental investigation did not occur or where borings were removed from the plan will not be included in the report following Table 2-1.

Table 2-1 Sample Analyte Rational and RECs

Street Number	Boring ID	Recognized Environmental Concerns (RECs)	Analytical Requirements					
			VOC	G/DRO	PAH	RCRA8	Cu/CrVI	Asbestos
710	RW2SB01 [3]	A gasoline station formerly operated on the site from at least 1960 to 1971; the associated "L"-shaped building was present in the central portion of the property. Potential USTs and buried building materials associated with the former structure may be present. A historical solid waste landfill may be located immediately adjacent and to the south of the Site.	S,G	S,G	S[1]	S,G		D
	RW2SB02 [3]		S,G	S,G	S[1]	S,G		D
	RW2SB03 [3]		S,G	S,G	S[1]	S,G[2]		D
	RW2SB04 [3]		S,G	S,G	S[1]	S,G		
	RW2SB05 [3]		S,G	S,G	S[1]	S,G		
724	NA	An automotive service facility operated on the site from at least 1958 until 2013. Staining and petroleum odors were noted in the southern portion of the building (original automotive service area) and a wash area was noted in the northeast corner of the building. Buried building materials from the former residence (1926 to 1958) [demolished and buried in place] may be present on the eastern portion of the site. A gas station operated at the adjoining, upgradient property to the south (710 Federal Boulevard). A furniture manufacturing and/or assembling facility operated at the adjoining, downgradient property to the north (730 Federal Boulevard). An automotive service facility on the adjoining, cross-gradient property to the east (2943 West 7th Avenue) has likely operated since the construction of the building in 1964.	Locations removed from plan (per CCOD) due to logistical issues, and spatial constraints.					

730	NA	A furniture manufacturing and/or assembly facility was present on the site from at least 1955 until circa 1995, when it was then used as an automotive service facility until 2013. Used automotive parts, a drum of used solvent, and an aboveground lift was noted in the eastern portion of the building. In addition, miscellaneous piping was noted on the northwestern exterior of the building, which may be indicative of underground storage tanks. An automotive service facility operated on the adjoining, upgradient property to the south (724 Federal Boulevard). An automotive service facility operated on the adjoining, downgradient property to the north (2970 West Severn Place). An automotive service facility operates on the adjoining, cross-gradient property to the east (see recommendation for impacts from 2943 West 7th Avenue in 724 Federal Boulevard section).	Locations removed from plan (per CCOD) due to logistical issues, and spatial constraints.					
2970	RW6SB01	An automotive repair facility operated onsite from 2000 to 2015, and for an unknown period of time during the 1960s. A scrap metal business operated at the Site from at least 1970 to 1989. Stained asphalt, stored vehicles, and 55-gallon drums were observed on the exterior. Buried building materials from the former residence (1924 to 1970s) [demolished and buried in place] may be present on the eastern portion of the property. An automotive service facility operated on the adjoining, upgradient properties to the south (724/730 Federal Boulevard). A gas station operated at upgradient property to the south (710 Federal Boulevard). Various auto repair businesses have operated at the adjoining property to the west since the 1950s (749/753/759 Federal Boulevard).	S,G	S,G	S	S,G		
	RW6SB02		S,G	S,G	S	S,G		
749, 753, 759	PE8SB01	Various auto repair businesses have operated at in this location since the 1950s.	S	S	S	S		

750	RW9SB01	The site is an active bus terminal with USTs and former automotive service/wrecking facility which had several leaking underground storage tank (LUST) events. The LUST events recorded for the bus terminal 1990 and 2001 were issued a No Further Action (NFA) letter by the Colorado Department of Labor and Employment Division of Oil and Public Safety (OPS) in June of 2012. LUSTs recorded for the wrecking company in 1992 and 1993 were issued NFA letters in January of 1993. These activities occurred on the central and eastern portion of the site; however, a groundwater plume was present extending across West 8th Avenue toward Weir Gulch.	S,G	S,G	S	S[4],G		D
2971/ 2901	NA	A photo processing facility operated on the adjoining, upgradient property to the west from 1970 to 1990. In addition, a chimney on the exterior of the building indicates the potential for the historical use of coal or fuel oil at the adjoining property (816 Federal Boulevard). An active bus terminal and active fueling station operates on the adjoining, up- to cross-gradient property to the south/southeast (750 Federal Boulevard).	Locations removed from plan (per CCOD) due to logistical issues.					
816	RW14SB02	A photo processing facility operated on the site from 1970 to 1990. In addition, a chimney was noted on the exterior of the building, and there is a potential for historical use of coal or fuel oil at the property. An active bus terminal and active fueling station operates on the adjoining, up- to cross-gradient property to the south/southeast (750 Federal Boulevard).	S,G	S,G	S	S,G		
830	RW14SB01	A photo processing facility operated on the adjoining, upgradient property to the south from 1970 to 1990. In addition, a chimney was noted on the exterior of the building (816 Federal Boulevard). An active bus terminal and active fueling station operates on the adjoining, up- to cross-gradient property to the south/southeast (750 Federal Boulevard).	S,G	S,G	S	S,G		
869	NA	Automotive repair businesses have operated at this location from at least 1969 to 2014.	No sample locations in plan					
877	NA	The on-site structure is occupied by an automotive repair facility.	No sample locations in plan					

888	RW19SB01	The site building was historically used as a photo processing facility from 1979 through the present day. The building may have previously been used as an automotive service facility. Adjoining properties to the west are comprised of automotive repair facilities that have been present since the late 1960s (869, 877, 891 Federal Boulevard). The property owner noted that the building may have previously been used as an auto shop.	S,G	S,G	S	S,G		
891	NA	An automotive repair facility operated at this location since at least 1985.	No sample locations in plan					
900	RW23SB01	900 Federal was occupied by a Truck Service Garage for an unknown period of time in the 1950s. Automotive repair businesses have operated at the adjoining properties to the west since the 1960s (891 and 903 Federal Boulevard).	S,G[2]	S,G[2]	S	S,G[2]		
903	NA	Automotive repair businesses have operated at this location from at least 1969 to the present day.	No sample locations in plan					
950	RW25SB01	An auto sales and repair business has been in operation at this parcel since at least 1989.	S,G	S,G	S	S,G		
970	RW28SB01	This parcel was used by the Standard Wrecking and Lumber Company at least during the 1950s and 1960s for lumber storage.	S,G	S,G	S	S[4],G	S	
990	RW31SB01	The site building is a retail store (Family Dollar) and the eastern portion was formerly used as an auto repair facility. The site and the property adjacent to the east (2950 West 10th Avenue) were formerly used as a lumber yard. In addition, the site may have been a former urban fill site. The adjoining property to the south is an active automotive service repair facility (950 and 970 Federal Boulevard). The adjoining property to the west (995 Federal Boulevard) is an active automotive service facility. A gasoline station historically operated at this property.	S,G[2]	S,G[2]	S	S[4],G[2]	S	D
995	RW32SB01	An auto repair business has operated at this parcel since at least 1926. A listing from 1935 identified a "City Dump" in association with this property.	S	S	S	S		

1000	NA	The site is an active gasoline station, and has operated as a gasoline station since at least 1930. A LUST event was reported for the current 7-Eleven facility in 2007; a NFA letter was issued for the facility in 2010.	No sample locations in plan
1005	NA	A gas station was located at this property in at least 1926. Sense of Healing, a marijuana dispensary and warehouse, has been located at the address since 2010.	No sample locations in plan
1200	NA	The site was developed with the Federal Auto Wrecking Company from at least 1930 to 1940. Staining of the ground was observed on the aerial photograph in the vicinity of the Site. Auto repair businesses have operated at the site from at least 1980 to the present day.	No sample locations in plan
1225	NA	Auto repair businesses have operated at the site from at least 1980 to the present day.	No sample locations in plan
1251	NA	The site formerly operated as a gas station from at least 1960 to 1979; a closed LUST event is listed for the property. The facility was granted closure by the OPS in 1997.	Locations removed from plan (per CCOD) due to logistical issues, and spatial constraints.

Notes:
[1]-PAH to be analyzed only if GRO/DRO greater than 500 mg/kg
[2]-Insufficient sample volume for analyses
[3]-Boring included two sample depths per CCOD
[4]-Includes TCLP-Lead
REC - Recognized Environmental Condition
NA - Not applicable
ROW - Right of way
S - Soil
G – Groundwater
D - Debris (subsurface building materials and/or debris)
VOCs - Volatile Organic Compounds (U.S. EPA Method 8260C)
G/DRO - Gasoline and Diesel Range Organics (U.S. EPA Method 8015c)
PAH - Polycyclic Aromatic Hydrocarbons (U.S. EPA Method 8270D SIM)
RCRA 8 - Resource Conservation and Recovery Act Eight Metals (U.S. EPA Method 6010C/7471A)
Cu/CrVI - Copper, Hexavalent Chromium (U.S. EPA Method 6020A, 7196A)
Asbestos - (U.S. EPA Method 600/R-93/116), asbestos was only sampled where suspect RACS was observed.

3. Results

3.1 Site Geology

Soil boring locations are presented on Figure 2, Pages 1 and 2; the following table provides a summary of the observed materials. Detailed boring logs are provided in Appendix D.

Table 3-1 Summary of Site Geology

Street Number	Boring ID (Figure 2)	Total Depth of Boring (feet bgs)	Soil	Urban Fill Material
			Soil Description	Depth and Description
710	RW2SB01	55.00	Lean to fat clays with intermittent layers of silt and sand	Approximately 20 to 25 feet bgs, suspect RACS at 20 to 25 feet bgs
	RW2SB02	45.00	Sand and/or silty sand with some clays	Isolated suspect RACS at 5 to 10 feet bgs
	RW2SB03	40.00	Lean to fat clays with intermittent layers of silt and sand	Approximately 0 to 5 feet bgs, suspect RACS at 0 to 5 feet bgs
	RW2SB04	45.00	Lean to fat clays with intermittent layers of silt and sand	Not observed
	RW2SB05	55.00	Lean to fat clays with intermittent layers of silt and sand with clayey sand deeper	Not observed
2970	RW6SB01	37.54	Lean to fat clays with intermittent layers of silt and sand	Not observed
	RW6SB02	37.38	Lean to fat clays with intermittent layers of silt and sand	Not observed
749, 753, and 759	PE8SB01	10.00	Silty sands and fat clay	Not observed
750	RW9SB01	32.07	Silty sands and lean clay	Approximately 4 to 25 feet bgs, confirmed trace asbestos at 7.5 feet bgs
816	RW14SB02	35.00	Fat clay with minimal amounts of lean clay	Not observed
830	RW14SB01	40.00	Fat clay with minimal amount of sand seams	Not observed
888	RW19SB01	40.00	Lean to fat clays with intermittent sand layer	Not observed
900	RW23SB01	54.96	Lean to fat clay with intermittent silty sand layers	Not observed
950	RW25SB01	63.30	Lean to fat clay with intermittent silts and sands	Not observed
970	RW28SB01	68.60	Sandy lean clay to fat clay	Approximately 0 to 20 feet bgs, suspect RACS not encountered
990	RW31SB01	63.00	Well-graded sands with lean to fat clay	Approximately 0-15 feet bgs, suspect RACS at 9-9.5 feet bgs
995	RW32SB01	25.00	Silty sands and lean clay	Not observed

Notes:
bgs - below ground surface

3.2 Site Hydrology

Pinyon installed a total of 15 groundwater monitoring wells at the Site (Figure 2, Pages 1 and 2):

- Soil boring RW2SB01 converted to groundwater well RW2GW01,
- Soil boring RW2SB02 converted to groundwater well RW2GW02,
- Soil boring RW2SB03 converted to groundwater well RW2GW03,
- Soil boring RW2SB04 converted to groundwater well RW2GW04,
- Soil boring RW2SB05 converted to groundwater well RW2GW05,
- Soil boring RW6SB01 converted to groundwater well RW6GW01,
- Soil boring RW6SB02 converted to groundwater well RW6GW02,
- Soil boring RW9SB01 converted to groundwater well RW9GW01,
- Soil boring RW14SB01 converted to groundwater well RW14GW01,
- Soil boring RW14SB02 converted to groundwater well RW14GW02,
- Soil boring RW19SB01 converted to groundwater well RW19GW01,
- Soil boring RW23SB01 converted to groundwater well RW23GW01,
- Soil boring RW25SB01 converted to groundwater well RW25GW01,
- Soil boring RW28SB01 converted to groundwater well RW28GW01, and
- Soil boring RW31SB01 converted to groundwater well RW31GW01.

Using a water level indicator, Pinyon measured groundwater to be between approximately 24 and 61 feet bgs, with the depth to groundwater generally increasing in depth (getting deeper) moving from south to north (Table 3-2). The maximum proposed depth of construction disturbance is 18 feet bgs.

On June 15, 2016, Bell Surveying Company was onsite with Pinyon to survey the tops of each well casing, along with the x,y coordinates (Appendix E). The survey data, along with the depth to water measurements, was used to create a groundwater potentiometric surface map (Figure 3).

Note that due to the layout of the corridor, the project's monitoring wells are approximately aligned on a north-south axis. This makes it difficult to evaluate groundwater flow in the east-west direction, but based on the site topography, the hydrogeologic relationship of the South Platte River which is located to the east, and information collected during the Phase I ESA reports, groundwater is likely flowing generally to the northeast.

Table 3-2 Groundwater Elevations

Street Number	Well ID (Figure 3)	Proposed depth of disturbance (feet)	Total Depth Measured in Well Casing (feet bgs)	Top of Casing Elevation (feet MSL)	Date	Depth to Groundwater (feet bgs)	Relative Groundwater Elevation (feet MSL)
710	RW2GW01	8 feet for utility relocation	55.00	5254.444	6/16/2016	39.16	5215.28
	RW2GW02		45.00	5254.363	6/16/2016	41.64	5212.72
	RW2GW03		39.55	5252.490	6/16/2016	36.74	5215.75
	RW2GW04		44.36	5252.981	6/16/2016	34.06	5218.92
	RW2GW05		54.55	5251.315	6/16/2016	33.83	5217.49
2970	RW6GW01	8 feet for utility relocation	37.57	5246.886	3/15/2016	32.44	5214.45
					5/2/2016	31.80	5215.09
					6/16/2016	31.35	5215.54
	RW6GW02		36.4	5244.996	3/15/2016	33.69	5211.31
					5/2/2016	32.58	5212.42
					6/16/2016	31.33	5213.67
749, 753, and 759	NA	8 feet for utility relocation	Soil boring only, no groundwater monitoring well				
750	RW9GW01	10 feet for utility relocation, 18 feet for signal pole installation	32.07	5238.594	3/15/2016	24.93	5213.66
					5/4/2016	23.99	5214.60
					6/16/2016	24.07	5214.52
816	RW14GW02	15 feet for utility relocation, 18 feet for signal pole installation	34.13	5238.044	5/2/2016	25.91	5212.13
					6/16/2016	25.99	5212.05
830	RW14GW01	15 feet for utility relocation, 18 feet for signal pole installation	39.59	5242.847	5/2/2016	32.59	5210.26
					6/16/2016	30.09	5212.76
888	RW19GW01	14 feet for utility relocation	39.38	5244.822	3/15/2016	33.09	5211.73
					5/2/2016	32.87	5211.95
					6/16/2016	31.78	5213.04
900	RW23GW01	10 feet for utility relocation	54.96	5247.490	3/15/2016	Dry	NA
					5/2/2016	Dry	NA
					6/16/2016	Dry	NA
950	RW25GW01	12 feet for utility relocation	62.96	5249.483	3/15/2016	61.68	5187.80
					5/2/2016	60.94	5188.54
					6/16/2016	59.86	5189.62
970	RW28GW01	12 feet for utility relocation	68.2	5248.548	3/15/2016	60.91	5187.64
					5/2/2016	60.21	5188.34
					6/16/2016	59.14	5189.41

Street Number	Well ID (Figure 3)	Proposed depth of disturbance (feet)	Total Depth Measured in Well Casing (feet bgs)	Top of Casing Elevation (feet MSL)	Date	Depth to Groundwater (feet bgs)	Relative Groundwater Elevation (feet MSL)
990	RW31GW01	14 feet for utility relocation, 13 feet for signal pole installation	60.03	5249.145	5/2/2016	Dry	NA
					6/16/2016	59.79	5189.36
995	NA	10 feet for utility relocation, 18 feet for signal pole installation	Soil boring only, no groundwater monitoring well				

Notes:
bgs - below ground surface
MSL - mean sea level
NA – not applicable

3.3 Field Screen Results

Field observations are summarized in the following table (Table 3-3). PID measurements were collected for each interval of the boring and the range measured for each soil boring is presented below. Landfill gases were measured downhole for borings at 710 Federal Blvd/RW2, 990 Federal Blvd/RW31, and 995 Federal Blvd/RW32 and included: methane (CH_4), oxygen (O_2), carbon dioxide (CO_2) in % volume; and hydrogen sulfide (H_2S) and carbon monoxide (CO) in parts per million (ppm). The methane measurements were less than action levels typically used for landfill projects; 0.5%. Four of the borings located at 710 Federal Blvd/RW2 had downhole oxygen levels less than atmospheric concentrations. The soil borings logs, which have more detailed field screening results as well as observations, can be found in Appendix D.

Table 3-3 Field Screening Summary

Street Number	Boring ID (Figure 2)	Soil Boring PID Measurement Range (PPM)	Observed Condition
710	RW2SB01	0.0 to 0.8	No staining, odor, or elevated PID measurement. Some trash observed from 20-25 ft bgs, consisting of white resinous material. Suspect RACS sampled 20-25 ft bgs. CH_4 measurement was zero. Oxygen measurement was 18.2%.
	RW2SB02	0.0 to 3.6	No staining, odor, or elevated PID measurement. Suspect RACS sampled 5-10 ft bgs. CH_4 measurement was zero. Oxygen measurement was 19.5%.
	RW2SB03	0.0 to 4.0	No staining, odor, or elevated PID measurement. Building debris observed from 0-5 ft bgs. Two suspect RACS samples at 0-5 ft bgs. CH_4 measurement was zero. Oxygen measurement was 17.6%.
	RW2SB04	0.0 to 0.6	No staining, odor, or elevated PID measurement. CH_4 measurement was zero. Oxygen measurement was 17.4%.
	RW2SB05	0.0 to 1.1	No staining, odor, or elevated PID measurement. CH_4 measurement was zero. Oxygen measurement was 17.3%.
2970	RW6SB01	0.0 to 0.7	No staining, odor, or elevated PID measurement.
	RW6SB02	5.0 to 23.3	Slight black staining with no odor from 9-9.5 ft bgs.
749, 753, and 759	PE8SB01	0.4 to 1.0	Slight black staining from 0-5 ft bgs, no odor or elevated PID measurement.
750	RW9SB01	1.2 to 14.1	Brick, light-gray cementitious material, and black coal-like debris observed from 4-15 ft bgs. Suspect RACS sampled 7.5-15 ft bgs. Brick and coal debris observed from 4-25 ft bgs.
816	RW14SB02	0.0 to 6.3	No staining, odor.
830	RW14SB01	0.5 to 6.1	Slight black staining with no odor or elevated PID measurement observed at 17 ft bgs.
888	RW19SB01	0.1 to 0.7	No staining, odor, or elevated PID measurement.
900	RW23SB01	2.6 to 15.8	No staining or odors observed.
950	RW25SB01	0.3 to 0.7	No staining, odor, or elevated PID measurement.
970	RW28SB01	1.0 to 2.0	Black staining with no odor or elevated PID measurement observed from 0-5 ft bgs. Brick, glass, plastic, and coal-like material observed from 0-20 ft bgs with organic decomposition odor.

Street Number	Boring ID (Figure 2)	Soil Boring PID Measurement Range (PPM)	Observed Condition
990	RW31SB01	0.0-0.5	Glass, brick and white cementitious debris with no odor or elevated PID measurement observed from 0-15 ft bgs. Suspect RACS sampled 9-9.5 ft bgs. CH_4 measurement was 0.1%. Oxygen measurement was 20.8%.
995	RW32SB01	0.1-0.4	Slight black staining with no odor or elevated PID measurement at 14 ft bgs. CH_4 measurement was zero. Oxygen measurement was 19.4%.

Notes:
bgs = below ground surface *PID = photoionization detector* *ppm = parts per million*

3.4 Soil Analytical Results

Soil concentrations, except for arsenic and GRO/DRO, detected in the samples were compared to the EPA May 2016 Regional Screening Levels (RSL) for residential (RRSL) and industrial soil (IRSL) (EPA, 2016). Arsenic values were compared to the Colorado Department of Public Health and Environment (CDPHE) risk management guidance value (CDPHE, 2014). GRO/DRO values were compared to the Colorado Department of Labor and Employment (CDLE) Division of Oil and Public Safety (OPS) total petroleum hydrocarbon (TPH) Threshold value (OPS, 2005). A summary of the soil analytical results is presented in Table 3-4; a table of the detected constituents is presented in Table F-1 of Appendix F; the laboratory analytical report is included as Appendix G.

Table 3-4 Soil Analytical Results Summary

Street Number	Sample ID (Figure 4)	Soil Analytical Result Summary
		Description
710	RW2SS01R (6-8)	Various metals were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.
	RW2SS01R (20-22)	
	RW2SS02R (6-8)	
	RW2SS02R (23-25)	
	RW2SS03R (6-8)	
	RW2SS03R (16-18)	
	RW2SS04R (10-12)	
	RW2SS04R (17.5-20)	
	RW2SS05R (15-17)	
	RW2SS05R (22-24)	
2970	RW6SS01	Various metals and phenanthrene were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.
	RW6SS02	Various metals, phenanthrene, and acetone were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.
749, 753, and 759	PE8SS01	Various metals and PAHs were detected at concentrations above the lab detection limit. None of the metals exceeded the EPA RRSL or IRSL, but benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected at concentrations exceeding the EPA RRSL, but less than the IRSL.
750	RW9SS01	Various metals, PAHs, DRO and acetone were detected at concentrations above the lab detection limit. None of the metals or acetone exceeded the EPA RRSL or IRSL, but benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected at concentrations exceeding the EPA RRSL, but less than the IRSL. TCLP-Lead was 0.190 milligrams per liter (mg/L), which is below the 5 mg/L standard for hazardous waste.
816	RW14SS02	Various metals, PAHs, and DRO were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL or threshold value (DRO only). None of the metals or PAH exceeded the EPA RRSL or IRSL.

Street Number	Sample ID (Figure 4)	Soil Analytical Result Summary
		Description
830	RW14SS01	Various metals, PAHs, and DRO were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL or threshold value (DRO only). None of the metals or PAHs exceeded the EPA RRSL or IRSL.
888	RW19SS01	Various metals and phenanthrene were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.
900	RW23SS01	Various metals and phenanthrene were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.
950	RW25SS01	Various metals, phenanthrene, and acetone were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL. Benzo(a)pyrene was detected at concentrations exceeding the EPA RRSL, but less than the IRSL.
970	RW28SS01	Various metals, PAHs, and DRO were detected at concentrations above the lab detection limit. Hexavalent chromium, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene were detected above the EPA RRSL, with benzo(a)pyrene also exceeding the EPA IRSL. DRO was detected at a concentration greater than the OPS "TPH threshold". TCLP-Lead was 0.292 mg/L, which is below the 5 mg/L standard for hazardous waste.
990	RW31SS01	Various metals, PAHs, and DRO were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL or threshold value (DRO only). Hexavalent chromium, lead, and benzo(a)pyrene were detected above the EPA RRSL, with lead also exceeding the EPA IRSL. TCLP was analyzed for lead. TCLP-Lead was 3.23 mg/L, which is below the 5 mg/L standard for hazardous waste.
995	RW32SS01	Various metals were detected at concentrations above the lab detection limit, but below the EPA RRSL and IRSL.

Notes:
bgs *below ground surface*
EPA *Environmental Protection Agency*
RRSL *Residential Regional Screening Level*
IRSL *Industrial Regional Screening Level*
PAH *polycyclic aromatic hydrocarbon*
mg/L *milligrams per liter*
TCLP *Toxicity Characteristic Leachate Procedure*

3.5 Groundwater Analytical Results

Monitoring wells were installed at 15 of the 17 boring locations. Wells were not installed at 749, 753, and 759 North Federal Blvd./PE8, and 995 North Federal Blvd./RW32. During the monitoring and sampling events, the wells installed at 900 and 990 North Federal, borings RW23SB01 and RW31SB01 respectively, were dry.

In the event that groundwater is encountered during construction, it may be necessary to perform dewatering activities. Analytical results were compared to the CDPHE Colorado Regulation 41, The Basic Standards for Ground Water (Groundwater Standards) (CDPHE, 2013) and the CDPHE Groundwater Protection Values Soil Cleanup Table (CDPHE, 2014a), as applicable. Additionally, groundwater sample analytical results were compared to the Colorado Regulation 31 Surface Water Standards (CDPHE, 2016a) and Colorado Regulation 38, Segment 14 Surface Water Standards (CDPHE, 2016b). Groundwater standards may be applicable if surface infiltration of pumped groundwater is allowed in the stormwater management permit.

Based on the historical and current use of the area along the project site, if dewatering activities are necessary, it may be necessary to obtain a remediation discharge permit in order to discharge to surface water (South Platte River Segment 14). In addition, CDPHE typically includes dewatering permit parameters whose concentration is at least ½ of the applicable surface water standard. A summary of the analytical results is presented in the following table (Table 3-5), a table of the detected constituents is presented in Table F-2 of Appendix F, and the laboratory analytical reports is included as Appendix G. More information can be found in the forthcoming Materials Management Plan (MMP).

Table 3-5 Groundwater Analytical Results Summary

Street Number	Sample ID (Figure 5)	Date	Groundwater Analytical Result Summary[1]
710	RW2GW01	6/16/2016	GW: Selenium was detected at 0.0501-0.0645 mg/L which exceeds the groundwater standard. Selenium from RW2GW05 was less than the groundwater standard. Barium, chromium, and lead were detected above the laboratory detection limit, but below the groundwater standards. SW: Selenium and lead detected at concentrations exceeding ½ the Segment 14 surface water standard. Barium, chromium, and lead were detected above the laboratory detection limit, but below ½ the surface water standards.
	RW2GW02	6/16/2016	
	RW2GW04	6/16/2016	
	RW2GW05	6/16/2016	
2970	RW6GW01	5/4/2016	GW: Selenium was detected at 0.031 mg/L which exceeds the groundwater standard. Arsenic, barium and chromium were detected above the laboratory detection limit, but below the groundwater standards. SW: Arsenic and selenium were detected at concentrations exceeding ½ the Segment 14 surface water standards. Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.

Street Number	Sample ID (Figure 5)	Date	Groundwater Analytical Result Summary[1]
	RW6GW02	5/4/2016	GW: Selenium was detected at 0.042 mg/L which exceeds the groundwater standard. Barium and chromium were detected above the laboratory detection limit, but below the groundwater standards. SW: Selenium was detected at concentrations exceeding ½ the Segment 14 surface water standard. Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.
749, 753, and 759	PE8SB01	NS	A well was not installed at this property; therefore, a groundwater sample was not collected.
750	RW9GW01	5/4/2016	GW: Barium and chromium were detected above the laboratory detection limit, but below the groundwater standards. SW: Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.
816	RW14GW02	5/4/2016	GW: Arsenic, barium, and chromium were detected above the laboratory detection limit, but below the groundwater standards. SW: Arsenic was detected at concentrations exceeding ½ the Segment 14 surface water standard. Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.
830	RW14GW01	5/4/2016	GW: Barium, chromium, and selenium were detected above the laboratory detection limit, but below the groundwater standards. SW: Selenium was detected at concentrations exceeding ½ the Segment 14 surface water standard. Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.
888	RW19GW01	5/4/2016	GW: Barium and chromium were detected above the laboratory detection limit, but below the groundwater standards. SW: Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.
900	RW23GW01	5/4/2016	Well was dry; unable to collect a groundwater sample.
950	RW25GW01	5/4/2016	GW: Barium, chromium, and selenium were detected above the laboratory detection limit, but below the groundwater standards. SW: Selenium was detected at concentrations exceeding ½ the Segment 14 surface water standard. Barium and chromium were detected above the laboratory detection limit, but below ½ the surface water standards.

Street Number	Sample ID (Figure 5)	Date	Groundwater Analytical Result Summary[1]
970	RW28GW01	5/4/2016	GW: Barium, chromium, and selenium were detected above the laboratory detection limit, but below the groundwater standards. Tetrachloroethylene was detected above the laboratory detection limit, but below groundwater standards. SW: Selenium was detected at concentrations exceeding ½ the Segment 14 surface water standard. Barium, chromium, and tetrachloroethylene were detected above the laboratory detection limit, but below ½ the surface water standards.
990	RW31GW01	5/4/2016	Well was dry; unable to collect a groundwater sample.
995	RW32GW01	NS	A well was not installed at this property; therefore, a groundwater sample was not collected.

Notes:
NS - not sampled
1 - Groundwater sample results are compared to the CDPHE - Water Quality Control Commission - Regulation No. 41 The Basic Standards for Ground Water. Organic compounds are compared to Table A Ground Water Organic Chemical Standards, and inorganics are compared to Table 1 Domestic Water Supply - Human Health Standards. Selenium is compared to the CDPHE Groundwater Protection Values Soil Cleanup Table because it is the more conservative value.
mg/L – milligrams per liter
GW – Discussion of concentrations compared to applicable groundwater standards
SW – Discussion of concentrations compared to applicable surface water standards

3.6 Asbestos Sampling Results

Six suspect asbestos samples from soil borings were collected and submitted for PLM analysis at Reservoirs Environmental Laboratory. The following table (Table 3-6) contains the analytical results, the laboratory analytical report is included in Appendix G.

Table 3-6 Asbestos Analytical Results

Street Number	Sample ID	Sample Interval (feet bgs)	Sample Description	Results
710	RW2SB01-DEB01	20.0 to 25.0	White resinous material	No asbestos detected
	RW2SB02-PM01	5.0 to 10.0	Gray/yellow fibrous material	No asbestos detected
	RW2SB03-ASP01	0 to 5.0	Black granular material, asphalt like	No asbestos detected
	RW2SB03-BR01	0 to 5.0	Orange brick	No asbestos detected
750	RW9SB01	7.5 to 15	White cementitious material	Trace chrysotile
990	RW31-OT01	9 to 9.5	White cementitious material	No asbestos detected

Notes:
bgs - below ground surface

3.7 Geophysical Survey Results

Pinyon contracted with Olson for geophysical surveys of two properties, 710 Federal Boulevard (RW2) and 2970 W Severn Place (RW6), to identify anomalies in the ground surface that may resemble abandoned underground storage tanks (USTs) or associated dispenser lines. The surveys were conducted on two separate dates to facilitate the project schedule. Olson utilized Time-Domain Electromagnetics (TDEM) and Vertical Gradient Magnetometry (VGM). Olson detailed these findings in an investigation report (Olson, 2016, Appendix B). The following table (Table 3-7) contains a summary of the geophysical survey results and resultant boring placement.

Table 3-7 Geophysical Survey Results

Street Number	Methods Used	Survey Discussion	Boring Placement
2970	TDEM and VGM	One large anomaly was identified on the northeast portion of the property along a concrete pad. Multiple cultural features were identified on the southwest portion of the property.	One boring/well was placed adjacent to the anomaly. One boring/well was placed near the cultural features.
710	TDEM and VGM	Six anomalies were identified throughout the property with TDEM (A-F). Two anomalies were confirmed with VGM (B,C).	One boring was placed adjacent to the largest anomaly (A) in the northwest portion of the property. One boring was placed adjacent to anomaly (E) in the central portion of the property. One boring was placed adjacent to anomaly (B) in the northeast portion of the property. One boring was placed in each the southwest and southeast portions of the property.

Notes:
TDEM Time-Domain Electromagnetics
VGM Vertical Gradient Magnetometry.

4. Conclusions and Recommendations

Pinyon has completed this Phase II ESA to support the CCOD Federal Boulevard Improvements Project. The Phase II ESA was completed to gain a better understanding of the environmental conditions associated with properties within the project area. Three environmental drilling events and two groundwater monitoring and sampling events were completed. The sampling plan was implemented to investigate the RECs identified in the Phase I ESAs (Pinyon, 2015a to 2015h). The constituents of concern for each investigated property are presented in Table 4-1 while overall Project Site conclusions are included in the text below. No further environmental investigation is planned.

Low-level metal concentrations were observed across the Project Site in soil and groundwater samples. Some of the low-level metals are likely the result of natural processes and/or mineralization. Low-levels of selenium were detected in multiple groundwater samples across the Project Site. Lead was observed at three boring locations. TCLP-lead was analyzed for the samples at RW-9, RW-28, and RW-31, with results less than the 5 mg/L standard for hazardous waste. PAHs were commonly measured in soil samples along the Project Site. DRO was detected in soil at five locations across the Project Site, with one concentration, 902 mg/kg from RW-28, exceeding the OPS TPH Threshold of 500 milligrams per kilogram. Suspect RACS samples were collected from five boring locations (six samples), spanning three properties; however, only the sample from RW-9 indicated trace asbestos.

A project-specific MMP is being developed for the entire project corridor. The MMP will be used to assist field operations, particularly construction, in preparing for identification and management of impacted soil and/or groundwater. It will also describe work activities to be completed in a manner that protects human health and the environment. Further, the MMP will help minimize potential delays, and clarify standard procedures to be implemented as needed in the event that regulated materials are encountered during construction. This Phase II ESA report will be appended to the MMP in order to provide information on the subsurface conditions within the study area. MMP constituents of concern are identified in Table 4-1. For the purposes of this Phase II, the MMP constituents of concern are defined as soil with concentrations greater than RRSLs, groundwater with concentrations that exceed groundwater standards and/or ½ of the surface water standards, and urban fill with suspected RACS.

In the event that groundwater is encountered during construction, it may be necessary to perform dewatering activities. Based on the historical and current use of the area along the project site, if dewatering activities are necessary, it may be necessary to obtain a remediation discharge permit in order to discharge to surface water (South Platte River Segment 14). These permits are issued by the Colorado Department of Public Health and Environment – Water Quality Control Division (CDPHE-WQCD) and the permit specifies allowable limitations for discharge.

Table 4-1 MMP Constituents of Concern

Street Number	Boring ID	Constituents of Concern
710	RW2SB01 RW2SB02 RW2SB03 RW2SB04 RW2SB05	*Soil*: No constituents of concern were identified *Fill*: Trash, building debris and potential RACS *Groundwater*: Selenium and lead
724	NI	-
730	NI	-
2970	RW6SB01 RW6SB02	*Soil*: No constituents of concern were identified *Fill*: Not observed *Groundwater*: Arsenic and selenium
749, 753, and 759	PE8SB01	*Soil*: Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene *Fill*: Not encountered *Groundwater*: Not sampled
750	RW9SB01	*Soil*: Benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, lead *Fill*: Building debris and confirmed RACS *Groundwater*: No constituents of concern were identified
2971/2901	NI	-
816	RW14SB02	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: Arsenic
830	RW14SB01	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: Selenium
869	NI	-
877	NI	-

Street Number	Boring ID	Constituents of Concern
888	RW19SB01	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: No constituents of concern were identified
891	NI	-
900	RW23SB01	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater*: Not sampled
903	NI	-
950	RW25SB01	*Soil*: Benzo(a)pyrene *Fill*: Not encountered *Groundwater*: Selenium
970	RW28SB01	*Soil*: Hexavalent chromium, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, diesel range organics, lead *Fill*: Building debris and potential RACS *Groundwater*: Selenium
990	RW31SB01	*Soil*: Hexavalent chromium, lead, benzo(a)pyrene *Fill*: Building debris and potential RACS *Groundwater:* Not sampled.
995	RW32SB01	*Soil*: No constituents of concern were identified *Fill*: Not encountered *Groundwater:* Not sampled.
1000	NI	-
1005	NI	-
1200	NI	-
1225	NI	-
1251	NI	-

Notes:
MMP - materials management plan
bgs - below ground surface
ppm - parts per million
NI – Not Investigated
EPA – Environmental Protection Agency
IRSL – Industrial Regional Screening Level
CCOD - City and County of Denver
PID - photoionization detector
PI - Pending Investigation
RACS - Regulated Asbestos-Contaminated Soil
RRSL – Residential Regional Screening Level
PAH – polycyclic aromatic hydrocarbons.

No further site characterization is recommended for the Project area at this time. PAH and metals impacted soil will likely be encountered during subsurface work. If encountered, USTs and potentially impacted soil should be managed in accordance with MMP requirements for each property.

The management of subsurface urban fill must be characterized and managed accordance with the CCOD's Asbestos-Contaminated Soil Management Standard Operating Procedure (CCOD, 2010) and Section 5.5 of the Colorado Solid Waste Regulations. The current wording in the SOP has been approved and complies with the substantive requirements of the regulation prior to amendment. It shall remain in effect until amended and approved and may be used to comply with the amended 5.5 Management of Regulated Asbestos Containing Soils (RACS) regulation. The contractor will ultimately be responsible for adhering to the most current version of the SOP and/or regulation.

5. Limitations

This report was prepared by Pinyon Environmental, Inc., at the request of and for the sole benefit of the City and County of Denver, or any entity controlling, controlled by, or under common control with the City and County of Denver. The conclusions and recommendations offered in this report are based on the data obtained from a limited number of samples. Soil and groundwater conditions typically vary even over short distances. Thus, the nature and extent of variations outside the subsurface investigation may not become evident except through further investigation.

This report is the exclusive and present use of the City and County of Denver, or any entity controlling, controlled by, or under common control with the City and County of Denver. Laboratory analysis has been performed for specific constituents during the course of this investigation, as described in the text. This study makes no attempt to assess constituents not searched for in the laboratory analysis.

Conclusions stated herein refer only to the specific site at the time of the investigation.

6. References

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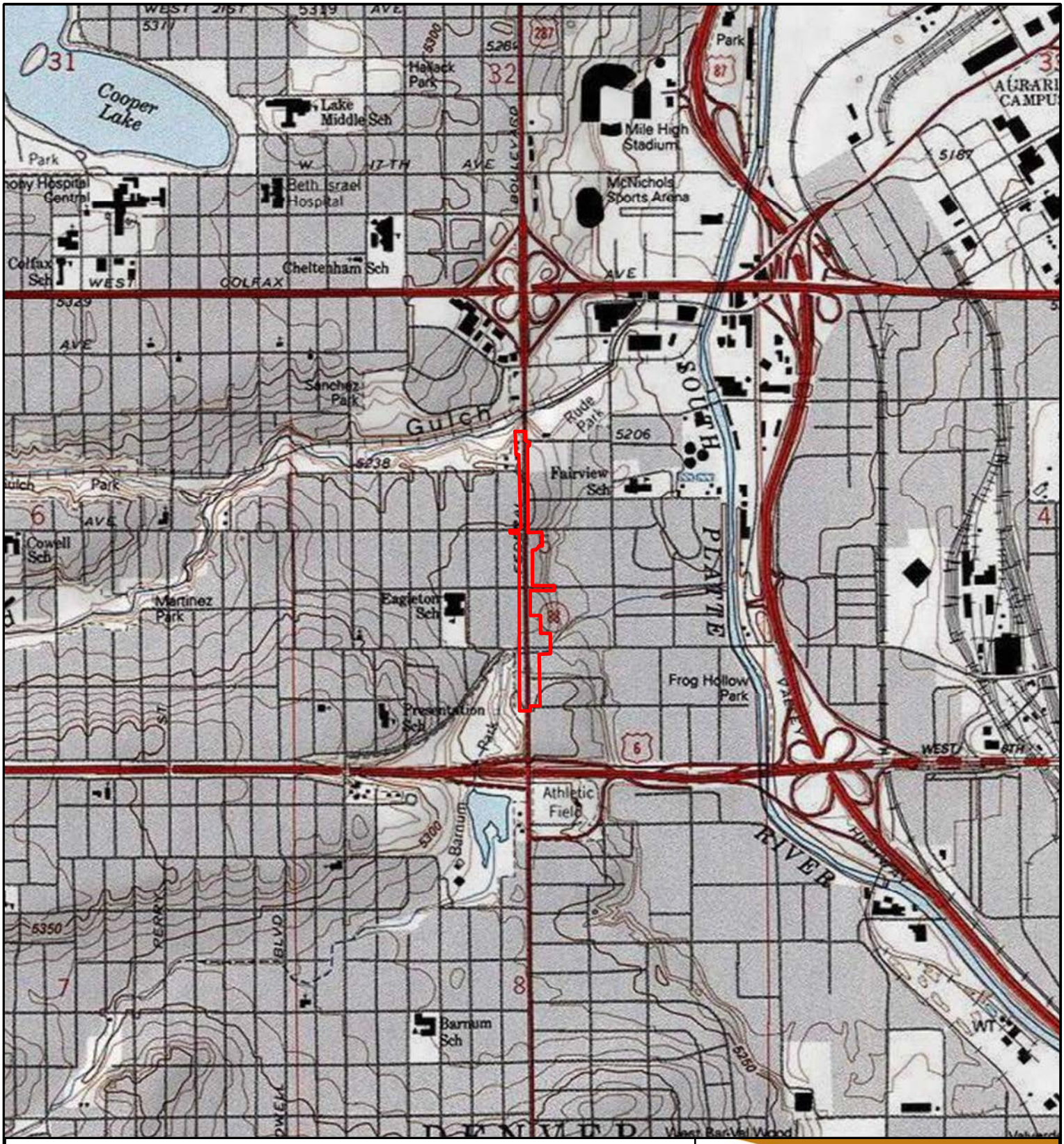
Figures



Legend

Approximate Site Boundary

N

USGS 7.5' Topographic Map
Fort Logan, Colorado 1965 (revised 1994)

0 750 1,500 Feet

Pinyon Environmental, Inc.

SITE LOCATION

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 1
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/19/2016

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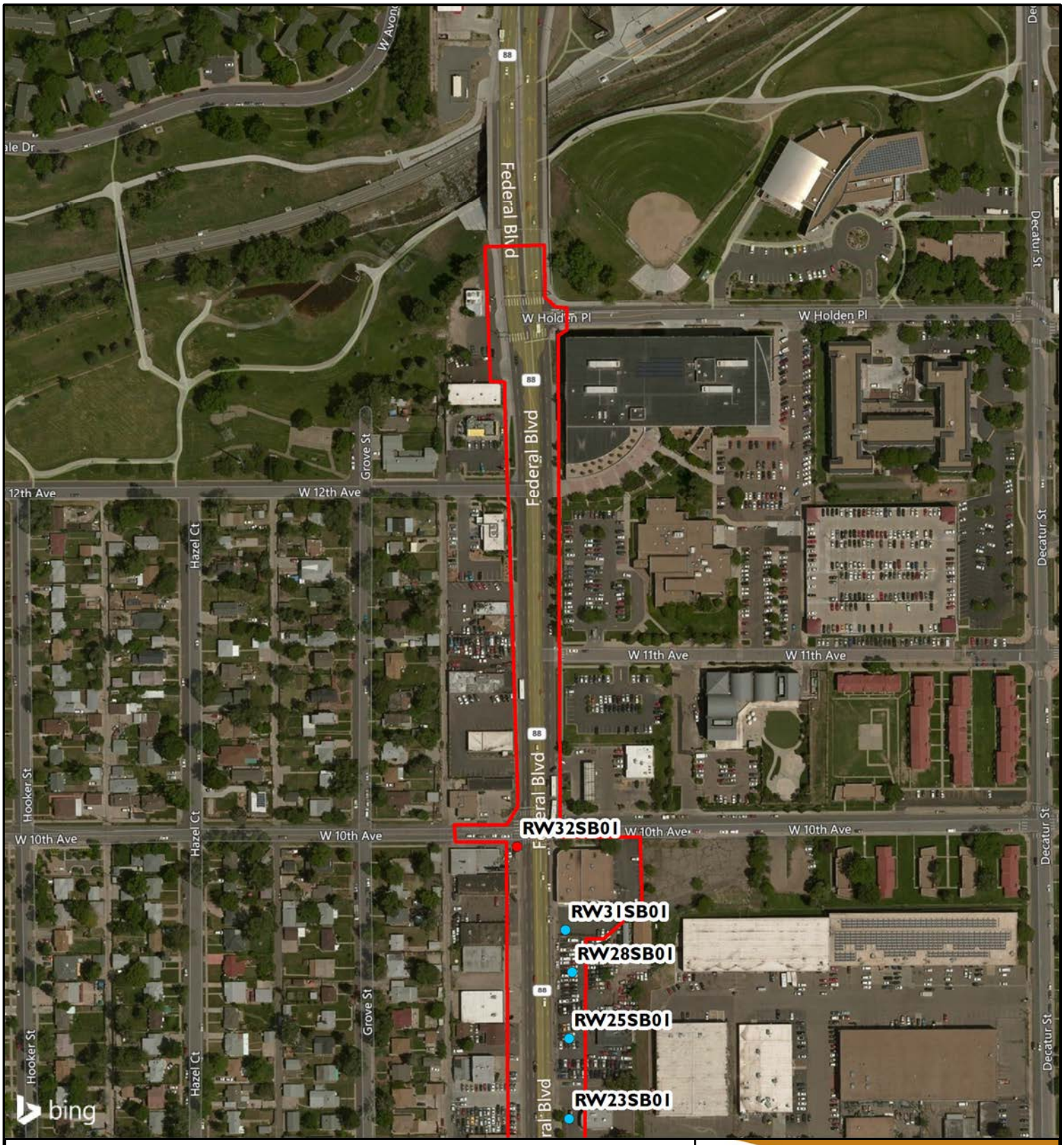

N

Legend

- Soil Boring
- Soil Boring and Monitoring Well
- Approximate Site Boundary

0 150 300 Feet

Pinyon Environmental, Inc.

SOIL BORING AND MONITORING WELL LOCATIONS

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 2 Page: 1
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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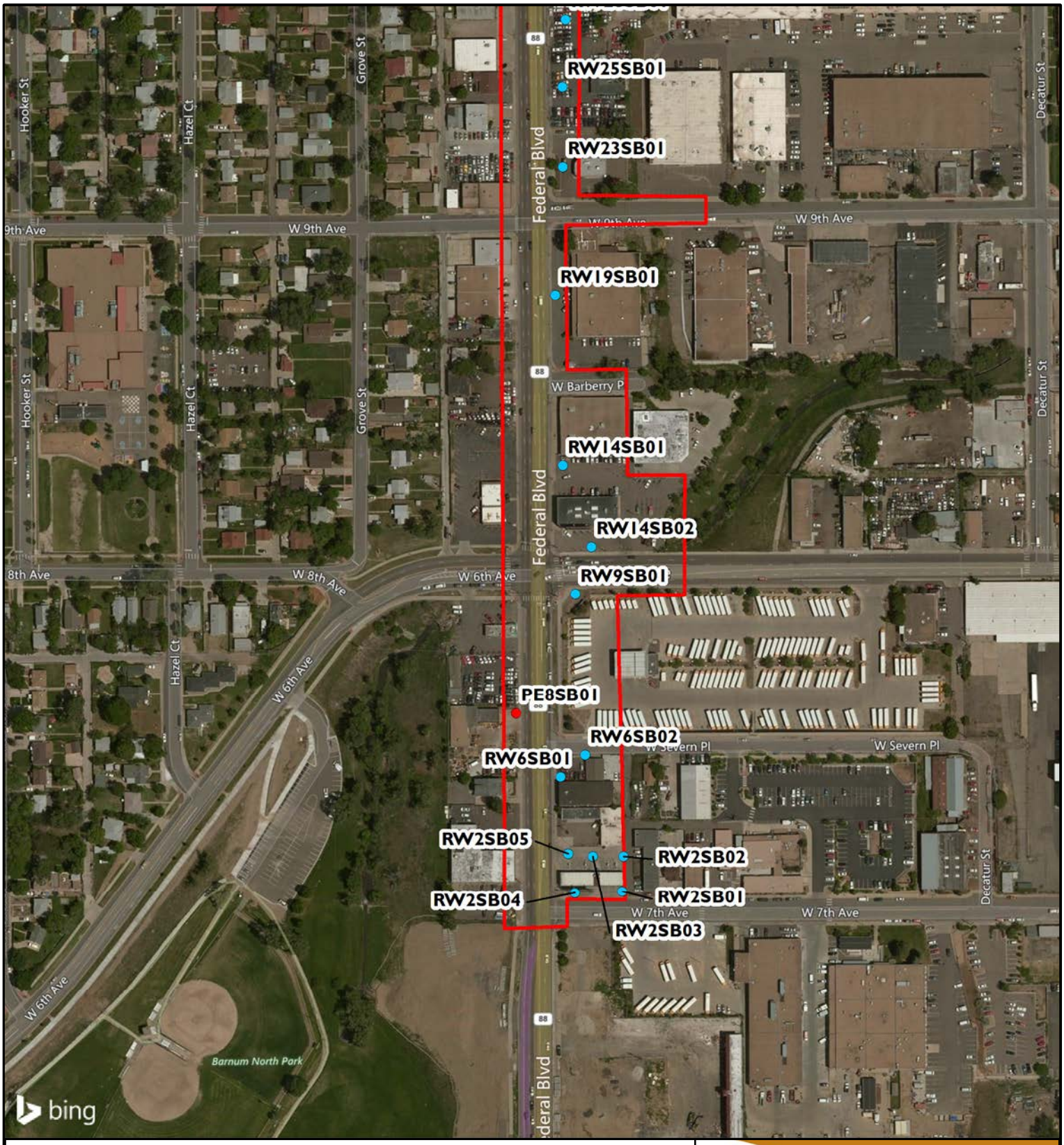

N

Legend

- Soil Boring
- Soil Boring and Monitoring Well
- Approximate Site Boundary

0 150 300 Feet

Pinyon Environmental, Inc.

SOIL BORING AND MONITORING WELL LOCATIONS

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 2 Page: 2
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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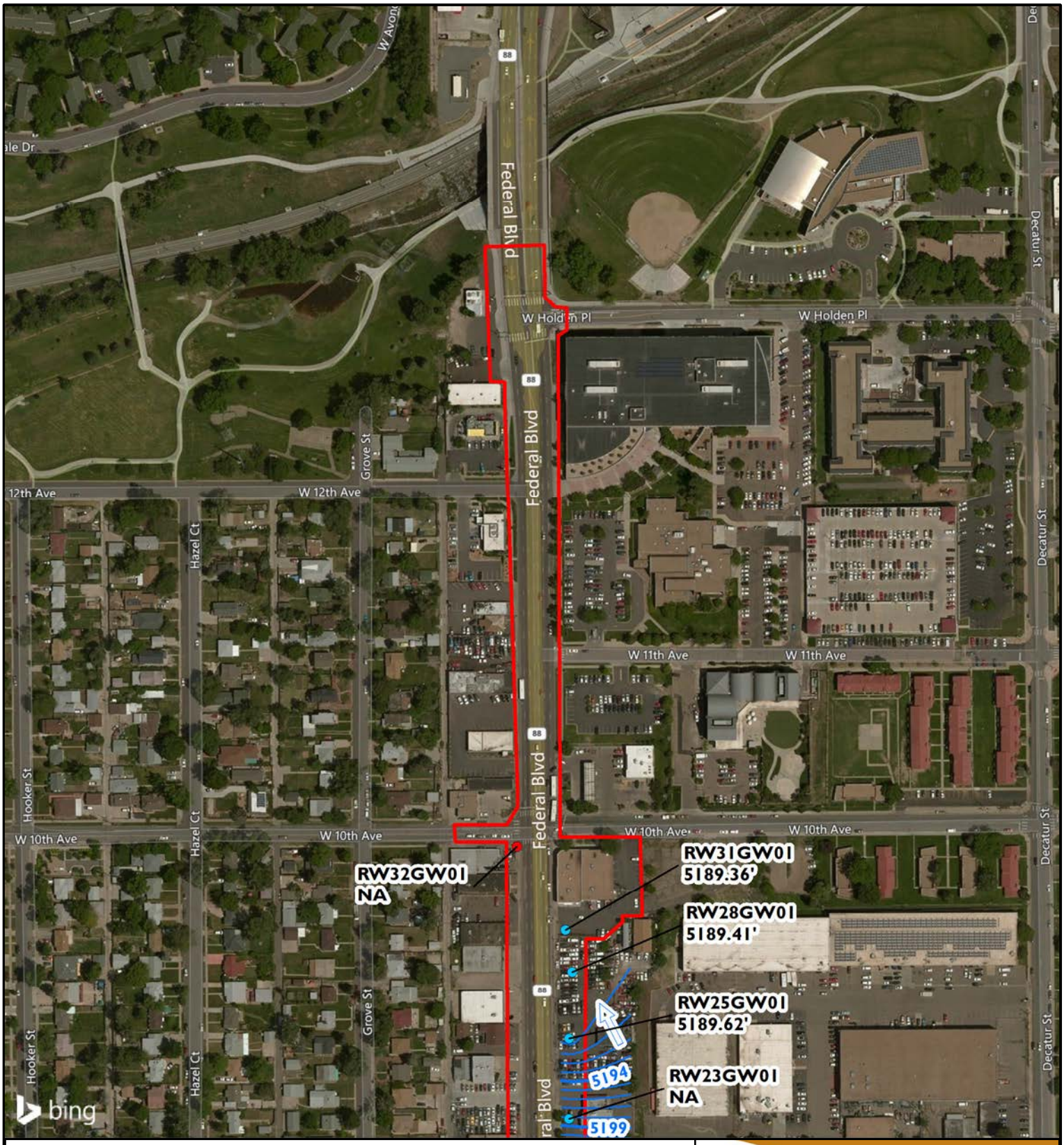

N

Legend

- Approximate Site Boundary
- Groundwater Elevation (ft)
- Approximate Groundwater Flow Direction
- Soil Boring
- Soil Boring and Monitoring Well

0 150 300 Feet

Pinyon Environmental, Inc.

GROUNDWATER ELEVATION ON 6/16/2016

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 3 Page: 1
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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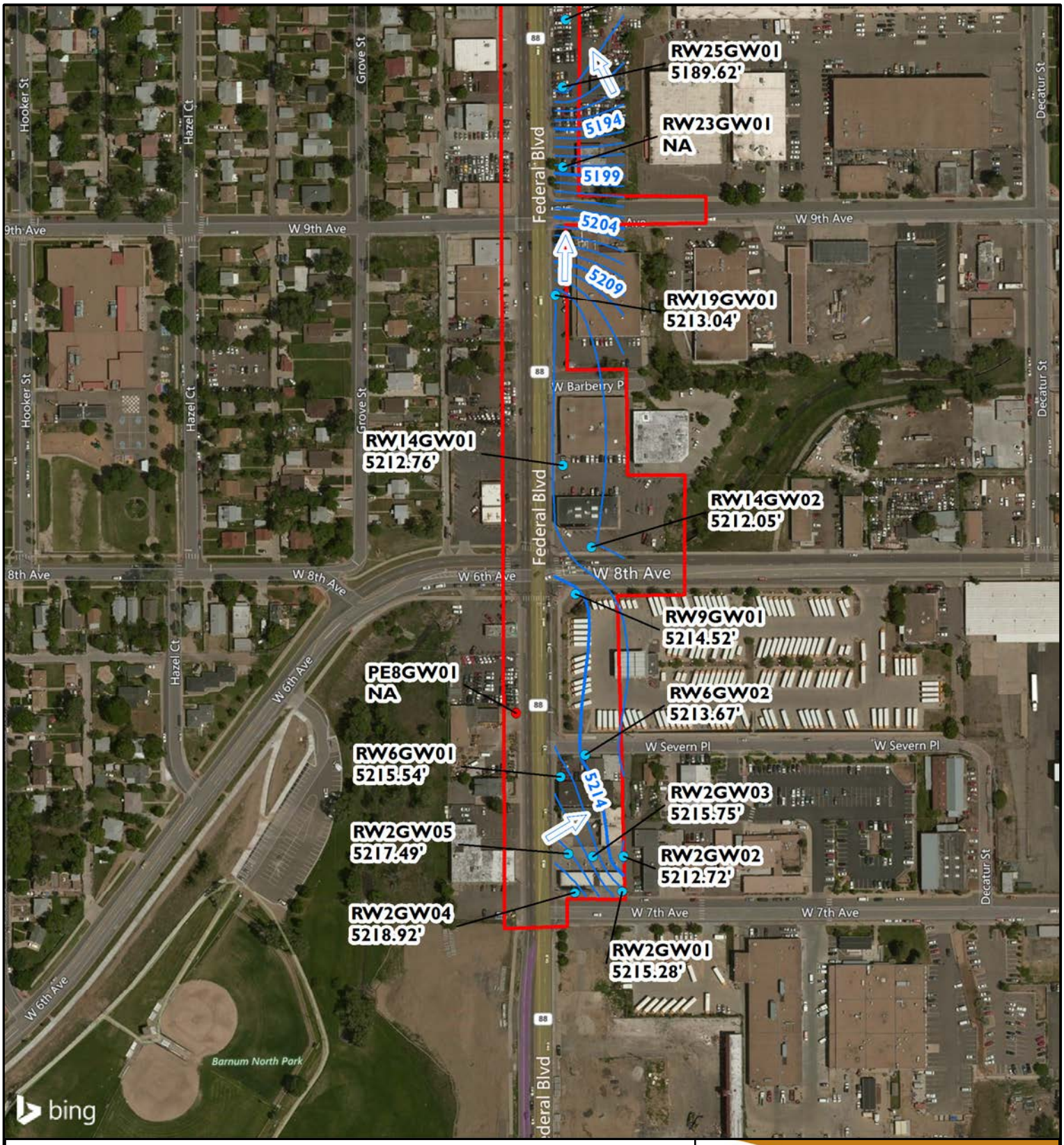

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Legend

- Approximate Site Boundary
- Groundwater Elevation (ft)
- Approximate Groundwater Flow Direction
- Soil Boring
- Soil Boring and Monitoring Well

0 150 300 Feet

Pinyon Environmental, Inc.

GROUNDWATER ELEVATION ON 6/16/2016

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 3 Page: 2
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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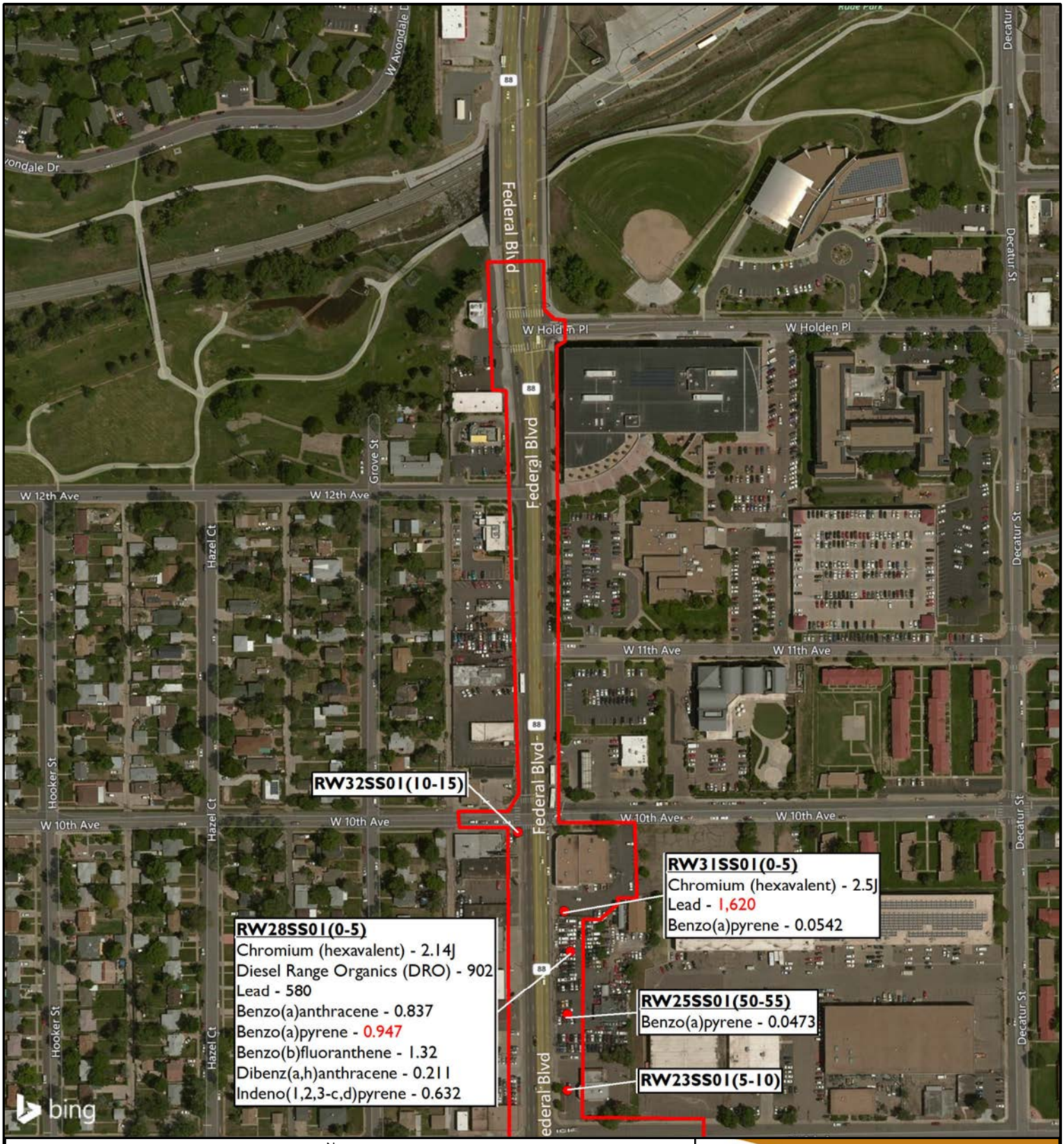

N

Legend

- Soil Sample Location
- Approximate Site Boundary

0 150 300 Feet

Notes:
(0-5) - feet below ground surface

All values are in miligrams per kilogram (mg/kg)

Black text - Value exceeds the EPA Residential Regional Screening Levels

Red text - Value exceeds the EPA Regional Screening Levels for both Residential and Industrial Soil

DRO value from Total Petroleum Hydrocarbon (TPH) Threshold Concentrations (OPS, 2005)

J - Estimated value, greater than lab detection limit, but less than reporting limit

Pinyon Environmental, Inc.

SOIL RESULTS - EXCEEDANCES ONLY

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 4 Page: 1
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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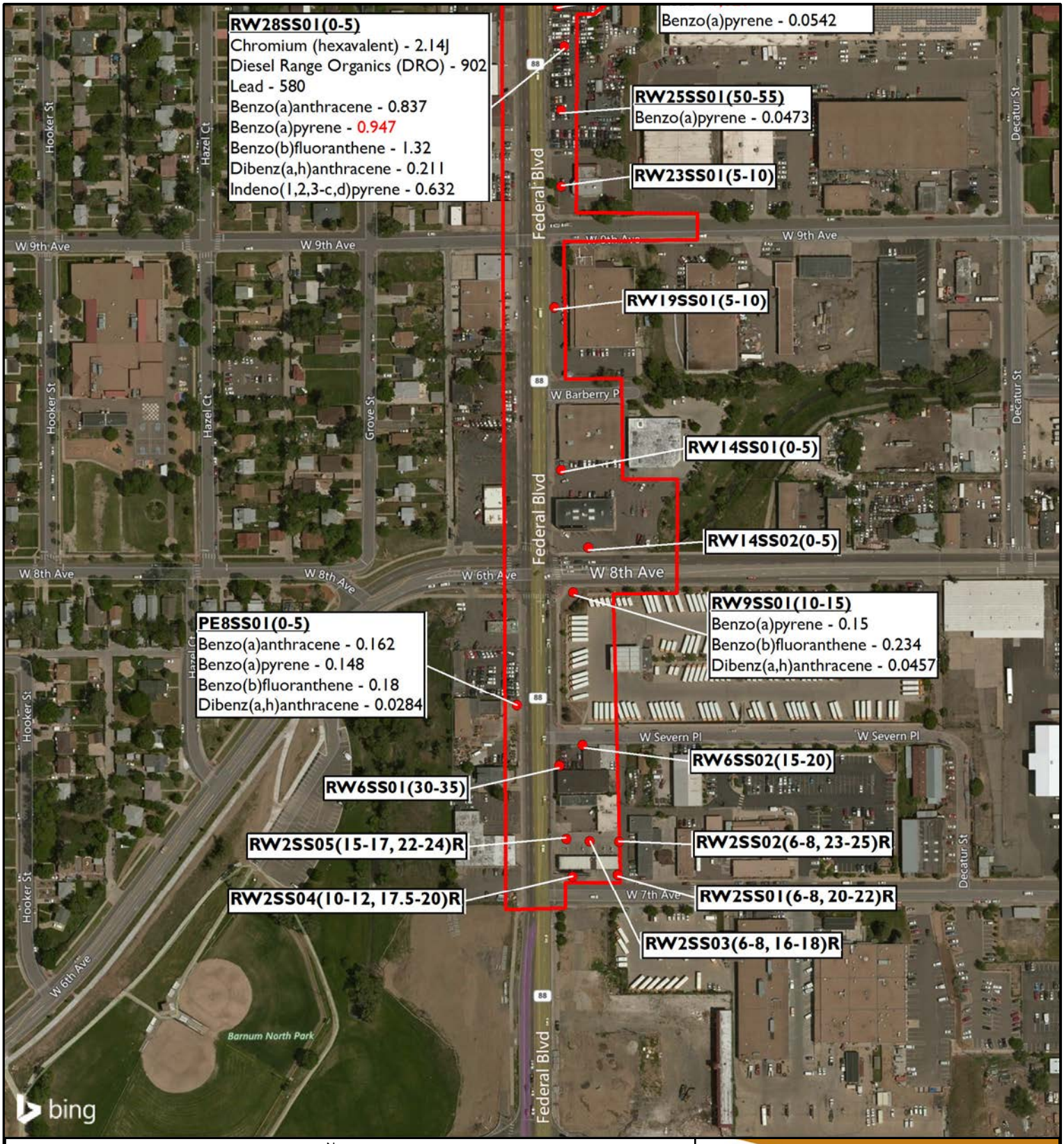

N **Legend**

- Soil Sample Location
- Approximate Site Boundary

0 150 300 Feet

Notes:
(0-5) - feet below ground surface

All values are in miligrams per kilogram (mg/kg)

Black text - Value exceeds the EPA Residential Regional Screening Levels

Red text - Value exceeds the EPA Regional Screening Levels for both Residential and Industrial Soil

DRO value from Total Petroleum Hydrocarbon (TPH) Threshold Concentrations (OPS, 2005)

J - Estimated value, greater than lab detection limit, but less than reporting limit

Pinyon Environmental, Inc.

SOIL RESULTS - EXCEEDANCES ONLY

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 4 Page: 2
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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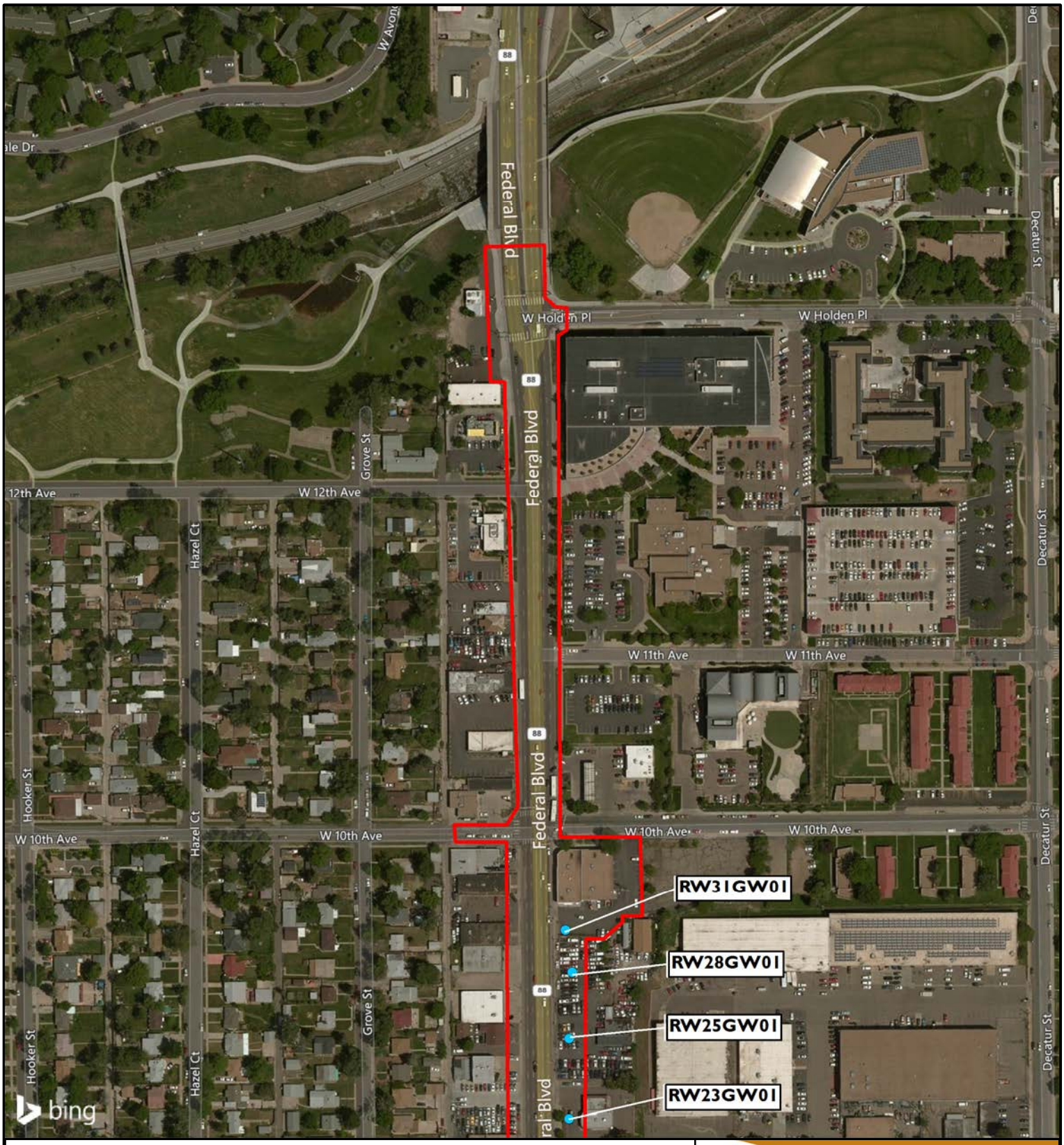

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Legend

- Groundwater Sample Location
- Approximate Site Boundary

Notes:
Value exceeds CDPHE Groundwater Protection Values Soil Cleanup Table

mg/L - miligrams per Liter

0 150 300 Feet

Pinyon Environmental, Inc.

GROUNDWATER RESULTS - EXCEEDANCES ONLY

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 5 Page: 1
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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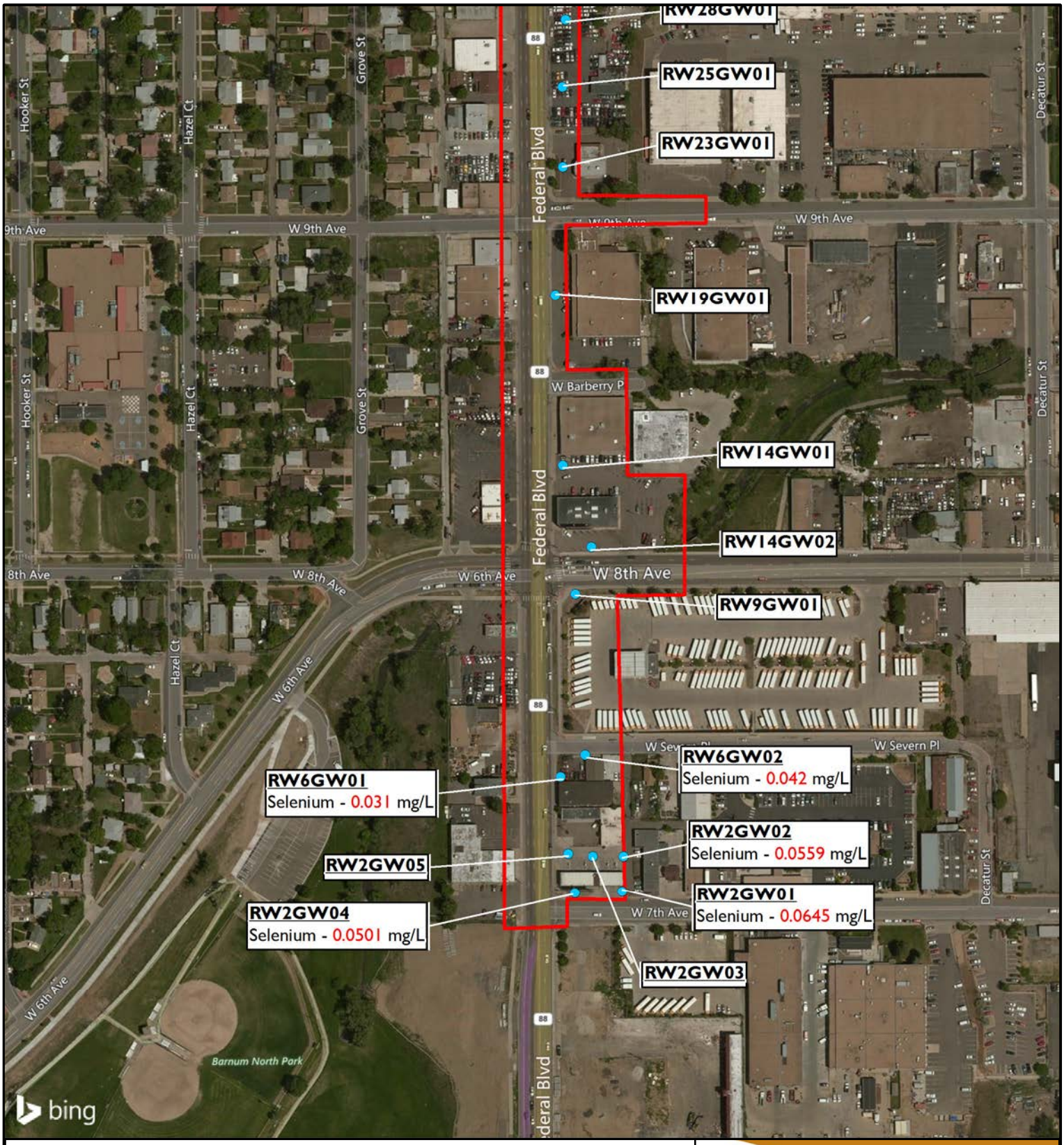

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Legend

- Groundwater Sample Location
- Approximate Site Boundary

Notes:
Value exceeds CDPHE Groundwater Protection Values Soil Cleanup Table

mg/L - miligrams per Liter

0 150 300 Feet

Pinyon Environmental, Inc.

GROUNDWATER RESULTS - EXCEEDANCES ONLY

Federal Boulevard Improvement Project
West 7th Avenue to Holden Place
Denver, Colorado

Site Location: Section 5, T 4S, R 68W, 6th Principal Meridian	Drawn By: JAF	Figure: 5 Page: 2
Pinyon Project Number: 1/16-007-02.2104	Reviewed By: TRG	Date: 7/20/2016

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Appendices

Appendix A Health and Safety Plan

Pinyon Environmental, Inc.

Corporate Headquarters
9100 West Jewell Avenue, Suite 200 Lakewood, CO 80232
TEL 303 980 5200 FAX 303 980 0089
www.pinyon-env.com

February 5, 2016

Site Specific Health and Safety Plan

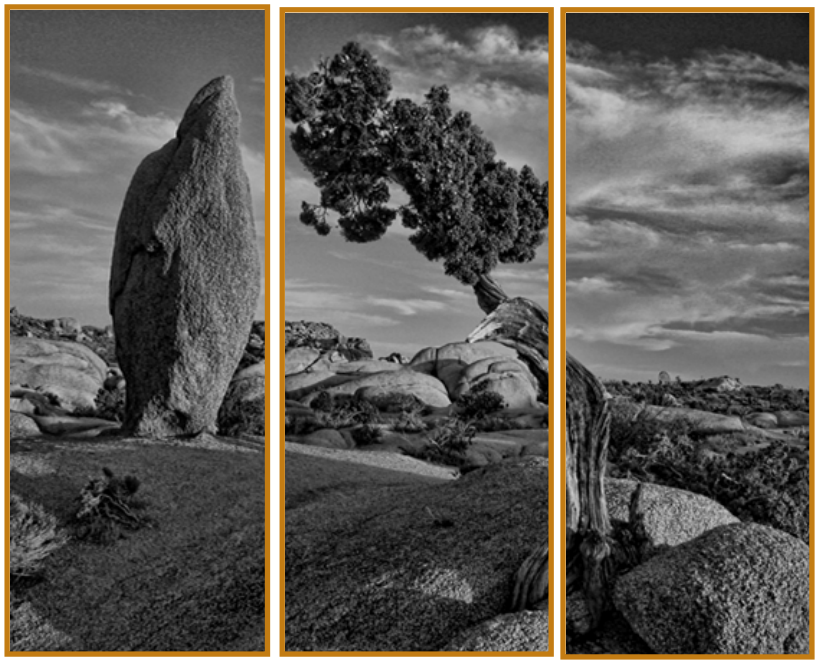
Federal Boulevard Phase II
Denver, Colorado

Prepared For:

Environmental Quality Division | Department of Environmental Health
City and County of Denver
200 West 14th Avenue, Department 310
Denver, Colorado 80204

Pinyon Project No.:

1/16-007-02.2101



Pinyon Environmental, Inc.

Corporate Headquarters
9100 West Jewell Avenue, Suite 200 Lakewood, CO 80232
TEL 303 980 5200 FAX 303 980 0089
www.pinyon-env.com

February 5, 2016

Site Specific Health and Safety Plan

Federal Boulevard Phase II
Denver, Colorado

Prepared For:

Environmental Quality Division | Department of Environmental Health
City and County of Denver
200 West 14th Avenue, Department 310
Denver, Colorado 80204

Pinyon Project No.:

1/16-007-02.2101

Prepared by:

Corinne Wardell

Reviewed by:

Russ Cirillo

Table of Contents

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Appendices

1. Introduction

1.1 General Site Information

Project Site Name: Federal Boulevard Phase II

Location: Along Federal Boulevard from West 7th Avenue to Holden Place

Project Number: 1/16-007-02.2101

1.2 Purpose of Activity

Pinyon Environmental, Inc. (Pinyon) understands that the City and County of Denver (CCoD), Department of Public Works has planned activities for improvements to Federal Boulevard including adding a third northbound lane between West 7th Avenue and West 10th Avenue, as well as upgrades to pedestrian facilities and intersections between West 7th Avenue to Holden Place. Federal Boulevard will be widened to the east in order to accommodate the additional lane capacity.

Upgrades to pedestrian facilities, intersection improvements, and utility relocations will result in partial acquisitions and temporary and permanent easements throughout the corridor (i.e., east and west sides of Federal Boulevard).

At the request of the CCoD, Pinyon completed Phase I ESA documentation for the properties that may be acquired for the project. Given the historical and current uses through the corridor, a number of recognized environmental conditions (RECs) were identified in the Phase I ESA reports. Pinyon understands that site investigations will be required to evaluate the presence and extent of RECs (if applicable) for liability protection prior to CCoD's purchase of these properties; therefore, soil and/or groundwater sampling is needed to investigate the RECs. In addition, site investigations may be necessary in order to evaluate the presence of environmental conditions or hazardous materials that may be encountered during construction activities; this will be done to guide health and safety and material management decisions, and to meet the mitigation commitments in the Environmental Assessment (EA).

Specific environmental concerns and recommendations for investigation activities in the project area are provided in Table 2 (Attachment B).

1.3 Background

In general, improvements to Federal Boulevard will include adding a third northbound lane between West 7th Avenue and West 10th Avenue, as well as upgrades to pedestrian facilities and intersections between West 7th Avenue to Holden Place. Federal Boulevard will be widened to the east in order to accommodate the additional lane capacity.

Pinyon completed Phase I ESAs for many of the project addresses prior to the Phase II ESA. Several RECs were identified and presented in the project proposal. Table 1 lists the identified RECs for each address.

Table 1 – Recognized Environmental Conditions by Address (Pinyon, 2015)

Address	Recognized Environmental Conditions
710 Federal Blvd	A gasoline station formerly operated on the site from at least 1960 to 1971; the associated "L"-shaped building was present in the central portion of the property.
	Potential USTs and buried building materials associated with the former structure may be present.
	A historical solid waste landfill may be located immediately adjacent and to the south of the Site.
724 Federal Blvd	An automotive service facility operated on the site from at least 1958 until 2013. Staining and petroleum odors were noted in the southern portion of the building (original automotive service area) and a wash area was noted in the northeast corner of the building.
	Buried building materials from the former residence (1926 to 1958) may be present on the eastern portion of the site.
	A gas station operated at the adjoining, upgradient property to the south (710 Federal Boulevard).
	A furniture manufacturing and/or assembling facility operated at the adjoining, downgradient property to the north (730 Federal Boulevard)
	An automotive service facility on the adjoining, cross-gradient property to the east (2943 West 7th Avenue) has likely operated since the construction of the building in 1964.
730 Federal Blvd	A furniture manufacturing and/or assembly facility was present on the site from at least 1955 until circa 1995, when it was then used as an automotive service facility until 2013. Used automotive parts, a drum of used solvent, and an aboveground lift was noted in the eastern portion of the building. In addition, miscellaneous piping was noted on the northwestern exterior of the building, which may be indicative of underground storage tanks.
	An automotive service facility operated on the adjoining, upgradient property to the south (724 Federal Boulevard).
	An automotive service facility operated on the adjoining, downgradient property to the north (2970 West Severn Place).
	An automotive service facility operates on the adjoining, cross-gradient property to the east (see recommendation for impacts from 2943 West 7th Avenue in 724 Federal Boulevard section).

2970 W. Severn Place	An automotive repair facility operated onsite from 2000 to 2015, and for an unknown period of time during the 1960s. A scrap metal business operated at the Site from at least 1970 to 1989. Stained asphalt, stored vehicles, and 55-gallon drums were observed on the exterior.
	Buried building materials from the former residence (1924 to 1970s) may be present on the eastern portion.
	An automotive service facility operated on the adjoining, upgradient properties to the south (724/730 Federal Boulevard).
	A gas station operated at upgradient property to the south (710 Federal Boulevard).
	Various auto repair businesses have operated at the adjoining property to the west since the 1950s (749/753/759 Federal Boulevard).
749, 753, and 759 Federal Blvd	Various auto repair businesses have operated at in this location since the 1950s.
750 Federal Blvd /2880 W. 8th Avenue	The site is an active bus terminal with USTs and former automotive service/wrecking facility which had several leaking underground storage tank (LUST) events. The LUST events recorded for the bus terminal 1990 and 2001 were issued a No Further Action (NFA) letter by the Colorado Department of Labor and Employment Division of Oil and Public Safety (OPS) in June of 2012. LUSTs recorded for the wrecking company in 1992 and 1993 were issued NFA letters in January of 1993. These activities occurred on the central and eastern portion of the site; however, a groundwater plume was present extending across West 8th Avenue toward Weir Gulch.
2971 & 2901 W. 8th Avenue	A photo processing facility operated on the adjoining, upgradient property to the west from 1970 to 1990. In addition, a chimney on the exterior of the building indicates the potential for the historical use of coal or fuel oil at the adjoining property (816 Federal Boulevard).
	An active bus terminal and active fueling station operates on the adjoining, up- to cross-gradient property to the south/southeast (750 Federal Boulevard).
816 Federal Blvd	A photo processing facility operated on the site from 1970 to 1990. In addition, a chimney was noted on the exterior of the building, and there is a potential for historical use of coal or fuel oil at the property.
	An active bus terminal and active fueling station operates on the adjoining, up- to cross-gradient property to the south/southeast (750 Federal Boulevard).
830 Federal Blvd	A photo processing facility operated on the adjoining, upgradient property to the south from 1970 to 1990. In addition, a chimney was noted on the exterior of the building (816 Federal Boulevard).

830 cont.	An active bus terminal and active fueling station operates on the adjoining, up- to cross-gradient property to the south/southeast (750 Federal Boulevard).
869 Federal Blvd	Automotive repair businesses have operated at this location from at least 1969 to 2014.
877 Federal Blvd	The on-site structure is occupied by an automotive repair facility.
888 Federal Blvd	The site building was historically used as a photo processing facility from 1979 through the present day. The building may have previously been used as an automotive service facility.
	Adjoining properties to the west are comprised of automotive repair facilities that have been present since the late 1960s (869, 877, 891 Federal Boulevard)
891 Federal Blvd	An automotive repair facility operated at this location since at least 1985.
900 Federal Blvd	900 Federal was occupied by a Truck Service Garage for an unknown period of time in the 1950s.
	Automotive repair businesses have operated at the adjoining properties to the west since the 1960s (891 and 903 Federal Boulevard).
903 Federal Blvd	Automotive repair businesses have operated at this location from at least 1969 to the present day.
950 Federal Blvd	An auto sales and repair business has been in operation at this parcel since at least 1989.
970 Federal Blvd	This parcel was used by the Standard Wrecking and Lumber Company at least during the 1950s and 1960s for lumber storage.
990 Federal Blvd	The site building is a retail store (Family Dollar) and the eastern portion was formerly used as an auto repair facility.
	The site and the property adjacent to the east (2950 West 10th Avenue) were formerly used as a lumber yard. In addition, the site may have been a former urban fill site.
	The adjoining property to the south is an active automotive service repair facility (950 and 970 Federal Boulevard).
	The adjoining property to the west (995 Federal Boulevard) is an active automotive service facility. A gasoline station historically operated at this property.
995 Federal Blvd	An auto repair business has operated at this parcel since at least 1926. A listing from 1935 identified a "City Dump" in association with this property.

1000 Federal Blvd	The site is an active gasoline station, and has operated as a gasoline station since at least 1930. A LUST event was reported for the current 7-Eleven facility in 2007; a NFA letter was issued for the facility in 2010.
1005 Federal Blvd	A gas station was located at this property in at least 1926. Sense of Healing, a marijuana dispensary and warehouse, has been located at the address since 2010.
1200 Federal Blvd	The site was developed with the Federal Auto Wrecking Company from at least 1930 to 1940. Staining of the ground was observed on the aerial photograph in the vicinity of the Site.
	Auto repair businesses have operated at the adjoining property to the west from at least 1980 to the present day.
1225 Federal Blvd	Auto repair businesses have operated at the site from at least 1980 to the present day.
1251 Federal Blvd	The site formerly operated as a gas station from at least 1960 to 1979; a closed LUST event is listed for the property. The facility was granted closure by the OPS in 1997.

1.4 Description of Activities

Pinyon has been tasked with investigating the environmental conditions in the project corridor. The particular onsite activities involved in the investigation are described below, the description of activities is limited to those that could potentially place personnel in the way of worksite hazards or in contact with hazardous substances.

Task 1 and Task 2 - Subsurface Investigation Planning and Utility Clearance and GPR

Prior to initiating site investigation activities, Pinyon will attend a preliminary project meeting and/or site visit with CCoD to review access, investigation activities, sample locations, and site-specific protocols. Pinyon will negotiate access with applicable property owners prior to the meeting; Pinyon will be responsible for signing access agreements with property owners. Proposed locations for several borings and/or groundwater monitoring wells will be marked with paint during the preliminary site visit; however, up to six borings locations are contingent on the geophysical survey results (see below).

Following the preliminary project meeting, the following services will be completed:

- Pinyon will contact the Utility Notification Center of Colorado to mark public buried underground utilities in the project area.

- Pinyon will retain Olson Engineering, Inc. (Olson), to complete a geophysical survey (i.e., ground penetrating radar or electromagnetic locating) to evaluate the potential presence of underground storage tanks and associated piping on 710 Federal Boulevard, and 730 Federal Boulevard/2970 West Severn Place, as identified in Table 1. Olson will prepare a letter report summarizing site conditions and

findings of the geophysical survey, which will be used by Pinyon to evaluate additional soil borings and locations on the above-referenced properties.

- Pinyon will also complete a Notice of Intent to Construct Monitoring Hole(s) application with the Colorado Division of Water Resources. Pinyon assumes that one notice will be needed for each discrete property that intersects groundwater (eight total); notification is not required for each individual well.

- Pinyon will retain Underground Consulting Services, LLC (UCS), a private utility locator, to identify private utilities for investigation activities at the following properties: 710, 724, 730, 816, 830, and 990 Federal Boulevard, and 2970 West Severn Place. These properties were selected for private utility locates due to the higher likelihood that they would have private utilities (e.g., for light poles).

Task 3 - Subsurface Investigation

Field investigations will include the completion of soil borings and installation of semi-permanent monitoring wells for a number of properties in the corridor, as outlined in Table 1. The general scope of work for investigation activities and methodologies is provided below. For properties where an on-site REC has been identified, soil and groundwater will be evaluated. Soil borings will also be advanced to obtain information for materials management purposes. The depth of these borings is based on the proposed construction activities (i.e., utility work, sidewalk upgrades, and signal improvements). Pinyon will coordinate with property owners for access, including right-of-entry and logistical access for investigation activities (e.g., removal of stored materials, vehicles); Pinyon would sign access agreements.

Task 3a - Soil Borings

Pinyon will advance a total of 28 soil borings be completed throughout the project area. A total of 22 of these borings will be converted into semi-permanent monitoring wells in order to evaluate RECs and ownership liability risk (see Task 3b - Monitoring Wells, below). Final termination depths will depend on site conditions observed at the time of soil boring advancement. Boring locations may be modified based on the locations of underground utilities and at the request of CCD. Note that an additional seven interior soil borings are included in the "Optional Task 5", and are not included as part of this task given that it is unknown if those parcels will be full acquisitions.

The proposed locations were selected based on the RECs identified during the Phase I ESAs, in conjunction with the proposed construction activities. In areas with adjoining property RECs, the boring locations were placed in order to sufficiently obtain data for both properties (e.g., a downgradient well for property A is the upgradient well for property B).

- The soil borings being converted into semi-permanent monitoring wells will be advanced to total depths of five feet below the groundwater interface (or to the depths specified in Table 1), or refusal, whichever is first. Based on available information, Pinyon understands groundwater ranges from 17 to 30 feet bgs in the vicinity of West 8th, and 49 to 58 feet in the vicinity of the "7-Eleven" on the northern portion of the project area. If groundwater is not encountered at 63 feet or the interface with bedrock, the boring will be terminated. Pinyon will sub-contract Vista GeoScience (Vista) to complete the proposed activities using a direct-push drilling rig.

  Note: it is possible that direct-push methods may not achieve target depths, particularly at those locations with the deeper depth to groundwater. Auger techniques may be required if direct-push methods are not successful.

- Following sample collection, soil borings not being converted into semi-permanent monitoring wells will be backfilled with bentonite chips and returned to original ground surface condition.

- Before and after each boring is complete, all reusable equipment that has come into contact with potentially contaminated soil will be decontaminated. Decontamination procedures will consist of scrubbing equipment with a brush and soapy (Liquinox® or equivalent) water in a first bucket, followed by rinsing equipment with clean tap water in a second bucket, and a final clean tap water rinse.

- Investigation derived waste (IDW) consisting of soil, groundwater and decontamination water will be stored on-site in appropriately labeled drums pending analytical results of the samples submitted to the laboratory. If the results are below regulatory action limits, the corresponding material will be thin spread at the Site. Non-hazardous IDW soil will be transported and disposed at the Denver Arapahoe Disposal Site (DADS) if analytical results indicate that soil concentrations exceed applicable residential standards. EQ will handle waste profiling and manifest preparation for IDW soil. For the purpose of cost estimating, three drums (1-soil and 2-groundwater) of IDW will be assumed to be generated during the Phase II field activities.

- The soil borings will be drilled using direct-push techniques. Soil samples will be collected in plastic sleeves, on a continuous basis. The soil core will be visually described according to the Unified Soil Classification System. Information regarding subsurface conditions will be recorded on a boring log.

- Soil samples collected during drilling will be field screened for non-specific volatile organic compounds (VOCs) using a photoionization detector (PID) and the headspace technique. Pinyon will use a PID equipped with a 10.6 eV lamp to ensure the soil contaminants of concern are identifiable by the instrument. In the headspace technique, a portion of the soil sample is placed in a "zip-lock" bag, which is sealed and placed in a warm area to promote volatilization. After a period of time, the PID is inserted into the headspace of the bag, and a reading is obtained. This reading will be recorded on the boring log.

- One soil sample will be selected from each soil boring for laboratory analysis. The soil sample selected for laboratory analysis will be either the sample with the highest headspace reading, exhibits notable visual or olfactory impacts (i.e., "looks bad, smells bad"), or the sample collected from just above the groundwater interface.

Task 3b – Monitoring Wells

A total of 20 soil borings will be converted into semi-permanent groundwater wells in order to evaluate groundwater conditions in the project area. Pinyon assumes the development, sampling, surveying, and abandonment of groundwater monitoring wells will be completed over three days of field work.

- After drilling activities, Vista will construct a semi-permanent groundwater monitoring well in each boring. An appropriate length of one-inch diameter factory-slotted polyvinyl chloride (PVC) screen (e.g., 10 feet) will be placed in the bottom of the boring, and blank casing will be threaded onto the screen and extended to the ground surface or slightly above ground surface. At each location, the wells will be completed with 10/20 silica sand from the bottom of the boring to two feet above the top of the screen, and the remainder of the annulus will be filled with hydrated bentonite. As the wells will be semi-temporary, traffic covers will not be installed, but rather the PVC will be capped flush with the pavement and the bentonite seal extended to the surface.

- Following installation, the depth to water and the total depth of each well will be measured with an electric water level indicator. Each well will be purged using either a foot-valve pump or a disposable bailer of five well volumes to remove residual fine sediment from the drilling process (well development)

and to facilitate a good connection between the groundwater in the annular space of the well and the aquifer surrounding the well.

- Following development, a groundwater sample will be obtained from each of the wells. Groundwater quality parameters will be monitored and recorded (pH, conductivity and dissolved oxygen), and after stabilization, groundwater samples will be collected. Based on depth to groundwater, purging and sampling may be completed by using disposable polyethylene tubing and a peristaltic pump (groundwater less than 20 feet bgs) or stainless-steel foot valve (groundwater deeper than 20 feet bgs).

- The locations of all well casings will be surveyed using a hand-held global position system (GPS), and the elevations of the tops of well casings will be surveyed to a relative benchmark by a licensed surveyor, Bell Surveying Company. These data, along with the depth to groundwater data, will be utilized to evaluate groundwater-flow direction (utilizing contouring software).

Task 4 – Groundwater Well Abandonment

All groundwater monitoring wells will remain in place after groundwater sampling, and will be abandoned at a later date, as requested by CCD DEH personnel, under a separate mobilization. The wells will be abandoned in accordance with the Colorado State Engineer's Office rules and reporting requirements.

Task 5 - Reporting

A report will be prepared outlining the work performed and the data obtained. Conclusions regarding the potential for subsurface contamination at the site will be provided. If necessary, recommendations regarding future work will also be included.

Optional Task 6 – Interior Soil Borings

Soil borings on the interior of buildings will be advanced using a dolly-mounted direct-push drill rig. Private locates will be included in the interior spaces; these costs have been included with the associated fee. Further, after concrete coring, hand augering up to three feet below the ground surface will be conducted with decontaminated tooling to verify utility clearance. The proposed locations were selected based on the RECs identified during the Phase I ESAs. Following sample collection, soil borings not being converted into semi-permanent monitoring wells will be backfilled with bentonite chips and returned to original ground surface condition.

Optional Task 7 - Additional Mobilization

Depending on the accessibility to the project area, there is a potential that additional mobilization(s) may be required to complete the above-referenced scope of work. Therefore, Pinyon recommends that a contingency of 10 % be included with this project funding to be used only as needed and with prior approval.

2. Site-Specific Information

2.1 Current Conditions at the Site

The project Site includes 24 properties, with multiple owners. Sixteen of these properties have subsurface investigation planned at the property. As discussed above, there are a number of RECs associated with past/current businesses/activities at the various addresses.

Based upon a review of the topographic maps, the groundwater-floor direction is expected to be to the east-northeast out of the project area, and the depth to groundwater is anticipated to vary considerably. Groundwater was encountered at 17 and 30 feet below ground surface (bgs) in borings drilled on West 8th Avenue in the vicinity of the Weir Gulch. A review of available regulatory files indicates that groundwater was present at a depth of 49 to 58 feet in the vicinity of the "7-Eleven" on the northern portion of the project area; during investigations at 2800 West 8th Avenue, groundwater was encountered at 25 to 30 feet.

2.2 Type of Site

The Site is located along a busy urban roadway, Federal Boulevard from West 7th Avenue to West Holden Place in Denver, Colorado. Businesses located at the properties included in the investigation area include auto service, sales and fuel stations, marijuana dispensary, Denver Public Schools bus yard, photo printmakers, and retail stores. Additionally, a historic city dump was reportedly present at one of the properties and south of another. Potential specific contaminants and hazards may include:

- Methane
- ACM
- Heavy metals, including arsenic and lead, hexavalent chromium and copper. Others may also be present.
- Organic constituents, such as chlorinated solvents and petroleum, gasoline and diesel range organics.
- PCBs
- PAHs

3. Potential Health and Safety Hazards

The Site contains several safety hazards, as identified below. A discussion of each of the identified hazards is provided in Sections 3.1 through 3.10.

- ☒ Heat (High Ambient Temperature)
- ☒ Cold
- ☒ Noise
- ☐ Oxygen Depletion
- ☐ Asphyxiation
- ☐ Excavation
- ☒ Falls, Trips, Slipping
- ☒ Handling and Transfer of Petroleum Products or Other Chemicals of Concern
- ☒ Flammable Characteristics
- ☒ Heavy Equipment
- ☐ General Construction
- ☒ Physical Injury and Trauma
- ☐ Electrical Hazards
- ☐ Confined Space Entry
- ☒ Traffic
- ☒ Inhalation of Vapors
- ☐ Biological Hazards
- ☐ Gamma Radiation
- ☒ Methane

3.1 Heat

Heat stress is a major hazard, especially for workers wearing protective clothing. The same protective materials that shield the body from chemical exposure also limit the dissipation of body heat and moisture. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly - within as little as 15 minutes. In its early stages, heat stress can cause rashes, cramps, discomfort and drowsiness, resulting in impaired functional ability that threatens the safety of both the individual and co-workers. Continued heat stress can lead to heat stroke and death.

A "hot environment" is defined as "any combination of air temperature, humidity, radiant heat and windspeed that exceeds a wet bulb globe temperature (WBGT) of 79 °F (26 °C)." When this temperature is exceeded, then work practices shall be altered to include periods of rest, regular breaks, provision for salt and water intake, and protective clothing. Water shall be made available to all personnel; personnel should wear light cotton clothing. If the ambient temperature is expected to meet or exceed 80 °F, then provisions must be made for a WBGT measurement.

Permissible Heat Exposure Threshold Limit Values WBGT (°F)				
Work Load (BTU/hr)	Continuous Work	Work Rest Regimen		
		75% Work	50% Work	25% Work
		25% Rest	50% Work	75% Rest
		each hour	each hour	each hour
Light (800)	86.0	87.1	88.5	90.0
Medium (1400)	80.1	82.4	84.9	88.0
Heavy (2000)	77.0	78.6	82.2	86.0

Notes: WBGT - Wet Bulb Globe Temperature

3.2 Cold

A cold environment can result in hypothermia. Hypothermia results when the body loses heat faster than it can be produced. The first symptom of heat loss is reduced blood flow to the hand and feet. Continued heat loss results in shivering, the first real sign of hypothermia. Subsequent symptoms include speech difficulty, forgetfulness, loss of manual dexterity, collapse, and death. The body loses heat more rapidly with air movement across the body (windchill). To protect the body from cold environments, layers of clothing should be worn. The dead air space created between clothing layers creates layers of insulation. A windproof shell should be worn outside the clothing to protect against wind. The clothing should also allow some venting of perspiration; wet skin loses heat more rapidly than dry skin. Personnel should eat snacks frequently when working outside, and warm liquids (not coffee) can also protect the body.

3.3 Noise

The noise level of the equipment used during this work effort may exceed the OSHA action level of 85 decibels. The use of hearing protection will be required when working power tools (e.g., drills, saws), or near heavy equipment.

3.4 Excavation

Each excavation or trench generally deeper than five feet (5') must be supported to avoid trench failure, or sloped accordingly. Each situation must be evaluated independently, and consider the trench geometry and soil material. **No Pinyon employee is authorized to enter into an unsupported trench or excavation deeper than five feet.** OSHA regulation requires that a protective system be provided for workers unless excavations are made in entirely stable rock, or excavations are less than five feet in depth, and an examination by competent person provided no indication of a potential cave-in. The protective system can be sloping or bracing. These systems provide failure protection on the sides of the excavation. These systems must be designed following OSHA guidelines. One option is to slope the sides of the excavation to an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal). The other system that can provide protection for the worker is the trench box. This does not prevent failure of the trench but does protect the worker if the worker is in the box when the trench fails. When working in areas where there is a back-filled trench, a railroad, a highway, or another source of vibration or unstable condition, additional precautions must be taken in order to properly shore and brace the excavation.

Another design method, which can be applied for both sloping and shoring, involves using tabulated data, such as tables and charts, approved by a registered professional engineer. This data must be in writing and must include sufficient explanatory information to enable the user to make a selection, including the criteria for determining the selection, and the limits on the use of the data.

At least one copy of the information, including the identity of the registered professional engineer who approved the data, must be kept at the work-site during construction of the protective system. Upon completion of the system the data may be stored away from the job site, but a copy must be made available, upon request, to the OSHA.

When bracing systems are used as support, they must be installed from the top down and removed from the bottom up. As part of the safety audit, the stability of the bracing systems must be checked. In addition, all bracing systems must be checked after each rain and when use is discontinued for over 48 hours (e.g., use following a weekend).

All excavated or fill materials must be placed a minimum of two feet away from the top edge of the trench. If materials need to be placed closer than two feet from the edge of the trench, an effective barrier to prevent the material from falling into the excavation must be constructed.

Excavations must be fenced and barricaded when not in use.

NOTE: Detailed site specific plans and specifications will be required for each site requiring trenching.

3.5 Trips, Slips, and Falls

Numerous safety hazards may be present at the Site, which could potentially cause an injury. Potential safety hazards include:

- Holes or ditches
- Sharp objects, such as nails, metal shards, or broken glass
- Slippery surfaces
- Unstable surfaces
- Uneven terrain

Workers should be aware of their surroundings at all times, to avoid such injuries. Some safety hazards are a function of the work itself. For example, heavy equipment creates an additional hazard for workers in the vicinity of the operating equipment. Protective equipment can impair a worker's agility, hearing, communication, resulting in an increased risk of an accident. Accidents involving physical hazards can directly injure workers, and may also create a secondary hazard, such as increased risk of chemical exposure due to damaged protective equipment.

3.6 Handling and Transfer of Petroleum Products or Other Chemicals of Concern

Chemicals of concern which may potentially be encountered in the subsurface during the investigation include the following:

- ACM
- Heavy metals, including arsenic and lead, hexavalent chromium and copper. Others may also be present.
- Organic constituents, such as chlorinated solvents and petroleum, gasoline and diesel range organics.
- PCBs
- PAHs

3.7 Flammable Characteristics

Flash point is defined as the minimum temperature at which a substance produces sufficient flammable vapors to support a flame when an ignition source is present. An ignition source could be the spark from static electricity, an electrical tool or a wayward cigarette. The relative flammability of a substance is based on its flash point. Note: It is not the liquid but the vapor above it which actually burns. **No Smoking is permitted at the work-site.**

Flash Point/Flammability Relation

- Highly flammable - Flash point <100 °F
- Moderately flammable - Flash point >100 °F but <200 °F
- Relatively inflammable - Flash point >200 °F

3.8 Heavy Equipment/Physical Injury and Trauma

Equipment used at the Site will include drill rigs for advancement of soil borings, and various hand tools such as shovels, pipe wrenches, or hammers. Potential injuries may occur from moving equipment. The on-site Pinyon manager will coordinate with the Contractor staff and the facility manager at the start of field activities, to identify operations in the vicinity that will be occurring, and the equipment that will be associated with these operations. Workers should be aware of hazards from moving equipment, and take the following precautions:

- Do not approach heavy equipment if the operator is not aware of your presence, or cannot see you; and
- Stand in an area where you can be easily seen while equipment is being moved.
- Use caution while activities are being completed or equipment is being moved. Do not stand close to the equipment, or wear loose fitting clothing which could become entangled.
- Avoid standing close to the drill rig.
- Be aware of the drill string, which may be suspended above ground level.
- Stand in an area where you can be easily seen while the equipment being moved throughout the Site.
- Wear high-visibility clothing and do not work past sunset without adequate lighting.
- Additionally, the Contractor's heavy equipment will be equipped with an audible warning when reverse gear is engaged.
- Beware of overhead work hazards such as power line or signs.

3.9 Traffic

Traffic can result in workers being struck by vehicles or other mobile equipment and may lead to work zone fatalities and injuries. Pinyon has made the assumption that the subsurface investigation will be conducted in areas not requiring traffic control. However, if the need for traffic control does arise it will be subcontracted to a firm qualified to provide an approved traffic control plan. Construction and incident zones can benefit

from temporary traffic control to mitigate the unexpected situations that arise in areas where workers encounter pedestrian traffic. Components of a traffic control plan should inhibit road user movement as little as practically possible, guide all road users in a clear and positive manner, provide acceptable levels of operations, and maintain good public relations.

3.10 Electrical Hazards and Subsurface Utilities

Prior to fieldwork, Pinyon will contact the UNCC in order to mark buried underground utilities in the survey area. Soil borings will not be excavated within 18 inches of a marked utility. In the event that an unmarked utility line is damaged during drilling, the following procedure will be followed:

- Call 911 immediately if anyone is injured. Assist any injured workers, only if it is safe to do so without putting yourself at risk.
- In certain situations, such as breaking a gas main or underground electrical line, it may be necessary to immediately evacuate the work area.
- Report any damage to subsurface utilities to the UNCC at 800-922-1987. Damage to private utility lines, such as sprinkler lines, may be reported to the property owner.
- Contact Pinyon Project Manager or Supervisor.

Lightning is a potential hazard during outdoor operations. Weather conditions will be monitored during field work; in case of an approaching electrical storm (i.e., lightning can be seen, or thunder can be heard), work will be suspended.

3.11 Inhalation of Vapors

Potential concerns may include petroleum vapors, or solvent vapors. The potential presence of these concerns at the Site is currently unknown. If strong odors are encountered during drilling, workers should avoid breathing the vapors, if possible, and evacuate the area until further monitoring can be completed. In the event that strong odors are noted or monitoring with the PID measures greater than 5 parts per million (ppm) over an extended period of time (five minutes) during subsurface work, it may be necessary for workers to stop work, initiate engineering controls, and/or wear respiratory protection (see Section 4.2.2).

3.12 Methane

Methane is a simple asphyxiant at high concentrations and has no other significant physiologic effects. At high concentrations, Methane displaces oxygen and can significantly limit the availability of oxygen in the air. For worker safety, where Methane is a suspected hazard the oxygen content should be monitored with an oxygen meter. Oxygen levels should ideally be between 18 and 23.5% by volume under normal atmospheric conditions. Methane is also highly flammable, with a lower explosive limit (LEL) of 5%. A Combustible Gas Indicator (CGI) will be used to monitor the presence of Methane. If vapor concentrations when monitored by a CGI exceed 5,000 ppm, or 10% of the LEL, the operations must be suspended and heavy equipment shut-down until the level is below 1,000 ppm, or 2% of the LEL (see section 4.2.4). If either of these limits are not met, evacuate the area and ventilate the area until levels become safe again or employ the use of respirators.

4. Methods of Control

4.1 Field Monitoring Equipment

Field monitoring equipment will be utilized to screen for potential chemicals of concern while site work, especially excavation, is performed. Prior to sampling activities, field instruments will be calibrated according to the manufacturer's specifications. In the case of rental equipment, which is pre-calibrated by the equipment supplier, a calibration check (monitoring the field instrument's response to a known standard) will be sufficient. Results of instrument calibration and calibration-checks will be documented in the field book. If field monitoring equipment failure is experienced in the field, field operations will cease until repairs or replacement of the equipment is completed.

- Monitoring Instrumentation: (Note: Monitoring instruments must be used for all operations unless appropriate rationale or restrictions are provided.)
- Photo-Ionization Detector (PID)
- GEM2000 Gas Meter

4.2 Action Levels

4.2.1 Heavy Metals

A variety of heavy metals may be encountered as contaminants in soil at the Site. Some metals are highly toxic; others are also recognized human carcinogens. As these materials are not volatile unless heated to extremely high temperatures, control by proper use of PPE and personal hygiene practices will prevent significant exposure. Sampling will involve the collection of soil using grab samplers/hand sampling equipment under ambient temperatures; therefore, the exposure to volatile metals or airborne particulate should be negligible.

4.2.2 Solvent Vapors

A PID will be used to monitor the concentrations of non-specific VOCs and strong petroleum or solvent odors in the air during the test pit excavations. If PID readings exceed five times ambient air background values or 50 ppm, Pinyon will stop work and evaluate how best to proceed with work, including upgrading PPE or ventilation.

4.2.3 ACMs

During test-pit activities, Pinyon will provide a Certified Asbestos Building Inspector (CABI) to evaluate for the presence of ACMs in the subsurface at the Site. If ACMs are identified, the material will be immediately backfilled to eliminate exposure to ACM fibers. Additionally, care will be taken so not to render ACMs friable and cause a release of asbestos fibers. If additional work is needed regarding ACMs, it will be necessary to complete a Soil Characterization and Management Plan (SCMP) in accordance with Section 5.5 of the Colorado Solid Waste Regulations.

4.2.4 Methane

If vapor concentrations when monitored by a GEM2000 gas meter exceed 5,000 ppm, or 10% of the LEL, the operations must be suspended and heavy equipment shut-down until the level is below 1,000 ppm, or 2% of

the LEL. If levels do not decrease, field personnel and all other individuals in the vicinity of the boring must be directed to move to a safe area and the local fire department must be alerted. Oxygen content will also be measured when Methane is a potential hazard. This will be monitored with an Oxygen Meter, safe oxygen levels are between 18 and 23.5%. If oxygen levels occur outside this range, the area should be vacated and properly ventilated until levels become safe again or respirators should be utilized.

4.3 Personal Protective Equipment

Site work will be performed in Level D PPE. All Site personnel will be equipped with the following PPE:

- Steel toe work boots
- Hard hat
- Safety glasses
- Hearing protection
- Long pants or coveralls
- Gloves

5. References

Pinyon, 2015. "Proposal to Complete a Phase II Environmental Site Assessment, Federal Boulevard Improvements Project, West 7th Avenue to West Holden Place, Denver, Colorado." Prepared by Pinyon Environmental, Inc., 2015.

6. Emergency Information

Fire/Rescue	911
Ambulance	911
Police	911
Rocky Mountain Poison Control Center	303-629-1123
Poison Information	1-800-642-9999
Pinyon Project Manager – Russ Cirillo	720-530-4554 (mobile)
Pinyon Project Manager – Corinne Wardell	303-748-0910
Client Contact – Agatha Linger, CCoD	720.865.5356 Phone | 303.526.6884 Cell
Hospital Information:	
DENVER HEALTH MEDICAL CENTER 777 Bannock St, Denver, CO 80204	303- 436-6000

(Reference Appendix A for Route to Hospital)

7. Plan Approval

Approved By:

Project Manager Date: 2/28/16

Approved By:

Site Safety Coordinator Date:

8. Personnel Acknowledgment – Pinyon Employees

By signing below, the undersigned acknowledge that he/she has read and reviewed this Site-Specific. The undersigned also acknowledge that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained herein.

NAME (PRINT)	SIGNATURE	DATE
Russ Cirillo	J R Cirillo	2/28/16
Travis Gwinn	T-G	06/22/16
Rachel Tometich		6/22/16
Brian Partyka		6/22/16
Lindsey Freytag		6/22/16
David Fontana		6/22/16
Andy Woodward		6/22/16

515-230-4208

720-989-8457

(307) 267-2639

9. Health and Safety Plan Acceptance Form – Subconsultants or Others

The subconsultant shall provide a Health and Safety Plan for their employees covering any exposure to hazardous materials, and shall complete all work in accordance with that plan. In addition to subconsultant's general health and safety guidelines, subconsultant may elect to use the Consultant's site specific Health and Safety Plan in developing its own plans. In any event, subconsultant shall hold Consultant and Client harmless from, and indemnify them against, all liability in the case of any injury arising out of such use.

Should the subconsultant choose to follow Pinyon's Site Health and Safety Plan, in lieu of preparing their own, then the following form is to be completed by each person to work on the subject project work site and returned to the Project Manager or Safety Coordinator.

Project Name Federal Boulevard Phase II, Denver Colorado

Project Number 1/16-007-02.2101

Date February 5, 2016

I represent that I have read and understand the contents of the above plan and agree to perform my work in accordance with it. Additionally, I shall hold Consultant and Client harmless from, and indemnify them against, all liability in the case of any injury arising out of such use.

NAME (PRINT)	SIGNATURE	DATE

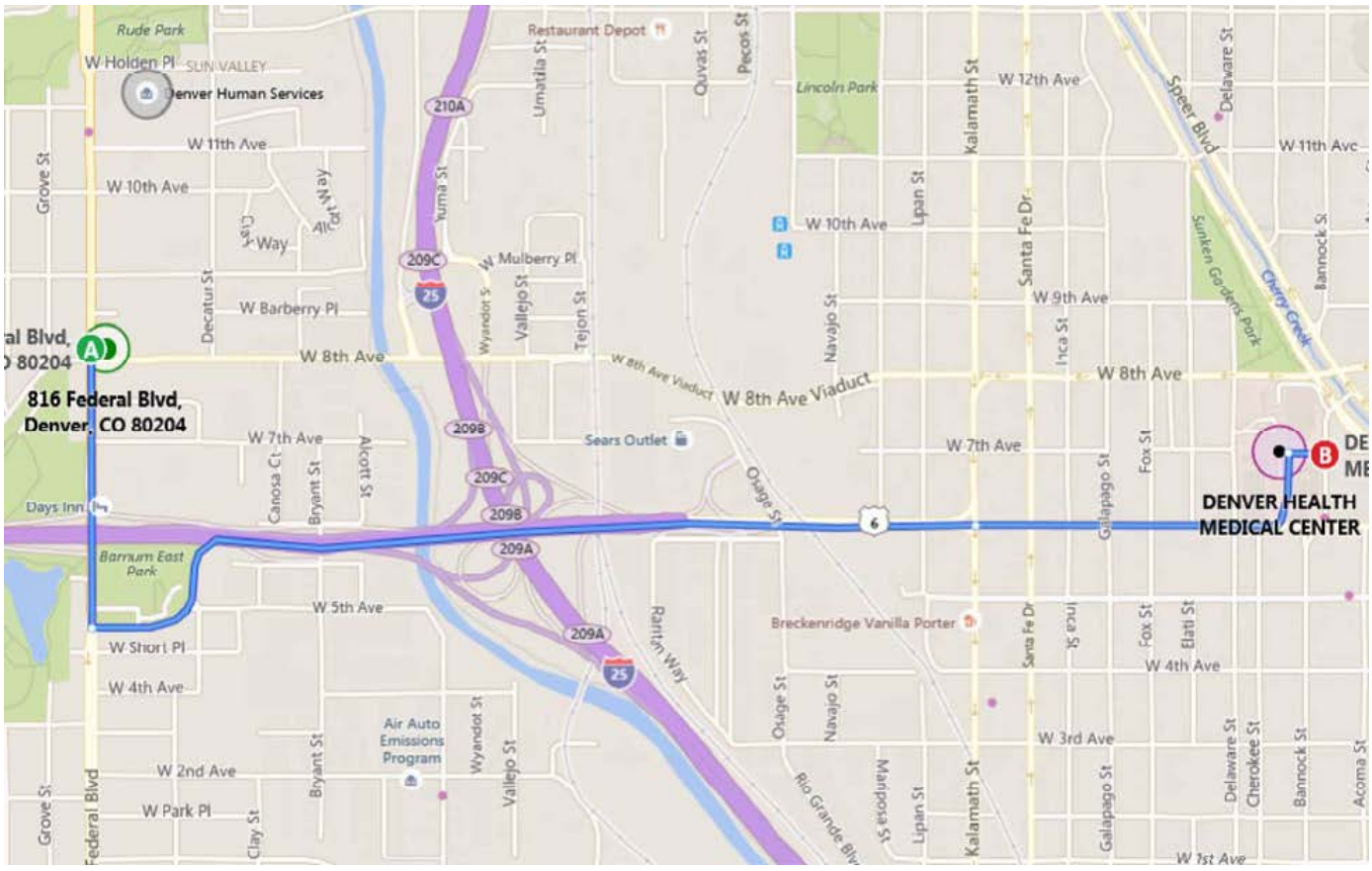
Appendices

Appendix A – Route to Nearest Hospital

816 Federal Blvd, Denver, CO 80204

	1.	Depart **CO-88 / Federal Blvd** toward W 8th Ave	0.4 mi
6	2.	Take ramp **left** and follow signs for **US-6 East**	1.4 mi
↑	3.	Keep **straight** onto **W 6th Ave**	0.5 mi
↰	4.	Bear **left** onto **road**	0.1 mi
↱	5.	Turn **right** onto **road**	292 ft
	6.	Arrive If you reach Bannock St, you've gone too far	

DENVER HEALTH MEDICAL CENTER
777 Bannock St, Denver, CO 80204



Appendix B – Table 2 - Site Specific RECs and Scope of Work

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
710 Federal Boulevard	A gasoline station formerly operated on the site from at least 1960 to 1971; the associated "L"-shaped building was present in the central portion of the property. Potential USTs and buried building materials associated with the former structure may be present. A historical solid waste landfill may be located immediately adjacent and to the south of the Site.	RW-2 (3,411) TE-2 (8,449)	**This property could potentially be slated for full acquisition and full demolition of the on-site structure.** At a minimum, a partial acquisition would occur on the western property boundary, and improvements would include excavation for roadway widening, sidewalk construction, and utility reconstruction (up to 8 feet bgs).	☒ GPR ☒ Drilling ☐ None	☒ Soil (5) ☒ GW (5) ☒ ACM (5)	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☒ ACM	GPR survey to identify anomalies in the ground surface that may resemble abandoned USTs or associated dispenser lines. Up to three soil borings/ GW wells in order to evaluate GPR survey results. Two soil borings/ groundwater wells located on southwest corner and east of site near alley to evaluate potential impacts from off-site sources. Groundwater is anticipated to be at approximately 35 feet bgs. ACM samples to evaluate debris that may be encountered at drilling locations. "Simple" screening for urban fill gases (e.g., methane) will be conducted on open borings immediately after borings to evaluate lateral movement of gases from urban fill site to the south. This will be completed using GEM2000 (or equivalent) gas meter within the open borings prior to constructing groundwater monitoring wells.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
724 Federal Boulevard	An automotive service facility operated on the site from at least 1958 until 2013. Staining and petroleum odors were noted in the southern portion of the building (original automotive service area) and a wash area was noted in the northeast corner of the building. Buried building materials from the former residence (1926 to 1958) may be present on the eastern portion of the site. A gas station operated at the adjoining, upgradient property to the south (710 Federal Boulevard). A furniture manufacturing and/or assembling facility operated at the adjoining, downgradient property to the north (730 Federal Boulevard) An automotive service facility on the adjoining, cross-gradient property to the east (2943 West 7th Avenue) has likely operated since the construction of the building in 1964.	RW-3 (2,474) TE-3 (6,899)	**There is a potential for the property to be acquired in full; the on-site building could be either partially or fully demolished.** At a minimum, a partial acquisition would occur on the western property boundary, and improvements would include excavation for roadway widening, sidewalk construction, and utility reconstruction (up to 8 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (3) ☒ GW (3) ☒ ACM (3)	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☒ ACM	*Interior (Optional): One soil boring in the original automotive service area, and one in the vicinity of the wash area. Soil borings to a depth of 10 feet bgs.* Exterior: Three soil borings/groundwater wells to evaluate impacts from on- and off-site uses. Groundwater is anticipated to be at approximately 35 feet bgs. Recommendations for off-site RECs are discussed under their respective addresses.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
730 Federal Boulevard	A furniture manufacturing and/or assembly facility was present on the site from at least 1955 until circa 1995, when it was then used as an automotive service facility until 2013. Used automotive parts, a drum of used solvent, and an aboveground lift was noted in the eastern portion of the building. In addition, miscellaneous piping was noted on the northwestern exterior of the building, which may be indicative of underground storage tanks. An automotive service facility operated on the adjoining, upgradient property to the south (724 Federal Boulevard). An automotive service facility operated on the adjoining, downgradient property to the north (2970 West Severn Place). An automotive service facility operates on the adjoining, cross-gradient property to the east (see recommendation for impacts from 2943 West 7th Avenue in 724 Federal Boulevard section).	RW-4 (1,649) TE-4 (4,599)	**There is a potential for the property to be acquired in full; the on-site building could be either partially or fully demolished.** At a minimum, a partial acquisition would occur on the western property boundary, and improvements would include excavation for roadway widening, sidewalk construction, and utility reconstruction (up to 8 feet bgs).	☐ GPR Survey ☐ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	*Interior (Optional): One soil boring (to 10 feet bgs) in the automotive service area.* Borings located on 724 Federal and 2970 Severn placed to evaluate RECs on those respective properties and should adequately evaluate RECs on this facility. One boring/well on eastern portion of this facility to evaluate groundwater coming through property.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
2970 West Severn Place	An automotive repair facility operated onsite from 2000 to 2015, and for an unknown period of time during the 1960s. A scrap metal business operated at the Site from at least 1970 to 1989. Stained asphalt, stored vehicles, and 55-gallon drums were observed on the exterior. Buried building materials from the former residence (1924 to 1970s) may be present on the eastern portion. An automotive service facility operated on the adjoining, upgradient properties to the south (724/730 Federal Boulevard). A gas station operated at upgradient property to the south (710 Federal Boulevard). Various auto repair businesses have operated at the adjoining property to the west since the 1950s (749/753/759 Federal Boulevard).	RW-6 (2,754) TE-6 (3,512)	**There is a potential for the property to be acquired in full; the on-site building could be either partially or fully demolished.** At a minimum, a partial acquisition would occur on the north and western property boundary, and improvements would include excavation for roadway widening, sidewalk construction, and utility reconstruction (up to 8 feet bgs).	☒ GPR Survey ☒ Drilling ☐ None	☒ Soil (2) ☒ GW (2) ☒ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	*Interior (Optional): One soil borings (to 10 feet bgs) in the automotive service area. If applicable, the soil boring should be extended in the vicinity of the reported floor drain.* Exterior: Two soil borings/groundwater wells to evaluate impacts from on- and off-site uses. Eastern boring to evaluate impacts on this property, as well as on 730 Federal. Groundwater is anticipated to be at approximately 35 feet bgs. Recommendations for off-site RECs are discussed under their respective addresses. GPR survey to identify anomalies in the ground surface that may resemble abandoned USTs or associated dispenser lines.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
749, 753, and 759 Federal Boulevard	Various auto repair businesses have operated at in this location since the 1950s.	749: TE-7 (376) 753-759: PE-8 (10) 753-759: TE-8 (629)	Temporary and permanent easements along the eastern portion of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 8 feet bgs),	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☐ GW ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring (to 10 feet bgs) along proposed ROW to evaluate impacts that may be encountered during project activities in this area (i.e., utility relocation, sidewalk improvements). Groundwater samples not recommended due to the limited easement acquisitions at these locations.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
750 Federal Boulevard/ 2880 West 8th Avenue	The site is an active bus terminal with USTs and former automotive service/wrecking facility which had several leaking underground storage tank (LUST) events. The LUST events recorded for the bus terminal 1990 and 2001 were issued a No Further Action (NFA) letter by the Colorado Department of Labor and Employment Division of Oil and Public Safety (OPS) in June of 2012. LUSTs recorded for the wrecking company in 1992 and 1993 were issued NFA letters in January of 1993. These activities occurred on the central and eastern portion of the site; however, a groundwater plume was present extending across West 8th Avenue toward Weir Gulch.	RW-9 (7,178) TE-9 (22,324)	Partial acquisitions, and temporary and permanent easements along the western and northern portions of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 8 feet bgs), and signal pole installation (up to 18 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring along proposed ROW at southeast corner of West 8th Avenue and Federal Boulevard to evaluate for impacts that may be encountered during project activities in this area (i.e., signal improvements, utility relocation), as well as liability protections Groundwater is anticipated to be at approximately 30 feet bgs, so groundwater may not need to be evaluated (if not encountered to 20 feet). Extensive groundwater sampling not recommended as UST and LUST events were located in interior and downgradient portions of this property.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
2971 West 8th Avenue and 2901 West 8th Avenue	A photo processing facility operated on the adjoining, upgradient property to the west from 1970 to 1990. In addition, a chimney on the exterior of the building indicates the potential for the historical use of coal or fuel oil at the adjoining property (816 Federal Boulevard). An active bus terminal and active fueling station operates on the adjoining, up- to crossgradient property to the south/southeast (750 Federal Boulevard).	RW-12 REV (1,054) RW-13 REV (2,777) TE-13 (4,216)	Partial acquisitions, and temporary easements along the southern portions of the property would be required for sidewalk construction, roadway widening, and utility relocation (up to 8 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring/ groundwater well to evaluate impacts from the off-site bus terminal. Groundwater is anticipated to be at approximately 30 feet bgs. Recommendations for off-site RECs are discussed under their respective addresses.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
816 Federal Boulevard	A photo processing facility operated on the site from 1970 to 1990. In addition, a chimney was noted on the exterior of the building, and there is a potential for historical use of coal or fuel oil at the property. An active bus terminal and active fueling station operates on the adjoining, up- to crossgradient property to the south/southeast (750 Federal Boulevard).	RW-14 (13,221) TE-14 (26,408)	**There is a potential for the property to be acquired in full; the on-site building could be either partially or fully demolished.** At a minimum, a partial acquisition would occur on the western property boundary, and improvements would include excavation for roadway widening, sidewalk construction, utility reconstruction (up to 8 feet bgs), and signal pole installation (up to 18 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (2) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	*Interior (Optional): One soil boring (to 10 feet bgs) to evaluate former use as a photo facility.* Exterior: One soil boring (to 10 feet bgs) to evaluate potential impacts near the chimney (PAHs will be evaluated at this location regardless of TPH results). One soil boring/ groundwater well on the southern property boundary. Groundwater is anticipated to be at approximately 30 feet bgs.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
830 Federal Boulevard	A photo processing facility operated on the adjoining, upgradient property to the south from 1970 to 1990. In addition, a chimney was noted on the exterior of the building (816 Federal Boulevard). An active bus terminal and active fueling station operates on the adjoining, up- to crossgradient property to the south/southeast (750 Federal Boulevard).	Combined with 816 above.	**There is a potential for the property to be acquired in full; the on-site building could be either partially or fully demolished.** At a minimum, a partial acquisition would occur on the western property boundary, and improvements would include excavation for roadway widening, sidewalk construction, and utility reconstruction (up to 8 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring/ groundwater well to the south of the onsite building. Groundwater is anticipated to be at approximately 30 feet bgs. Recommendations for off-site RECs are discussed under their respective addresses.
869 Federal Boulevard	Automotive repair businesses have operated at this location from at least 1969 to 2014.	TE-20 (100)	Temporary easements along the eastern portion of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 2 feet bgs),	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ PAHs ☐ RCRA 8	The onsite structures immediately adjoin the project area, leaving limited areas for investigation activities. Further, it is not anticipated that the project will require acquisitions, and easements are minimal. It is recommended that potential impacts from these properties be addressed in the project-specific MMP.
877 Federal Boulevard	The on-site structure is occupied by an automotive repair facility.	TE-21 (501)	Temporary easements along the eastern portion of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 2 feet bgs),	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ PAHs ☐ RCRA 8	

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
888 Federal Boulevard	The site building was historically used as a photo processing facility from 1979 through the present day. The building may have previously been used as an automotive service facility. Adjoining properties to the west are comprised of automotive repair facilities that have been present since the late 1960s (869, 877, 891 Federal Boulevard)	RW-19 (8,006) TE-19 (2,467)	Partial acquisitions, and temporary easements along the westernmost portion of the property would be required for sidewalk construction, roadway widening, and utility relocation (up to 10 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil/groundwater boring along proposed ROW to evaluate impacts that may be encountered during project activities in this area, and RECs. Recommendations for off-site RECs are discussed under their respective addresses.
891 Federal Boulevard	An automotive repair facility operated at this location since at least 1985.	None	It is not anticipated that the project would require acquisition or easements on this parcel; however, project activities adjoining the parcel may require excavation for sidewalk construction and roadway widening (up to 8 feet bgs).	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ G/DRO ☐ PAHs ☐ RCRA 8 ☐ Cu/Cr ☐ ACM	The onsite structure immediately adjoins the project area, leaving limited areas for investigation activities. Further, it is not anticipated that the project will require acquisitions or easements on this property. It is recommended that potential impacts from these properties be addressed in the project-specific MMP.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
900 Federal Boulevard	900 Federal was occupied by a Truck Service Garage for an unknown period of time in the 1950s. Automotive repair businesses have operated at the adjoining properties to the west since the 1960s (891 and 903 Federal Boulevard).	RW-23 (3,821) TE-23 (5,589)	Partial acquisitions, and temporary easements along the westernmost portion of the property would be required for sidewalk construction, roadway widening, and utility relocation (up to 10 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring/monitoring well along proposed ROW to evaluate impacts that may be encountered during project activities in this area (i.e., utility relocation, sidewalk improvements), and identified RECs. Recommendations for off-site RECs are discussed under their respective addresses.
903 Federal Boulevard	Automotive repair businesses have operated at this location from at least 1969 to the present day.	None	It is not anticipated that the project would require acquisition or easements on this parcel; however, project activities adjoining the parcel may require excavation for sidewalk construction and roadway widening (up to 8 feet bgs).	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ G/DRO ☐ PAHs ☐ pB ☐ RCRA 8 ☐ Copper ☐ ACM	The onsite structure immediately adjoins the project area, leaving limited areas for investigation activities. Further, it is not anticipated that the project will require acquisitions or easements on this property. It is recommended that potential impacts from these properties be addressed in the project-specific MMP.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
950 Federal Boulevard	An auto sales and repair business has been in operation at this parcel since at least 1989.	RW-25 (3,967) TE-25 (1,630)	Partial acquisitions, and temporary easements along the westernmost portion of the property would be required for sidewalk construction, roadway widening, and utility relocation (up to 10 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring/monitoring well along proposed ROW to evaluate impacts that may be encountered during project activities in this area (i.e., utility relocation, sidewalk improvements), as well as identified RECs.
970 Federal Boulevard	This parcel was used by the Standard Wrecking and Lumber Company at least during the 1950s and 1960s for lumber storage.	RW-28 (2,092) TE-28 (1,096)	Partial acquisitions, and temporary easements along the westernmost portion of the property would be required for sidewalk construction, roadway widening, and utility relocation (up to 10 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☒ Cu/Cr ☐ ACM	One soil boring and groundwater well along proposed ROW to evaluate impacts that may be encountered during project activities in this area (i.e., utility relocation, sidewalk improvements), and on-site REC. Groundwater expected to be at approximately 55 feet.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
990 Federal Boulevard	The site building is a retail store (Family Dollar) and the eastern portion was formerly used as an auto repair facility. The site and the property adjacent to the east (2950 West 10th Avenue) were formerly used as a lumber yard. In addition, the site may have been a former urban fill site. The adjoining property to the south is an active automotive service repair facility (950 and 970 Federal Boulevard). The adjoining property to the west (995 Federal Boulevard) is an active automotive service facility. A gasoline station historically operated at this property.	RW-31 (5,196) TE-31 (27,668)	**There is a potential for the property to be acquired in full; the on-site building could be either partially or fully demolished.** At a minimum, a partial acquisition would occur on the western property boundary, and improvements would include excavation for sidewalk construction, roadway widening, utility relocation (up to 10 feet bgs), and signal pole installation (up to 18 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (5) ☒ GW(2) ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☒ RCRA 8 ☒ Cu/Cr ☒ ACM	*Interior (Optional): One soil boring (to 10 feet bgs) to evaluate former use as an automotive service facility.* Exterior: Three soil borings (to 10 feet bgs) to evaluate potential impacts from former use as a lumber yard. Two soil borings/ groundwater wells on the northern and southern property boundaries. Groundwater is anticipated to be at approximately 55 feet bgs. "Simple" screening for urban fill gases (e.g., methane) will be conducted on open borings immediately after borings to evaluate lateral movement of gases from urban fill site to the south. This will be completed using GEM2000 (or equivalent) gas meter within the open borings prior to constructing groundwater monitoring wells. Recommendations for off-site RECs are discussed under their respective addresses.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
995 Federal Boulevard	An auto repair business has operated at this parcel since at least 1926. A listing from 1935 identified a "City Dump" in association with this property.	RW-32 (97) TE-32 (705)	Partial acquisitions, and temporary and permanent easements along the eastern and northern portions of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 10 feet bgs), and signal pole installation (up to 18 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☒ GW (1)	☒ VOCs ☒ G/DRO ☐ PAHs ☒ RCRA 8 ☐ Cu/Cr ☒ ACM	One soil boring (to 20 feet bgs) and groundwater well (if groundwater is encountered) along proposed ROW at southwest corner of West 10th Avenue and Federal Boulevard to evaluate for impacts that may be encountered during project activities in this area (i.e., signal improvements, utility relocation). Groundwater is anticipated to be at approximately 55 feet bgs. "Simple" screening for urban fill gases (e.g., methane) will be conducted on open borings immediately after borings to evaluate lateral movement of gases from urban fill site to the south. This will be completed using GEM2000 (or equivalent) gas meter within the open borings prior to constructing groundwater monitoring wells.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
1000 Federal Boulevard	The site is an active gasoline station, and has operated as a gasoline station since at least 1930. A LUST event was reported for the current 7-Eleven facility in 2007; a NFA letter was issued for the facility in 2010.	RW-34 (2,498) TE-34 (2,451)	Partial acquisitions, and temporary easements along the western and southern portions of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 10 feet bgs), and signal pole installation (up to 18 feet bgs).	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ G/DRO ☐ PAHs ☐ pB ☐ RCRA 8 ☐ Copper ☐ ACM	No recommendation for this property. Although the project will result in a partial acquisition at this property, a review of available records indicates adequate site characterization for this property. It is recommended that potential impacts from this property be addressed in the project-specific MMP.
1005 Federal Boulevard	A gas station was located at this property in at least 1926. Sense of Healing, a marijuana dispensary and warehouse, has been located at the address since 2010.	RW-33 (37) TE-33 (82)	Partial acquisitions and temporary easements along the eastern and southeastern portions of the property would be required for sidewalk construction, roadway widening, utility relocation (up to 10 feet bgs), and signal pole installation (up to 18 feet bgs).	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ G/DRO ☐ PAHs ☐ RCRA 8 ☐ Cu/Cr ☐ ACM	As ROW take is very small, Pinyon recommends impacts be addressed with MMP.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
1200 Federal Boulevard	The site was developed with the Federal Auto Wrecking Company from at least 1930 to 1940. Staining of the ground was observed on the aerial photograph in the vicinity of the Site. Auto repair businesses have operated at the adjoining property to the west from at least 1980 to the present day.	RW-40 (1,827) TE-40 (1,519)	Partial acquisitions and temporary easements along the westernmost portion of the property would be required for sidewalk construction, roadway widening, and utility relocation (up to 8 feet bgs).	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ G/DRO ☐ PAHs ☐ RCRA 8 ☐ Cu/CR ☐ ACM	The onsite structure immediately adjoins the project area, leaving limited areas for investigation activities. It is recommended that potential impacts be addressed in the project-specific MMP.
1225 Federal Boulevard	Auto repair businesses have operated at the site from at least 1980 to the present day.	None	It is not anticipated that the project would require acquisition or easements on this parcel; however, project activities adjoining the parcel may require excavation for sidewalk construction and roadway widening (up to 8 feet bgs).	☐ GPR Survey ☐ Drilling ☒ None	☐ Soil ☐ GW ☐ ACM	☐ VOCs ☐ G/DRO ☐ PAHs ☐ RCRA 8 ☐ Cu/Cr ☐ ACM	The onsite structure immediately adjoins the project area, leaving limited areas for investigation activities. Further, it is not anticipated that the project will require acquisitions or easements on this property. It is recommended that potential impacts from these properties be addressed in the project-specific MMP.

Address	Recognized Environmental Conditions	Acquisition Type (square feet)	Proposed Construction Activity	Investigation Type	Media (Number of Samples)	Analytes	Discussion
1251 Federal Boulevard	The site formerly operated as a gas station from at least 1960 to 1979; a closed LUST event is listed for the property. The facility was granted closure by the OPS in 1997.	PE-43 (242)	A permanent easements on the eastern and northern portions of the property would be required for construction, access, and maintenance of a storm sewer line (up to 10 feet bgs).	☐ GPR Survey ☒ Drilling ☐ None	☒ Soil (1) ☐ GW ☐ ACM	☒ VOCs ☒ G/DRO ☒ PAHs ☐ pB ☒ RCRA 8 ☐ Cu/Cr ☐ ACM	One soil boring (to 10 feet bgs) within the extents of PE-43 to evaluate impacts that may be encountered during project activities in this area (i.e., utility relocation/installation). Historical REC does not require further evaluation.

Appendix B Geophysical Survey Report

INFRASTRUCTURE IMAGING AND NDE
ASSESSMENT, MONITORING AND REPAIR

Olson ENGINEERING

Corporate Office:
12401 W. 49th Ave.
Wheat Ridge, CO 80033-1927 USA
phone: 303.423.1212
fax: 303.423.6071

June 8, 2016

Pinyon Environmental
9100 W. Jewell Avenue
Lakewood, CO 80232

Attn: Corinne Wardell, EI
Phone: 303.980.5200
Email: wardell@pinyon-env.com

Re: Geophysical investigation for utility detection, Denver, CO
Olson Project No. 5280A

Olson Engineering Inc. (Olson) conducted geophysical investigations for Pinyon Environmental (Pinyon) at two sites in Denver, CO; 2970 W Severn Place and 710 Federal Blvd (Figure 1). The objective of the investigations were to locate possible underground utilities or other metallic objects that could interfere with excavation operations. These objectives were met using Time-Domain Electromagnetics (TDEM) and Vertical Gradient Magnetometry (VGM).

The investigations were performed based on the scope of work outlined in Olson Proposal No. PG2015300.1PG. Field work was conducted on February 24th, 2016 by Olson geophysicist Paul Schwering, and May 10th, 2016 by Olson geophysicist Miriam Moller. The following report presents results from the investigations and summarizes data acquisition and processing procedures, and interpretation approach. For further information regarding the intricacies of the TDEM or VGM methods used for this project, Olson can submit a method addendum, per method, to this report upon request.

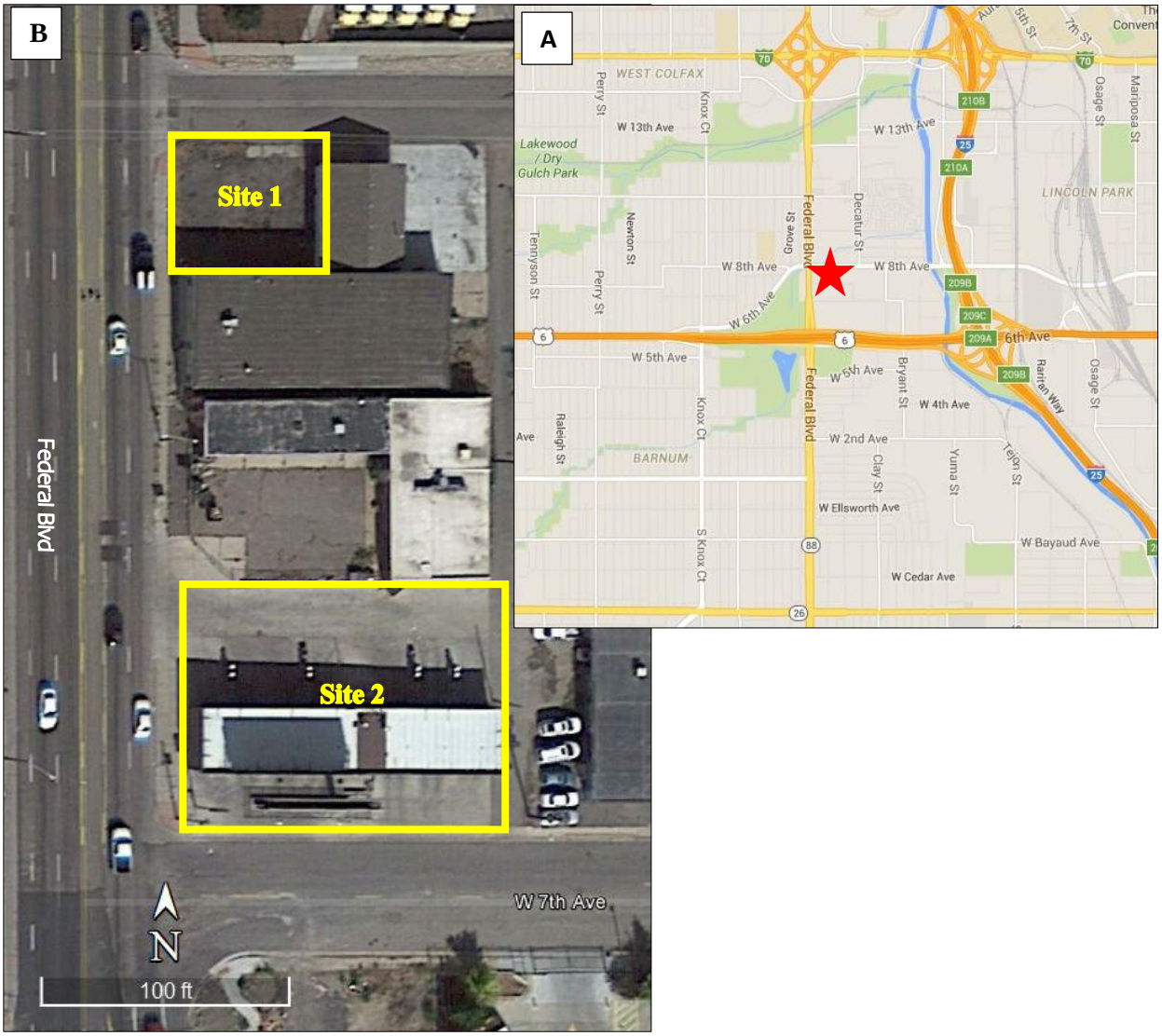
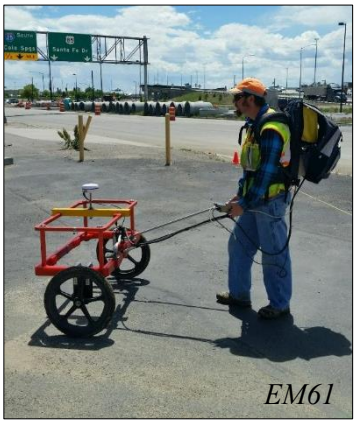


Figure 1. A) Approximate site location indicated by red star; B) sites 1 and 2 indicated by yellow boxes.

Data Acquisition



The geophysical investigations consisted of TDEM and VGM transects. The transects were oriented approximately north-south and nominally spaced 4 feet apart. Transects were positioned in the field based on recommendations from Pinyon personal and accessibility constraints. The location of the TDEM and VGM equipment was continuously measured during the surveys with a Trimble GeoHX 6000 series GPS unit capable of sub-meter spatial precision. However, especially in the southern site, the GPS signal was degraded by nearby structures.

All TDEM data were acquired using an EM61-MK2 produced by Geonics Limited (*inset photo above left*). For TDEM measurements, electrical current is applied to a loop for a short amount of time. Once the current is turned off, the instrument measures the decay of the currents induced in the subsurface. The EM61 instrument measures the current decay at 4 distinct times, referred to as time gates. The EM61 is effective for detecting both ferrous and non-ferrous metals.


G858

VGM data were acquired using a Geometrics G858 magnetic gradient system (*inset photo at right, top*) at Site 1 and a Foerster Ferex 4.032 magnetometer (*inset photo at right, bottom*) at Site 2. The magnetometers were configured in a vertical gradient set up with two sensors, one above the other, using a 1-meter separation. Each magnetometer measures the strength of the Earth's magnetic field, called the Total Field Intensity (TFI), simultaneously. The presence of ferrous materials causes distortions in the magnetic field that are detected by the sensors. The vertical gradient of the magnetic field is the difference of the magnetic field values measured by the two independent sensors.


Ferex 4.032

Data Processing

The raw data were converted to tabular data files using TrackMaker61 (Geomar Software) MK2 for the TDEM data, and MagMap2000 (Geometrics) or TrackMakerFX (Geomar Software) for the VGM data. All further data processing and gridding of data was performed using Geosoft Oasis montaj (Geosoft), a processing and data visualization software suite used for analysis of geophysical data sets. Filtering the data was not necessary, however interpolating GPS coordinates was necessary, particularly for Site B. In the case of Site B, data was collected under the car wash, which caused the Trimble GeoHX unit to lose connection with satellites. Data collection was paused after passing through the car wash to allow the unit to reconnect. However, due to this and surrounding structures (e.g. billboards), interpolation was still necessary. Geosoft was used to grid data using the minimum curvature method and export the results as a plan view map images.

Results and Discussion

The geophysical results from Site 1 and Site 2 are presented in Figures 2 and 3, respectively, as plan view maps. Color contour grids of the TDEM and VGM analytic signal are presented in units of millivolts (mV) and nanoteslas per meter (nT/m), respectively. Observed cultural features are marked and labeled on the results images and also presented in a separate plan view image. Background imagery is from Bing Maps. The interpreted locations of several subsurface anomalies, likely representing buried metallic object(s), are shown by gray boxes. A substantial amount of surface culture was encountered at both sites, and consequently, distinguishing between

anomalies caused by surficial culture versus a buried object can be challenging. Cultural features are labeled and marked on all images as red circles, lines, and boxes.

Site 1

Most of the anomalies seen on the TDEM results are associated with cultural features and the edges of surrounding buildings. There is one large anomaly on the western half of a rebar reinforced concrete pad, highlighted by a gray box and labeled "A". The VGM results are similar, and also indicate a significant anomaly on the western half of the concrete pad.

Site 2

There was a significant amount of surface culture at Site 2. As such, it is difficult to discern surface culture from a potential buried object in some places. The TDEM results show several anomalies which are not related to surface culture, labeled A-F. The VGM results were not particularly helpful in the impetration of this site. Only anomalies B and C are apparent in the VGM results. The largest anomaly is on the western side of the site, labeled A. This anomaly is consistent with an underground storage tank, however, it is also possible that this is caused by rebar reinforcement in this area. Rebar was observed in the wall immediately to the west of the anomaly location. There are five smaller anomalies labeled B-F. Anomalies C and E are relatively close to surface culture, however the anomalies appear to extend beyond the limits of the surface features.

Closure

The geophysical methods and field procedures defined in this report were applicable to the project objectives and have been successfully applied by Olson to investigations of similar size and nature. However, sometimes field or subsurface conditions are different from those anticipated and the resultant data may not achieve the project objectives. Olson warrants that our services were performed within the limits prescribed for this project, with the usual thoroughness and competence of the geophysical profession. Olson conducted this project using the current standards of the geophysical industry and utilized in house quality control standards to produce a precise geophysical survey.

The quality of the TDEM and VGM data acquired was good, although, as mentioned above, the significant amount of culture does interfere with locating buried objects. If you have any questions regarding the field procedures, data analyses, or the interpretive results presented herein, please do not hesitate to contact us. We appreciate working with you and look forward to providing Pinyon with geophysical or nondestructive testing services in the future.

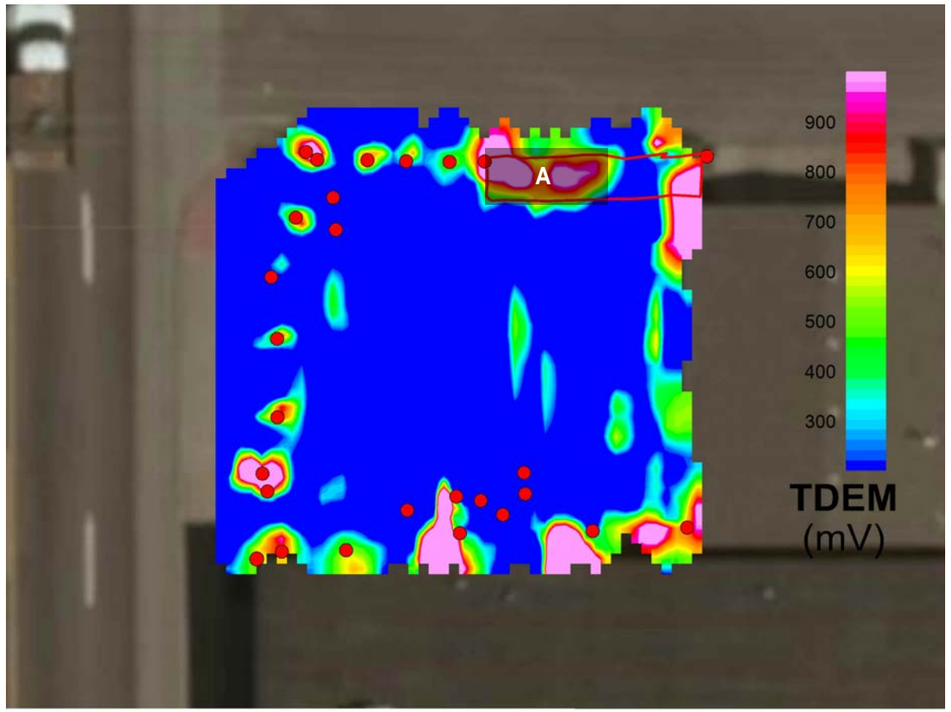
Respectfully,

Miriam Moller
Geophysicist

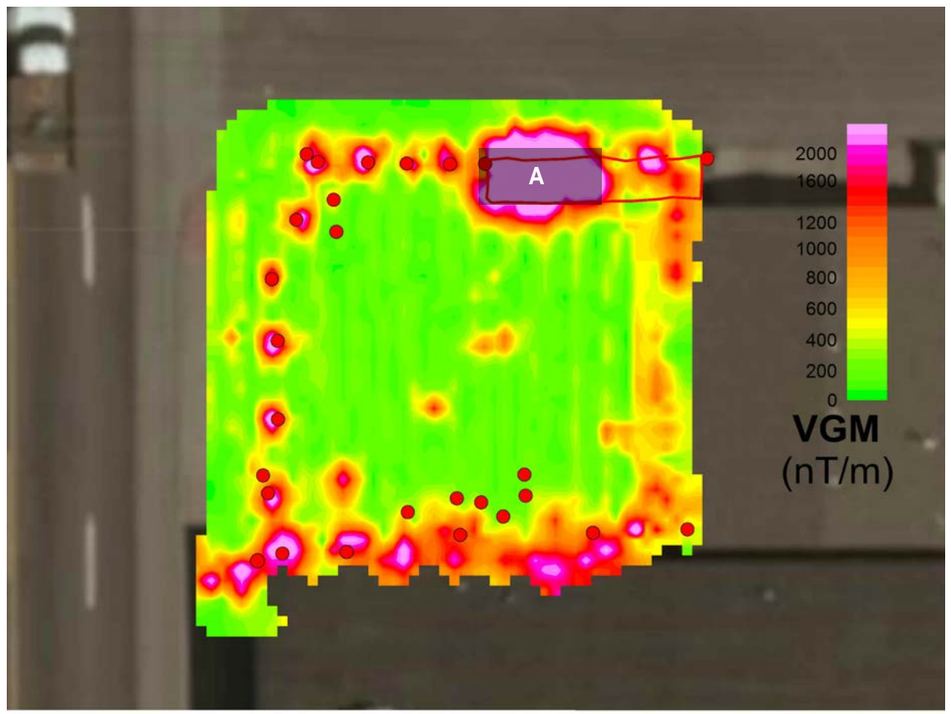
Jacob Sheehan
Senior Geophysicist

(1 copy e-mailed PDF format)

TDEM Results



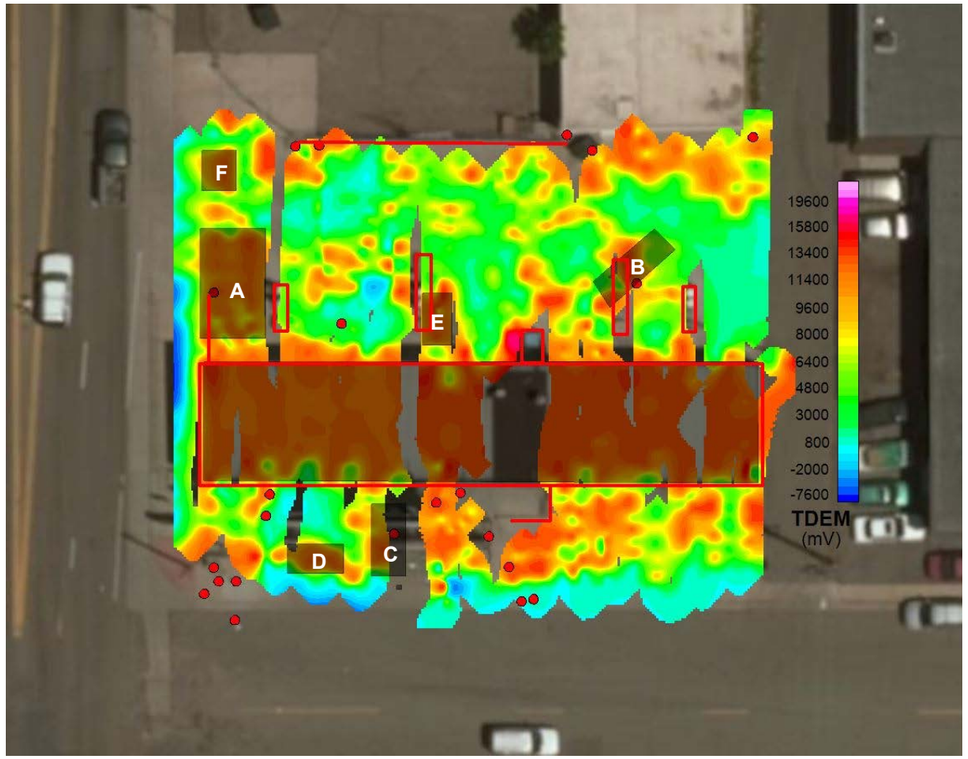
VGM Results



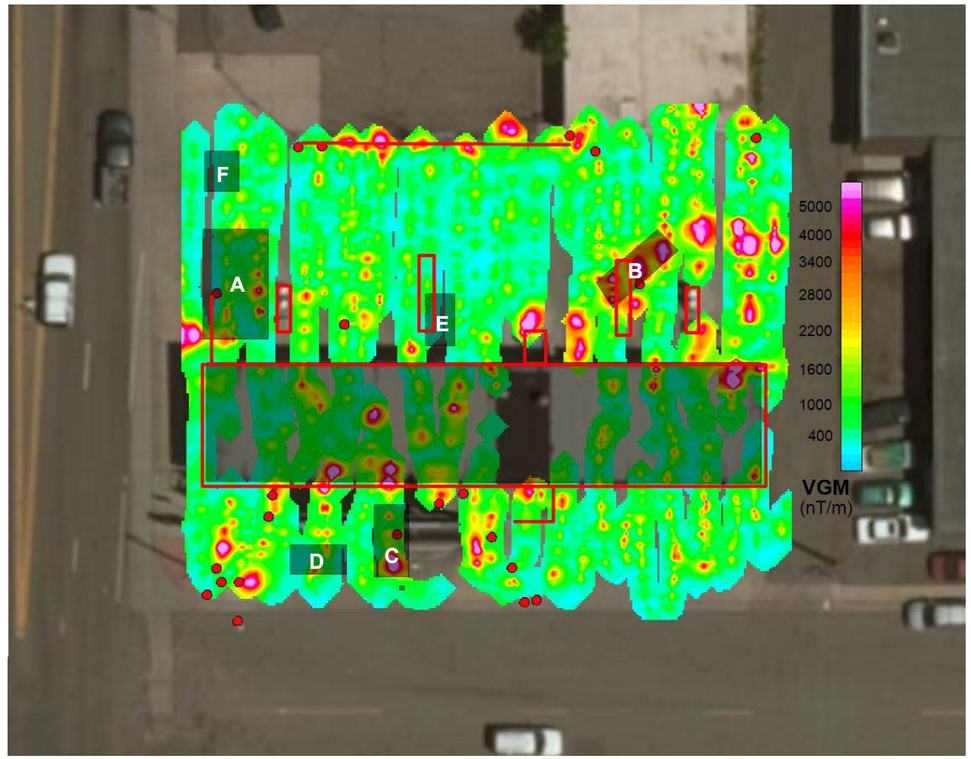
Culture

Pinyon Environmental 9100 W. Jewell Avenue Lakewood, CO 80232		
Olson ENGINEERING	***UST Denver, CO*** ***Site 1***	
	Job 5280A *June 2016*	**Figure 2**

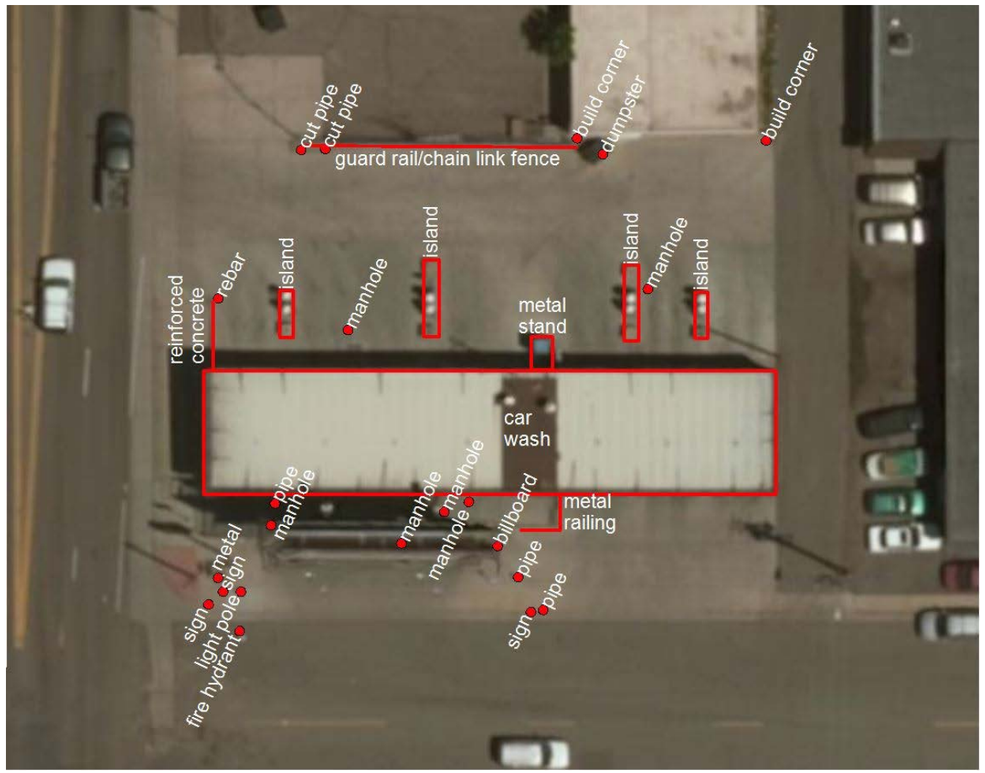
TDEM Results



VGM Results



Culture



Pinyon Environmental
9100 W. Jewell Avenue
Lakewood, CO 80232

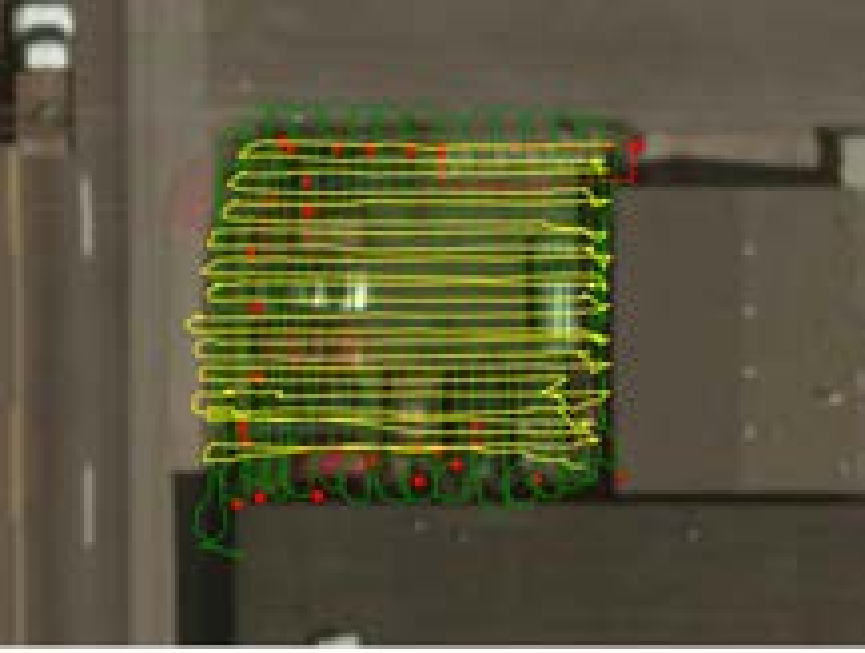
Olson ENGINEERING

UST Denver, CO Site 2

Job 5280A
June 2016

Figure 3

Line Paths



Methods Appendix

METHOD APPENDIX
MAGNETICS METHODS

INTRODUCTION

The magnetometer is a sensitive instrument which can be used to map spatial variations in the Earth's magnetic field. Magnetometers are highly portable instruments which are operated manually. In the proton magnetometer a magnetic field which is not parallel to the Earth's field is applied to a fluid rich in protons causing them to partly align with this artificial field. When the controlled field is removed, the protons precess toward realignment with the Earth's field at a frequency which depends on the intensity of the Earth's field. By measuring this precession frequency, the total intensity of the field can be determined.

For some purposes a close approximation of the gradient of the field is determined by measuring the difference in the field between two closely spaced sensors. In principle, the gradient of any component of the total intensity of the field can be measured in the vertical direction or any horizontal direction. In practice the quantity measured most commonly is the vertical gradient of the total field.

Ground magnetic measurements are usually made with portable instruments at regular intervals along more or less straight and parallel lines which cover the survey area. Often the interval between measurement locations (stations) along the lines is less than the spacing between lines. Ordinary land surveying methods are used to establish stations at which measurements are made; accuracy of 1-10 feet in plan is usually required.

To make accurate anomaly maps, temporal changes in the Earth's field during the period of the survey must be considered. Normal changes during a day, sometimes called diurnal drift, are a few tens of gammas but changes of hundreds or thousands of gammas may occur over a few hours during magnetic storms. During severe magnetic storms, which occur infrequently, magnetic measurements should not be made. There are a number of methods used to correct surveys for temporal variations. For ground surveys, one method is to establish a base or reference station in the survey area and to repeat measurements at this base at frequent intervals. All of the measurements at field stations are then corrected by assuming a linear change of the field during the time interval between repeat base station readings. This method works well provided the earth's field is relatively stable. Sometimes continuously recording magnetometers are used at fixed base sites to monitor temporal changes. If time is accurately recorded at both base site and field location the field data can be corrected by subtraction of the variations at the base site. This method works very well for surveys of small areas, provided the base site is in or near the area. It does not work well for surveys of large areas because, over a large area (tens of kilometers), temporal variations vary spatially in an unpredictable manner.

Intense fields from man-made electromagnetic sources can be a problem in magnetic surveys. Most magnetometers are designed to operate in fairly intense 60 hertz and radio frequency fields. However extremely low frequency fields caused by equipment using direct current or the

switching of large alternating currents can be a problem. Pipelines carrying direct current for cathodic protection can be particularly troublesome. With great care, airborne anomalies on the order of one nanoTesla (nT) or less can be mapped in areas of very gentle magnetic expression. Although some modern ground magnetometers have a sensitivity of 0.1 nT, sources of cultural and geologic noise usually prevent full use of this sensitivity in ground measurements.

After all corrections have been made magnetic survey data are usually displayed as individual profiles or as contour maps. Geologic interpretation of magnetic anomalies is carried out by comparison with theoretical anomalies calculated for idealized geologic models, comparison with anomalies over known geologic features, and from constraints provided by other geophysical and geological results in the area. Identification of anomalies caused by cultural features, such as railroads, pipelines, and bridges is commonly made using field observations and maps showing such features. There are no well established analytical procedures to follow for identification and location of such features.

BACKGROUND

The Earth possesses a magnetic field caused primarily by sources in the core. The form of the field is roughly the same as would be caused by a dipole or bar magnet located near the Earth's center and aligned parallel to the geographic axis. The intensity of the Earth's field is customarily expressed in S.I. units as nanoTeslas (nT) or in an older unit, the gamma. Except for local perturbations, the intensity of the Earth's field varies between about 45,000 and 60,000 nT over the coterminous United States.

Many rocks and minerals are weakly magnetic or magnetized by induction in the Earth's field, and cause spatial perturbations or "anomalies" in the Earth's main field. Man-made objects containing iron or steel are often highly magnetized and locally can cause large anomalies up to several thousands of nT.

Magnetic methods are generally used to map the location and size of ferrous objects. Determination of the applicability of the magnetics method is done by an experienced engineering geophysicist. Modeling and incorporation of auxiliary information may be necessary to produce an adequate work plan.

The Earth's magnetic field dominates most measurements on the surface of the earth. Permanently magnetized earth materials with fields like a common bar magnet are the exception. A secondary magnetic field is induced in most materials when the material is in the presence of a strong magnetic field such as the Earth's. Induced magnetization refers to the action of the field on the material wherein the ambient field is enhanced causing the material itself to act as a magnet. The field caused in such a material is directly proportional to the intensity of the ambient field and to the ability of the material to enhance the local field-a property called magnetic susceptibility. The induced magnetization is equal to the product of the volume magnetic susceptibility and the inducing field of the earth:

$$I=kF$$

Where I is the induced magnetization per unit volume in cgs electromagnetic units (A vector)

F is the external field intensity in Teslas (A vector)
k is the volume magnetic susceptibility.

For most materials k is much less than 1 and, in fact is usually on the order of 10^{-6} for most rock materials. From a geologic standpoint, magnetite and its distribution determine the magnetic properties of rocks. The susceptibility of magnetite is about 0.3. There are other important magnetic minerals in mining prospecting, but the amount and form of magnetite determines how most rocks respond to an inducing field. Iron, steel and other ferromagnetic alloys have susceptibilities one to several orders of magnitude larger than magnetite. The exception is stainless steel which is only weakly magnetic.

The influence of magnetite on a magnetics measurement cannot be exaggerated. Some tests on rock materials have shown that a rock containing one percent magnetite may have a susceptibility as large as 10^{-3}, or one thousand times larger than most rock materials. The following list gives some typical values for rock materials-note that the range of values given for each sample depends on the amount of magnetite present.

ROCK TYPE	SUSCEPTIBILITY
Altered ultra basics	10^{-4} to 10^{-2}
Basalt	10-^{4} to 10^{-3}
Gabbro	10^{-3}
Granite	10^{-5} to 10-^{3}
Andesite	10^{-4}
Rhyolite	10^{-5} to 10^{-4}
Shale	10^{-5} to 10^{-4}
Schist and other Metamorphic Rocks	10^{-4} to 10^{-6}
Most Sedimentary Rocks	10^{-6} to 10^{-5}
Limestone and Chert	10^{-6}

Thus it can be seen that in most engineering and environmental scale investigations, the sedimentary or alluvial sections will not show sufficient contrast such that magnetic measurements will be of use in mapping the geology. However, the presence of ferrous materials in ordinary municipal trash and in most industrial waste does allow the magnetometer to be used in direct detection of landfills and other disposal features. Underground steel tanks, where isolated from interfering anomalies, cause easily detected magnetic anomalies.

FIELD WORK

The magnetometer is operated by a single person. However, grid layout, surveying or the buddy system may require the use of another technician. The use of a base station is covered above. Additionally, some QC/QA procedures require that several field-type stations be occupied at the start and end of each day's work. The incorporation of computers and non-volatile memory in magnetometers has greatly increased the ease of use and data handling capability of magnetometers. The instruments typically will keep track of position, prompt for inputs, and internally store the data for an entire day of readings. Downloading the information

to a personal computer is straight forward and preliminary plots of the results of the day's work can be prepared each night.

The base magnetometer is activated every day prior to collection of any ground magnetic data. It is placed at least 100 feet from any metal objects or traveled roads and at least 500 feet from any power lines. The sensor is mounted above the ground surface and rotated until the sensor is properly oriented (if there is a preferred orientation marked on the sensor). The base magnetometer is activated and measurements are taken and recorded, along with the measurement time, at a specified time interval. At the end of the field day, the unit is deactivated and the time is recorded.

Steel and other ferrous metals in the vicinity of a magnetometer can distort the data. Thus, large (steel) belt buckles, etc. must be removed when operating the unit. The magnetic effect of any potentially offensive article should be tested for its effect on magnetic data. If a compass is carried, the magnetometer reading must be made more than ten feet from it.

A final test is to immobilize the magnetometer and take readings while the operator's body is moved to different directions around the sensor. If the readings do not change by more than a nT or so, the operator is "magnetically clean". If the readings do change, the operator must find the ferrous object on the operator's person that is causing the problem. Zippers, watches, glasses frames, boot grommets, keys, pencils, and almost anything else can have steel or iron in them. On very precise surveys, the operator effect must be held under one nT.

To obtain a representative reading, the sensor should be held well above the ground. This procedure is done because of the probability of collections of soil magnetite disturbing the reading at the station. In rocky terrain where the rocks have some percentage of magnetite, sensor heights of up to 12 feet have been used to remove near-surface effects. One obvious exception to this is some types of ordnance detection where the objective is to detect near-surface objects. Often a rapid-reading magnetometer is used (cycle time less than 1/4 second) and the magnetometer is used to sweep across an area near the ground. Small ferrous objects can be detected, and spurious occurrence of soil magnetite can be recognized by their lower amplitude and dispersion. Ordnance detection requires not only training in the recognition of the dangerous objects, but experience in separating small intense and interesting anomalies from more dispersed geologic noise.

On some magnetics surveys the field magnetometer must be read several times at each station until three readings agree to within 1 nT. On other surveys you must read the unit several times and record each reading. The work plan will specify which technique is required for a given survey. In either case, the time of the reading is also recorded unless the magnetometer stores the readings and times internally.

Sheet-metal barns, power lines, and other potentially magnetic objects will occasionally be encountered during a magnetic survey. When a magnetic reading is taken in their vicinity, they must be described and the distance from them noted in the field book or on a separate cultural survey map of the site.

The experienced magnetics operator will be alert for the possible occurrence of the following conditions:

1. Excessive gradients beyond the magnetometers ability to make a stable measurement. Modern magnetometers give a quality factor for the reading or otherwise indicate a successful determination of the value of the field. Multiple measurements at a station, minor adjustments of the station location and other adjustments of technique may be necessary to produce repeatable, representative data.

2. Nearby metal objects which may cause interference. Some items, such as automobiles are obvious, but some subtle interference will be recognized only by the imaginative and observant magnetics operator. Curbs and foundation remnants, buried cans and bottles, power lines, fences, and other hidden factors can greatly affect magnetic readings.

INTERPRETATION

Total magnetic field disturbances or anomalies are highly variable in shape and amplitude; they are almost always asymmetrical, sometimes appear complex (even from simple sources), and usually portray the combined effects of several sources. Ambiguity is present in the method in that an infinite number of possible sources can produce a given anomaly. This ambiguity is illustrated in Figure M-l where identical magnetic anomalies are accounted for by quite different distributions of causative materials.

One additional difficult issue is the fact that most magnetometers used measure the magnitude of total field of the earth. The direction of the field is not recorded. The consequences of this fact is that only the component of an anomalous field in the direction of earth's main field is measured. Figure M-2 illustrates this consequence of the measurement technique.

The induced nature of the measured field makes even large bodies act as dipoles, that is like a large bar magnet. If the (usual) dipolar nature of the anomalous field is combined with the measurement system that measures only the component in the direction of the earth's field, the difficult nature of most magnetic interpretations can be appreciated. To achieve a qualitative understanding of how some anomalies may look, consider Figure M-3. From this figure, based on a distributed body of narrow width perpendicular to the profile, one can see how the dipolar nature of the anomaly is muted. The negative portion of the anomaly is less than 1/10 of the positive anomaly. Figure M-4 however, illustrates the anomaly due to a thin but more distributed body. The body in figure M-4 is long perpendicular to the profile. Its narrow width is another factor which adds to the negative anomaly off to the north of the body. In Figure M-4 the negative portion of the anomaly is nearly 1/3 of the size of the positive portion. Note that for the body in Figure M-4, the body is located closer to the inflection point in the total field measurement rather than to the peak of the anomaly.

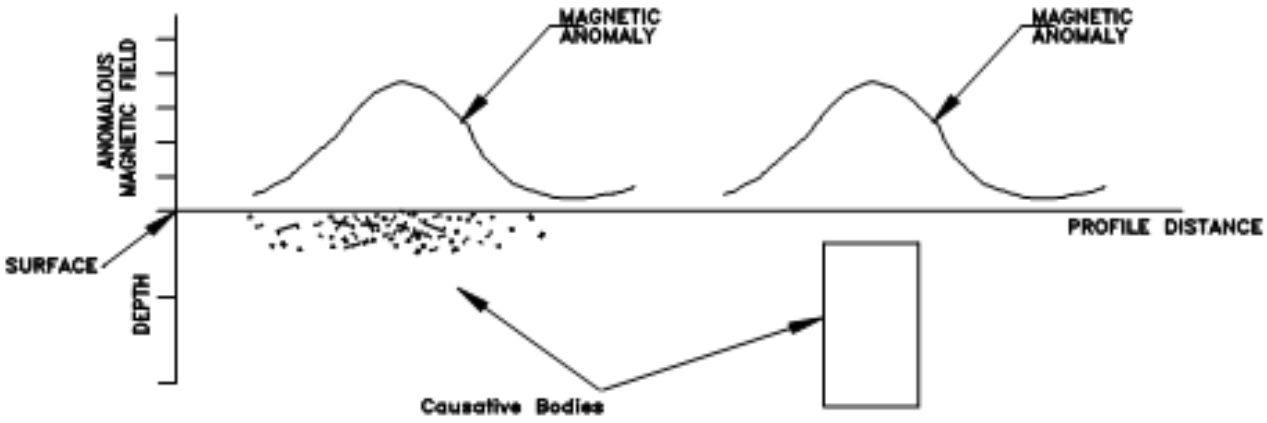


FIGURE M–1

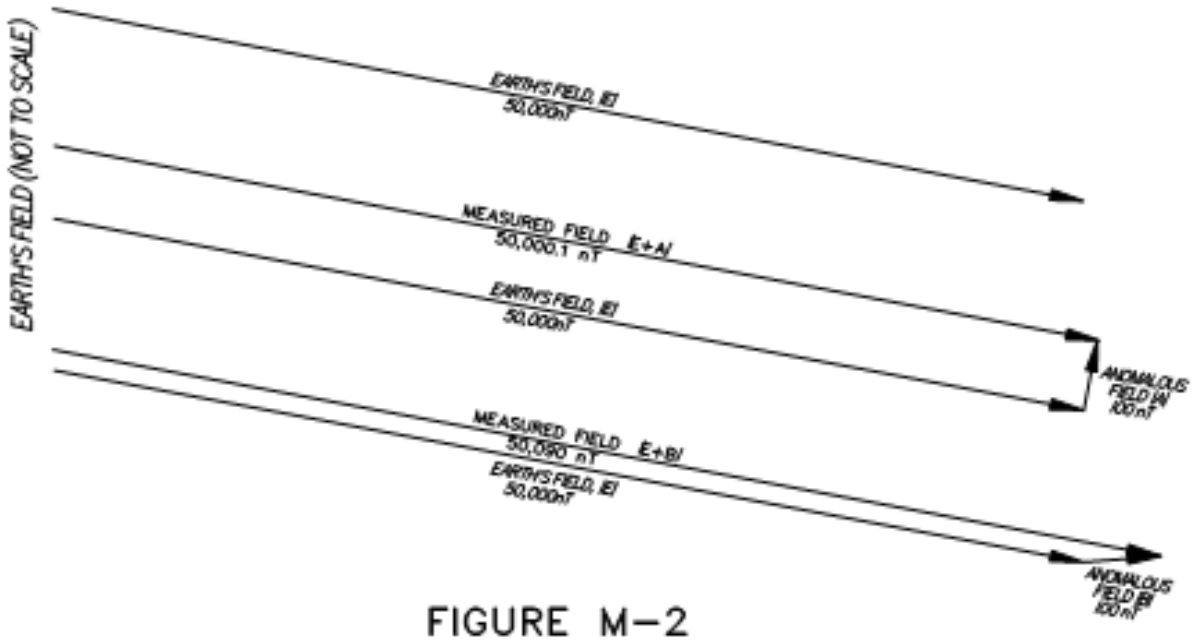


FIGURE M–2

Olson ENGINEERING

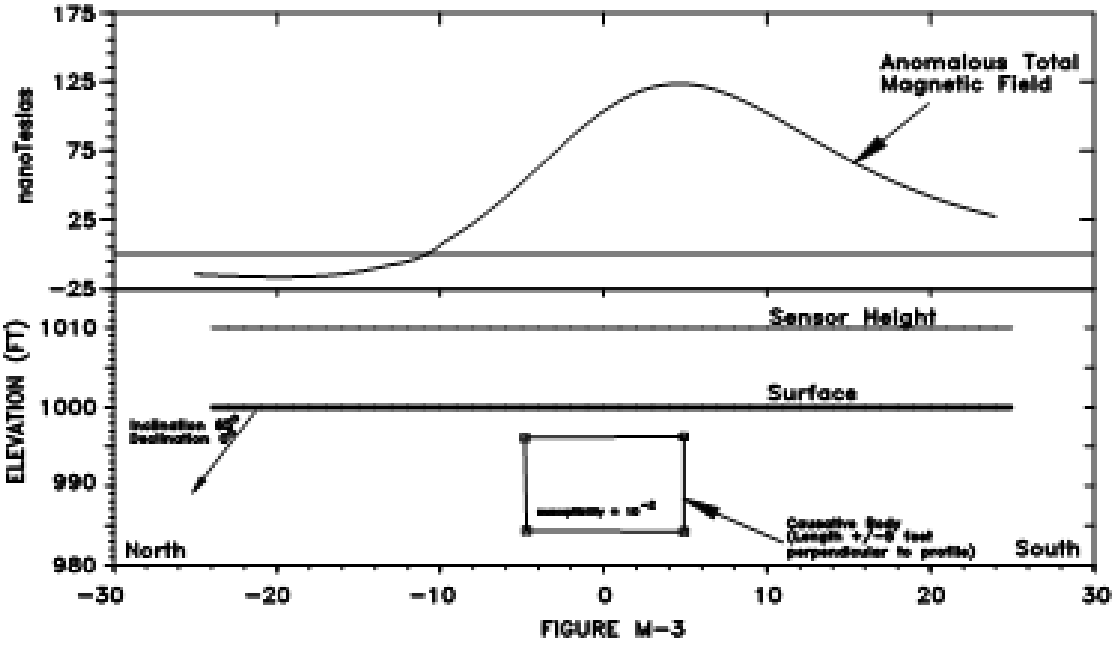


FIGURE M−3

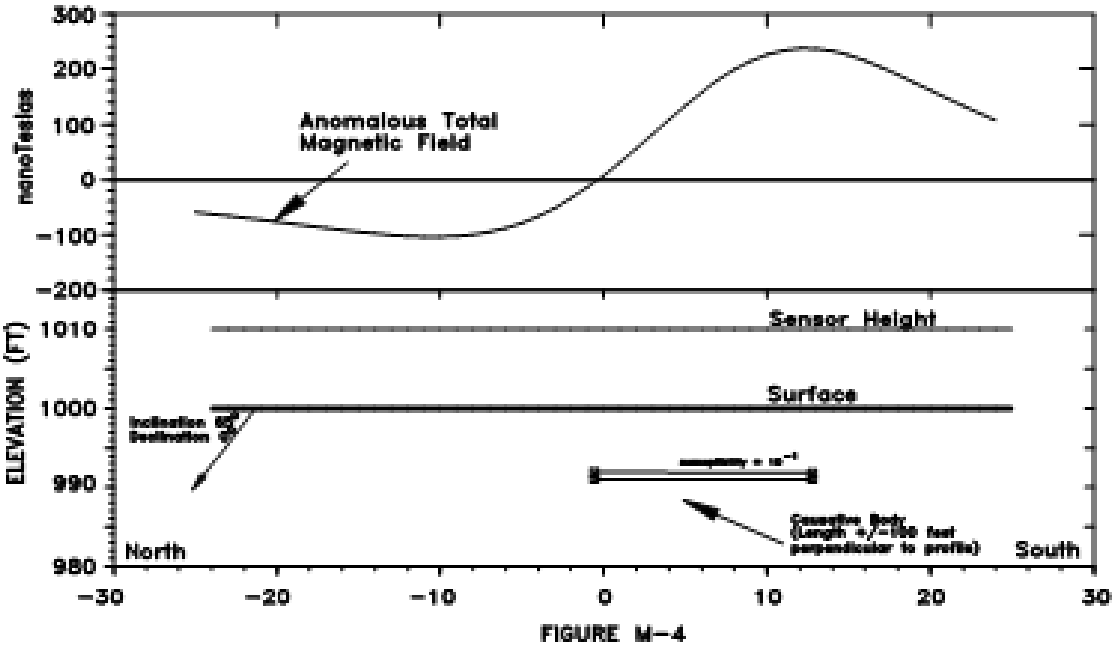


FIGURE M−4

Olson
ENGINEERING

METHOD APPENDIX
TIME DOMAIN ELECTROMAGNETICS
THE GEONICS EM61

The EM61-MK2 uses electromagnetic (EM) fields (also called EM waves) to detect buried metallic objects. The instrument has two rectangular coils, 1.0 by 0.5 meters in size, mounted one above the other as shown in the figure on the right. The lower coil is the transmitter and also acts as a receiver and the upper coil is a receiver only. Since the instrument uses EM fields to locate buried metal, any metal that conducts electrical current can be detected, including both ferrous and non-ferrous metal.

In order to generate EM fields, electrical current is passed through the lower coil and then turned off. After a short period of time the current is turned on again and the process repeated at 75 Hz. Turning on or off the current creates a changing EM field, and this forms the basis of the method.

When a changing EM field penetrates an object that conducts electricity, secondary electrical currents are induced to flow in the conductor. These currents then generate secondary changing EM fields that can be detected by a coil. These secondary EM fields are detected while the transmitter current is off. Secondary currents in highly conductive objects take longer to decay than do those in less conductive objects. Thus, the decay curves due to the conductivity of the ground decay relatively fast compared to those from metal objects. When no metal is present, a low-level or constant signal is received. An increased signal is received when metal is present. This signal is generally highest when the coils are located directly over the object, resulting in “bulls-eye” type anomalies for isolated metal objects and simplifies data analysis.

The EM61-MK2 allows the measurement of the secondary EM fields at 216, 366, 660 and 1266 microseconds after the transmitter current has been turned off. These times are often called data channels, or time gates. The top coil measures the secondary EM field 660 microseconds after the transmitter current has turned off. The instrument provides the option to either measure all four times from the lower coil or the earliest three times from the lower coil and one reading from the top coil.

Data positioning may be accomplished using three different methods. The most accurate method of positioning the data involves the coupling of Global Positioning System (GPS) data with the geophysical data. GPS data is streamed directly into the recording console and merged with the geophysical data. Positioning of the data with GPS may result in a

horizontal positional resolution of <5 cm. When using GPS for positioning, data are collected at user defined time intervals. The EM61-MK2 has the ability to collect up to 10 data points per second.

The other two methods are not as accurate and require additional work prior to surveying. One method uses an optical encoder housed in a single wheel of EM61. This method uses a predefined distance (rotation of the wheel) to collect data. Data collected in this manner normally have nominal along spacing of 0.63 feet. The final method allows for the collection of more data along the survey line but requires open areas for accurate positioning. This last method collects at user defined time intervals. This is the same mode of data collection as with GPS. During data acquisition marks are placed in the data. These marks are referenced to the survey grid and used to position the data during processing.

Appendix C CDWR Well Forms: Notice of Intent, Construction and Abandonment Reports

RECEIVED

GWS-51
3/2013

NOTICE OF INTENT TO CONSTRUCT MONITORING HOLE(S)

FEB 17 2016

Please type or print legibly in black or blue ink or file online @ dwrpermitsonline@state.co.us
COLORADO DIVISION OF WATER RESOURCES-1313 SHERMAN ST-STE 821-DENVER-CO-80203
PHONE: 303-866-3581---FAX: 303-866-3589 WEB: www.water.state.co.us

WATER RESOURCES
STATE ENGINEER
COLO

Well Owner Name(s): City and County of Denver
Address : 200 W. 14th Ave., Suite 310, Denver, CO 80204
Phone (area code & no.): 720.865.5356
Landowner's Name: multiple - see attached

Please check one and complete as indicated including contact info:

☐ Water Well Driller Licensed in Colorado – Lic. No. _____

☐ Professional Engineer Registered in Colorado – Reg. No. _____

☐ Professional Geologist per CRS 34-1-201(3)

■ Other -anyone directly employed by or under the supervision of a licensed driller, registered professional engineer or professional geologist

Contact / Company Pinyon Environmental, Inc.
Address 9100 West Jewell Avenue
City, State & Zip Lakewood, CO 80232
Phone 303-980-5200 Fax 303-980-0089

Print Name: Tim Grenier
Sign or enter full name here: Tim Grenier

Location: NW ¼ SE ¼, Section 5
Township 4 ☐N ☒S, Range 68 ☐E ☒W, ____ PM
County Denver
Subdivision: _____
Lot: _____ Block: _____ Filing Unit: _____
Site/Property Address multiple - see attached

GPS Location in UTM format (optional):
Set GPS unit to true north, datum NAD83, and use meters for the distance units, ☐ Zone 12 or ☐ Zone 13.
Easting _____ Northing _____

# of Monitoring Hole(s) to be constructed: 9
Estimated Depth _____ **Ft., Aquifer** _____
Purpose of Monitoring Hole(s) Groundwater Monitoring
Anticipated Date of Construction (mm/dd/yyyy) 03/01/2016
Date Notice Submitted (mm/dd/yyyy): 02/23/2016
(Must be at least 3 days prior to construction)

ACKNOWLEDGEMENT FROM STATE ENGINEER'S OFFICE

FOR OFFICE USE ONLY

055023 - MH PROCESSED BY Debbie Grady

DIV. 1 WD 8 BAS _____ MD _____ DATE ACKNOWLEDGED 2/17/16

CONDITIONS OF MONITORING HOLE ACKNOWLEDGEMENT

A COPY OF THE WRITTEN NOTICE OR ACKNOWLEDGEMENT SHALL BE AVAILABLE AT THE DRILLING SITE.

1) **Notice was provided to the State Engineer at least 3 days prior to construction of monitoring & observation hole(s).**
2) **Construction of the hole(s) must be completed within 90 days of the date notice was given to the State Engineer.** Testing and/or pumping shall not exceed a total of 200 hours unless prior written approval is obtained from the State Engineer. Water diverted during testing shall not be used for beneficial purposes. The owner of the hole(s) is responsible for obtaining permit(s) and complying with all rules and regulations pertaining to the discharge of fluids produced during testing.
3) **All work must comply with the Water Well Construction Rules, 2 CCR 402-2.** Minimum construction standards must be met or a variance obtained. Standard permit application and work report forms, including online filing instructions, are found on the DWR website at http://www.water.state.co.us. **Well Construction and Test Reports (GWS-31)** must be completed for each hole drilled. The licensed contractor or authorized individual must submit the completed forms to this office within 60 days of monitoring hole completion.
4) **Unless a well permit is obtained, or variance approved, the hole(s) must be plugged and sealed within one (1) year after construction. An Abandonment Report (form GWS-9) must be submitted within 60 days of plugging & sealing.** The above MH acknowledgement number, owner's structure name, and owner's name and address must be provided on all well permit application(s), well construction and abandonment reports.
5) **The owner of the hole(s) shall maintain records of water quality testing and submit this data to the State Engineer upon request.**
6) **A MONITORING HOLE CANNOT BE CONVERTED TO A PRODUCTION WATER WELL, except for purposes of remediation (recovery) or as a permanent dewatering system, if constructed in accordance with the Water Well Construction Rules and policies of the State Engineer.**
7) **IF HOLES WILL NOT BE CONSTRUCTED UNDER THIS NOTICE WITHIN 90 DAYS, PLEASE WRITE, "NO HOLES CONSTRUCTED" ON A COPY OF THE ACKNOWLEDGED NOTICE WITH THE FILE NUMBER AND FAX THE COPY TO THE DIVISION OF WATER RESOURCES.**

THIS ACKNOWLEDGEMENT OF NOTICE DOES NOT INDICATE THAT WELL PERMIT(S) CAN BE APPROVED.

(Use above space for labels or additional conditions as needed)

NWSE

Address	Property Owner	# groundwa	Estimated Total Depth
2901 W. 8th Avenue, Denver, CO 80204	Don Sik Kim and Gamila Kim	1	30
816-830 Federal Blvd, Denver, CO 80204	830 Gamila and Dong Kim LLC	2	30
888 Federal Blvd, Denver, CO 80204	Robert & Betty Reed	1	30
900 Federal Blvd, Denver, CO 80204	Thien Phan	1	40
950 Federal Blvd, Denver, CO 80204	Hassan S. Nekouie	1	55
970 Federal Blvd, Denver, CO 80204	Hassan S. Nekouie	1	55
990 Federal Blvd, Denver, CO 80204	Mohammad Teharani Raeouf	2	55
	Total	9	

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FEB 17 2016

WATER RESOURCES
STATE ENGINEER
COLO

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FEB 17 2016

WATER RESOURCES
STATE ENGINEER
COLO

GWS-51
3/2013

NOTICE OF INTENT TO CONSTRUCT MONITORING HOLE(S)

Please type or print legibly in black or blue ink or file online @ dwrpermitsonline@state.co.us

COLORADO DIVISION OF WATER RESOURCES-1313 SHERMAN ST-STE 821-DENVER-CO-80203

PHONE: 303-866-3581—FAX: 303-866-3589 WEB: www.water.state.co.us

Well Owner Name(s): City and County of Denver

Address : 200 W. 14th Ave., Suite 310, Denver, CO 80204

Phone (area code & no.): 720.865.5356

Landowner's Name: Rex Ausfahl and Gary Ausfahl

Please check one and complete as indicated including contact info:

☐ Water Well Driller Licensed in Colorado – Lic. No. _____

☐ Professional Engineer Registered in Colorado – Reg. No. _____

☐ Professional Geologist per CRS 34-1-201(3)

■ Other -anyone directly employed by or under the supervision of a licensed driller, registered professional engineer or professional geologist

Contact / Company Pinyon Environmental, Inc.

Address 9100 West Jewell Avenue

City, State & Zip Lakewood, CO 80232

Phone 303-980-5200 Fax 303-980-0089

Print Name: Tim Grenier

Sign or enter full name here: Tim Grenier

Location: NE ¼ SW ¼, Section 5

Township 4 ☐N ☒S, Range 68 ☐E ☒W, ____ PM

County Denver

Subdivision: _____

Lot: _____ Block: _____ Filing Unit: _____

Site/Property Address 995 Federal Blvd, Denver, CO 80204

GPS Location in UTM format (optional):

Set GPS unit to true north, datum NAD83, and use meters for the distance units, ☐ Zone 12 or ☐ Zone 13.

Easting _____ Northing _____

# of Monitoring Hole(s) to be constructed: 1

Estimated Depth 55 **Ft., Aquifer** _____

Purpose of Monitoring Hole(s) Groundwater Monitoring

Anticipated Date of Construction (mm/dd/yyyy) 03/01/2016

Date Notice Submitted (mm/dd/yyyy): 02/23/2016

(Must be at least 3 days prior to construction)

ACKNOWLEDGEMENT FROM STATE ENGINEER'S OFFICE

FOR OFFICE USE ONLY

055024 - MH PROCESSED BY Debbie Grizzle

DIV. 1 WD 8 BAS _____ MD _____ DATE ACKNOWLEDGED 2/17/16

CONDITIONS OF MONITORING HOLE ACKNOWLEDGEMENT

A COPY OF THE WRITTEN NOTICE OR ACKNOWLEDGEMENT SHALL BE AVAILABLE AT THE DRILLING SITE.

1) **Notice was provided to the State Engineer at least 3 days prior to construction of monitoring & observation hole(s).**
2) **Construction of the hole(s) must be completed within 90 days of the date notice was given to the State Engineer.** Testing and/or pumping shall not exceed a total of 200 hours unless prior written approval is obtained from the State Engineer. Water diverted during testing shall not be used for beneficial purposes. The owner of the hole(s) is responsible for obtaining permit(s) and complying with all rules and regulations pertaining to the discharge of fluids produced during testing.
3) **All work must comply with the Water Well Construction Rules, 2 CCR 402-2.** Minimum construction standards must be met or a variance obtained. Standard permit application and work report forms, including online filing instructions, are found on the DWR website at http://www.water.state.co.us. **Well Construction and Test Reports (GWS-31)** must be completed for each hole drilled. The licensed contractor or authorized individual must submit the completed forms to this office within 60 days of monitoring hole completion.
4) **Unless a well permit is obtained, or variance approved, the hole(s) must be plugged and sealed within one (1) year after construction. An Abandonment Report (form GWS-9) must be submitted within 60 days of plugging & sealing.** The above MH acknowledgement number, owner's structure name, and owner's name and address must be provided on all well permit application(s), well construction and abandonment reports.
5) **The owner of the hole(s) shall maintain records of water quality testing and submit this data to the State Engineer upon request.**
6) **A MONITORING HOLE CANNOT BE CONVERTED TO A PRODUCTION WATER WELL, except for purposes of remediation (recovery) or as a permanent dewatering system, if constructed in accordance with the Water Well Construction Rules and policies of the State Engineer.**
7) **IF HOLES WILL NOT BE CONSTRUCTED UNDER THIS NOTICE WITHIN 90 DAYS, PLEASE WRITE, "NO HOLES CONSTRUCTED" ON A COPY OF THE ACKNOWLEDGED NOTICE WITH THE FILE NUMBER AND FAX THE COPY TO THE DIVISION OF WATER RESOURCES.**

THIS ACKNOWLEDGEMENT OF NOTICE DOES NOT INDICATE THAT WELL PERMIT(S) CAN BE APPROVED.

(Use above space for labels or additional conditions as needed)

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FEB 17 2016

WATER RESOURCES
STATE ENGINEER
COLO

GWS-51
3/2013

NOTICE OF INTENT TO CONSTRUCT MONITORING HOLE(S)

Please type or print legibly in black or blue ink or file online @ dwrpermitsonline@state.co.us

COLORADO DIVISION OF WATER RESOURCES-1313 SHERMAN ST-STE 821-DENVER-CO-80203
PHONE: 303-866-3581---FAX: 303-866-3589 WEB: www.water.state.co.us

Well Owner Name(s): City and County of Denver

Address : 200 W. 14th Ave., Suite 310, Denver, CO 80204

Phone (area code & no.): 720.865.5356

Landowner's Name: multiple - see attached

Please check one and complete as indicated including contact info:

☐ Water Well Driller Licensed in Colorado – Lic. No. _____

☐ Professional Engineer Registered in Colorado – Reg. No. _____

☐ Professional Geologist per CRS 34-1-201(3)

■ Other -anyone directly employed by or under the supervision of a licensed driller, registered professional engineer or professional geologist

Contact / Company Pinyon Environmental, Inc.

Address 9100 West Jewell Avenue

City, State & Zip Lakewood, CO 80232

Phone 303-980-5200 Fax 303-980-0089

Print Name: Tim Grenier

Sign or enter full name here: Tim Grenier

Location: SW ¼ SE ¼, Section 5

Township 4 ☐N ☒S, Range 68 ☐E ☒W, ____ PM

County Denver

Subdivision: _____

Lot: _____ Block: _____ Filing Unit: _____

Site/Property Address multiple - see attached

GPS Location in UTM format (optional):

Set GPS unit to true north, datum NAD83, and use meters for the distance units, ☐ Zone 12 or ☐ Zone 13.

Easting _____ Northing _____

# of Monitoring Hole(s) to be constructed: 12

Estimated Depth _____ **Ft., Aquifer** _____

Purpose of Monitoring Hole(s) Groundwater Monitoring

Anticipated Date of Construction (mm/dd/yyyy) 03/01/2016

Date Notice Submitted (mm/dd/yyyy): 02/23/2016

(Must be at least 3 days prior to construction)

ACKNOWLEDGEMENT FROM STATE ENGINEER'S OFFICE

FOR OFFICE USE ONLY

055025 - MH PROCESSED BY Debbie Grozalis

DIV. 1 WD 8 BAS _____ MD _____ DATE ACKNOWLEDGED 2/17/16

CONDITIONS OF MONITORING HOLE ACKNOWLEDGEMENT

A COPY OF THE WRITTEN NOTICE OR ACKNOWLEDGEMENT SHALL BE AVAILABLE AT THE DRILLING SITE.

1) **Notice was provided to the State Engineer at least 3 days prior to construction of monitoring & observation hole(s).**
2) **Construction of the hole(s) must be completed within 90 days of the date notice was given to the State Engineer.** Testing and/or pumping shall not exceed a total of 200 hours unless prior written approval is obtained from the State Engineer. Water diverted during testing shall not be used for beneficial purposes. The owner of the hole(s) is responsible for obtaining permit(s) and complying with all rules and regulations pertaining to the discharge of fluids produced during testing.
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THIS ACKNOWLEDGEMENT OF NOTICE DOES NOT INDICATE THAT WELL PERMIT(S) CAN BE APPROVED.

(Use above space for labels or additional conditions as needed)

SWSE

Address	Property Owner	# groundwater wells	Estimated Total Depth of Well (ft bgs)
710 Federal Blvd., Denver, CO 80204	M&M Hi Performance Car Wash	5	35
724 Federal Blvd., Denver, CO 80204	Dolezal Family Partnership	3	35
730 Federal Blvd., Denver, CO 80204	Dolezal Family Partnership	1	35
2970 W Severn Pl, Denver, CO 80204	Thuan Thi Nguyen Living Trust	2	35
750 Federal Blvd., Denver, CO 80204	Denver Public Schools	1	30
	Total	12	

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WATER RESOURCES
STATE ENGINEER
COLO

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW2SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 710 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5254.566 feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 06/08/2016 TOTAL DEPTH 55.00 feet DEPTH COMPLETED 55.00 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-0.5	Concrete	Concrete	NA	
0.5-2	Lean Clay, Sand	Clay, Sand	Brown	
2-5	Silt, Sand	Sand	Brown	
5-8.5	Silt, Sand, Gravel	Sand,Silt,Grav	Brown	
8.5-10	Lean Clay, Sand	Clay, Sand	Brown	
10-15	Lean Clay, Sand	Clay, Sand	Brown	
15-20	Lean Clay, Sand	Clay, Sand	Brown	
20-25	Fat Clay, Silt	Clay, Silt		
25-30	Lean Clay, Silt,Sand	Clay, Silt,Sand		
30-34	Fat Clay, Sand	Clay, Sand		
34-38	Fat Clay, Silt, Sand	Clay,Silt,Sand		
38-40	Fat Clay, Silt	Clay, Silt		39
40-42.5	Lean Clay,Silt,Sand	Clay,Silt,Sand		
42.5-45	Lean Clay, Silt	Clay, Silt		
45-47.5	Lean Clay, Silt	Clay, Silt		
47.5-49	Lean Clay, Silt	Clay, Silt		
49-52.5	Silt, Sandy Clay	Silt, Sand,Clay		
52.5-55	Bedrock	Bedrock	Black, Blue	

6. HOLE DIAM (in.)

HOLE DIAM (in.)	From (ft)	To (ft)
3	0	55.00

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	45.00

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		45.00	55.00

8. FILTER PACK:

Material Sand

Size _____

Interval 43.00-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			3-43.00	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW2SB02

Easting: _____

STREET ADDRESS AT WELL LOCATION: 710 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5254.656 feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 06/08/2016 TOTAL DEPTH 45.00 feet DEPTH COMPLETED 45.00 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-0.5	Concrete	Concrete		
0.5-1	Sand,Silt,Gravel	Sand,Silt,Grav	Brown	
1-2	Sand, Clay	Sand, Clay	Brown	
2-3	Silty Sand, Clay	Silt,Sand,Clay	Brown	
3-4	No Recovery			
4-5	Silty Sand, Clay	Silt,Sand,Clay	Brown	
5-8.5	Silty Sand, Gravel	Silt,Sand,Grav	Brown	
8.5-10	Lean Clay, Sand	Clay, Sand	Brown	
10-15	Lean Clay, Sand	Clay, Sand	Brown	
15-17.5	Lean Clay, Sand	Clay, Sand	Brown	
17.5-19	Silty Sand, Clay	Silt,Sand,Clay	Brown	
19-20	Lean Clay, Sand	Clay, Sand	Brown	
20-25	Silty Lean Clay	Clay	Brown	
25-27	Silty Lean Clay	Clay		
27-30	Silt, Sand	Silt, Sand		
30-35	Silt, Sand	Silt, Sand		
35-40	Silt, Sand	Silt, Sand		39.5
40-41	Silt, Sand	Silt, Sand		

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	45.00

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	35.00

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		35.00	45.00

8. FILTER PACK:

Material Sand

Size _____

Interval 32.00-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			3-32.00	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW2SB03

Easting: _____

STREET ADDRESS AT WELL LOCATION: 710 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5252.748 feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 06/08/2016 TOTAL DEPTH 39.55 feet DEPTH COMPLETED 40.00 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-0.5	Concrete	Concrete		
0.5-1	No Recovery			
1-2	Clay, Silt, Gravel	Clay,Silt,Grav	Drk Brown	
2-4	Clay, Gravel	Clay,Gravel	Brown	
4-5	Silty Sand	Silt,Sand	Brown	
5-10	Fat Clay, Sand	Clay, Sand	Brown	
10-15	Fat Clay, Sand	Clay, Sand	Brown	
15-19	Sand, Silt, Gravel	Sand,Silt,Grav	Brown	
19-20	Silty Lean Clay,Sand	Clay, Sand	Brown	
20-25	Fat Clay, Silt	Clay, Silt	Brown	
25-30	Lean Clay, Sand	Clay, Sand		
30-35	Lean Clay, Silt	Clay, Silt,Sand	Copper Strk	34.5
35-40	Silty Sand	Silt, Sand,Clay	Copper Strk	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	40.00

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	30.00

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		30.00	40.00

8. FILTER PACK:

Material: Sand
Size: _____
Interval: 28.00-TD

9. PACKER PLACEMENT:

Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			3-28.00	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW2SB04

Easting: _____

STREET ADDRESS AT WELL LOCATION: 710 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5253.210 feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 06/09/2016 TOTAL DEPTH 44.36 feet DEPTH COMPLETED 45 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-0.5	Concrete	Concrete		
0.5-1	Lean Clay, Sand,Grav	Clay,Sand	Brown	
1-5	Silt, Sand	Silt, Sand	Brown	
5-10	Lean Clay, Silt,Sand	Clay,Silt,Sand	Brown	
10-15	Lean Clay, Sand,Grav	Clay,Sand,Grav	Brown	
15-17.5	Lean Clay, Sand	Clay, Sand	Brown	
17.5-20	Silty Sand	Sand, Silt	Brown	
20-25	Fat Clay, Silt	Clay, Silt	Brown	
25-30	Fat Clay, Sand	Clay, Sand		
30-35	Fat Clay	Clay		34
35-40	Fat Clay, Sand	Clay, Sand		
40-45	Fat Clay, Sand	Clay, Sand		

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	45.00

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	34.00

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		34.00	44.36

8. FILTER PACK:

Material: Sand
Size: _____
Interval: 32.00-TD

9. PACKER PLACEMENT:

Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			3-32.00	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW2SB05

Easting: _____

STREET ADDRESS AT WELL LOCATION: 710 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5251.513 feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 06/09/2016 TOTAL DEPTH 54.55 feet DEPTH COMPLETED 55 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-0.5	Concrete	Concrete		
0.5-2	Lean Clay, Silt,Sand	Clay,Silt,Sand	Brown	
2-5	Lean Clay, Silt,Sand	Clay,Silt,Sand	Brown	
5-10	Lean Clay, Silt,Sand	Clay,Silt,Sand	Brown	
10-14	Lean Clay, Silt,Sand	Clay,Silt,Sand	Brown	
14-18	Silty Sand, Gravel	Sand, Gravel	Brown	
18-20	Lean Clay, Silt	Clay, Silt	Brown	
20-25	Fat Clay	Clay	Brown	
25-30	Lean Clay, Sand	Clay, Sand		
30-32	Lean Clay, Sand	Clay, Sand		
32-35	Clayey Sand	Clay		34.5
35-40	Clayey Sand	Clay		
40-45	Clayey Sand	Clay		
45-49	Sand	Sand		
49-50	Bedrock	Bedrock		

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	55.00

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	44.55

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		44.55	54.55

8. FILTER PACK:

Material: Sand
Size: _____
Interval: 42.55-TD

9. PACKER PLACEMENT:

Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			3-42.55	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW6SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 2970 West Severn, Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/01/2016 TOTAL DEPTH 37.54 feet DEPTH COMPLETED 37.54 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-14	Lean Clay	Clay	Black	
14-15	Silty Sand	Sand	Lt Brown,Orange	
15-20	Fat Clay	Clay	Brown,Orange	
20-24	Fat Clay	Clay	Brown	
24-25	Silty Sand	Sand	Brown,Orange	
25-27.5	Fat Clay	Clay	Brown	
27.5-31.5	Fat Clay	Clay	Brown	
31.5-33.5	Silty Sand	Sand	Brown	31.5
33.5-37.5	Fat Clay	Clay	Brown	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	37.54

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	27.54

PERFORATED CASING: Screen Slot Size (in): 0.010

1			27.54	37.54

8. FILTER PACK:
Material: Sand
Size: _____
Interval: 25.54-TD

9. PACKER PLACEMENT:
Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-25.54	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW6SB02

Easting: _____

STREET ADDRESS AT WELL LOCATION: 2970 West Severn, Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/01/2016 TOTAL DEPTH 37.35 feet DEPTH COMPLETED 37.38 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Lean Clay	Clay, Sand	Brown	
5-10	Fat Clay	Clay	Brown,Black	
10-13	Silty Sand	Sand	Brown	
13-14	Lean Clay	Clay, Sand	Brown	
14-20	Fat Clay	Clay	Brown	
20-25	Fat Clay	Clay	Brown, Orange	
25-30	Fat Clay	Clay	Brown, Orange	
30-32.5	Fat Clay	Clay	Brown	30.5
32.5-35	Fat Clay	Clay	Brown	
35-38	Fat Clay	Clay	Brown	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	37.38

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	27.38

PERFORATED CASING: Screen Slot Size (in): 0.010

1			27.38	37.38

8. FILTER PACK:
Material: Sand
Size: _____
Interval: 25.38-TD

9. PACKER PLACEMENT:
Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-25.38	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055025-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: SW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW9SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 750 Federal Blvd., Denver, CO, 80204

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/04/2016 TOTAL DEPTH 32.07 feet DEPTH COMPLETED 32.07 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Silty Sand w/Gravel		Brown, Black	
5-10	Silty Sand w/Gravel		Light Gray	
10-15	Silty Sand w/Gravel		Dark Brown	
15-20	Lean Clay		Brown	
20-23	Lean Clay		Brown	
23-25	Silty Sand		Brown	25
25-30	Silty Sand		Grey	
30-32	Well Graded Sand		Grey	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	32.07

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	22.07

PERFORATED CASING: Screen Slot Size (in): 0.010

1			22.07	32.07

8. FILTER PACK:

Material Sand

Size _____

Interval 20.0-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-20.0	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code:

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW14SB02

Easting: _____

STREET ADDRESS AT WELL LOCATION: 816 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5738.102 feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 04/27/2016 TOTAL DEPTH 34.13 feet DEPTH COMPLETED 34.19 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-3	Sand, Gravel	Sand, Gravel	Brown	
3-5	Fat Clay	Clay	Brown	
5-9.5	Fat Clay	Clay	Brown	
9.5-10	Lean Clay, Sand	Clay, Sand	Brown	
10-15	Fat Clay	Clay	Brown, Gray	
15-15.5	Fat Clay	Clay	Brown	
15.5-16	Sandy Seam	Sand	Brown	
16-20	Fat Clay	Clay	Brown	
20-25	Fat Clay	Clay	Brown,Org,White	
25-30	Fat Clay, Sand	Clay,Sand	Brown,Org,Red	
30-35	Fat Clay	Clay	Brown,Orange	32.5

6. HOLE DIAM (in.)

	From (ft)	To (ft)
1	0	34.19

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	24.50

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		24.50	34.19

8. FILTER PACK:

Material Sand

Size _____

Interval 23.50-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			2-23.50	

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW14SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 830 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5242.942 feet DRILLING METHOD _____

DATE COMPLETED 04/27/2016 TOTAL DEPTH 39.59 feet DEPTH COMPLETED 39.60 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Fat Clay	Clay	Brown	
5-10	Fat Clay	Clay	Brown	
10-15	Fat Clay, Silty Sand	Clay, Sand	Brown	
15-20	Fat Clay, Silty/Sand	Clay, Sand	Brown, Black	
20-25	Fat Clay	Clay	Brown, Orange	
25-30	Fat Clay	Clay	Brown, Orange	26
30-35	Fat Clay	Clay	Brown, Orange	
35-40	Fat Clay	Clay	Brown, Orange	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
1	0	39.60

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	30.00

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		30.00	39.60

8. FILTER PACK:

Material: Sand
Size: _____
Interval: 28.00-TD

9. PACKER PLACEMENT:

Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			2-28.00	

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW19SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 888 Federal Blvd., Denver, CO, 80204

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/02/2016 TOTAL DEPTH 39.38 feet DEPTH COMPLETED 39.38 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-9	Lean Clay		Brown	
9-10	Lean Clay		Brown	
10-15	Fat Clay		Brown	
15-20	Lean Clay		Brown, Orange	
20-25	Lean Clay		Brown	
25-30	Fat Clay		Brown	
30-39	Falt Clay		Brown	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	39.38

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	29.38

PERFORATED CASING: Screen Slot Size (in): 0.010

1			29.38	39.38

8. FILTER PACK:

Material Sand

Size _____

Interval 27.38-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-27.38	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW23SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 900 Federal Blvd., Denver, CO, 80204

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/04/2016 TOTAL DEPTH 54.96 feet DEPTH COMPLETED 54.96 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Lean Clay	Clay, Gravel	Brown	
5-10	Lean Clay	Clay, Sand	Brown	
10-15	Fat Clay	Clay	Brown	
15-17.5	Silty Sand	Sand	Brown, Black	
17.5-20	Lean Clay	Clay	Brown, Orange	
20-22.5	Lean Clay	Clay	Brown	
22.5-23.5	Silty Sand	Sand	Brown, Black	
23.5-25	Lean Clay	Clay, Sand	Brown	
25-35	Fat Clay	Clay	Brown	
35-45	Fat Clay	Clay	Brown, Orange	
45-47.5	Fat Clay	Clay	Brown	
47.5-52	Fat Clay	Clay	Grey	
52-55	Graded Sand w/Gravel	Sand, Gravel	Reddish	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	54.96

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	44.96

PERFORATED CASING: Screen Slot Size (in): 0.010

1			44.96	54.96

8. FILTER PACK:
Material: Sand
Size: _____
Interval: 42.96-TD

9. PACKER PLACEMENT:
Type: _____
Depth: _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-42.96	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW25SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 950 Federal Blvd., Denver, CO, 80204

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/02/2016 TOTAL DEPTH 63.30 feet DEPTH COMPLETED 63.30 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Lean Clay	Clay	Brown	
5-6	Silt	Silt	Brown	
6-10	Lean Clay	Clay	Brown	
10-19	Fat Clay	Clay	Brown	
19-20	Silty Sand	Sand	Brown	
20-25	Lean Clay	Clay	Brown,Orange	
25-30	Fat Clay	Clay	Brown	
30-35	Fat Clay	Clay	Brown	
35-50	Fat Clay	Clay	Brown	
50-52.5	Fat Clay	Clay,Sand	Brown	
52.5-62	Fat Clay	Clay,Sand	Gray	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	63.30

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	53.30

PERFORATED CASING: Screen Slot Size (in): 0.010

1			53.30	63.30

8. FILTER PACK:

Material Sand

Size _____

Interval 51.30-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-51.30	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 130 Capital Dr. #C, Golden, CO 80401

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW28SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 970 Federal Blvd., Denver, CO, 80204

Northing: _____

4. GROUND SURFACE ELEVATION _____ feet DRILLING METHOD Direct Push/Auger

DATE COMPLETED 03/03/2016 TOTAL DEPTH 68.60 feet DEPTH COMPLETED 68.60 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Well Graded Sand	Sand	Brown, Black	
5-15	Well Graded Sand	Sand, Gravel	Dark Brown	
15-20	Silty Sand	Sand	Black	
20-25	Lean Clay	Clay,Sand	Light Brown	
25-30	Fat Clay	Clay	Brown	
30-35	Fat Clay	Clay	Brown	
35-37.5	Fat Clay	Clay	Brown	
37.5-40	Fat Clay	Clay	Brown, Orange	
40-50	Fat Clay	Clay	Brown, Orange	
50-51	Fat Clay	Clay	Brown	
51-68	Fat Clay	Clay,Sand	Grey	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
3	0	68.60

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1			0	58.60

PERFORATED CASING: Screen Slot Size (in): 0.010

1			58.60	68.60

8. FILTER PACK:

Material Sand
Size _____
Interval 56.60-TD

9. PACKER PLACEMENT:

Type _____
Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-56.60	pour

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	05/03/2016

FORM NO. GWS-31 4/2012

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
1313 Sherman St., Ste 821, Denver, CO 80203
Main (303) 866-3581 Fax (303) 866-3589 www.water.state.co.us

For Office Use Only

1. WELL PERMIT NUMBER: 055023-MH

2. WELL OWNER INFORMATION

NAME OF WELL OWNER: City and County of Denver

MAILING ADDRESS: 200 W. 14th Ave., Suite 310

CITY: Denver STATE: CO ZIP CODE: 80204

TELEPHONE NUMBER w/area code: 720.865.5356

3. WELL LOCATION AS DRILLED: NW 1/4, SE 1/4, Sec., 5 Twp. 4 ☐ N or S, ☒ Range 68 ☐ E or W ☒

DISTANCES FROM SEC. LINES: _____ ft. from ☐ N or ☐ S section line and _____ ft. from ☐ E or ☐ W section line.

SUBDIVISION: _____, LOT____, BLOCK____, FILING (UNIT) ____

Optional GPS Location: GPS Unit must use the following settings: Format must be **UTM**, Units must be **meters**, Datum must be **NAD83**, Unit must be set to **true N**, ☐ Zone 12 or ☐ Zone 13

Owner's Well Designation: RW31SB01

Easting: _____

STREET ADDRESS AT WELL LOCATION: 990 Federal Blvd., Denver, CO

Northing: _____

4. GROUND SURFACE ELEVATION 5249.353 feet DRILLING METHOD _____

DATE COMPLETED 04/27/2016 TOTAL DEPTH 60.03 feet DEPTH COMPLETED 60.60 feet

5. GEOLOGIC LOG:

Depth	Type	Grain Size	Color	Water Loc.
0-5	Sand/Silt, Debris	Sand, Silt	Drk Brown	
5-10	Sand, Cem. Debris	Sand	Red Brown,White	
10-15	No Recovery	NA	NA	
15-20	Sand	Sand	Drk Brown,Black	
20-25	Lean Clay, Sand Seam	Clay, Sand	Brown	
25-30	Lean Clay, Sand Seam	Clay, Sand	Brown	
30-50	Fat Clay	Clay	Brown, Orange	
50-51	Fat Clay, Sand	Clay, Sand	Brown	
51-54	Fat Clay	Clay	Gray	
54-55	Sand, Gravel	Sand, Gravel	Brown, Pink	
55-57.5	Sand, Gravel	Sand, Gravel	Lt Brown, Pink	
57.5-60	Lean Clay, Sand	Clay, Sand	Gray	
60-63	Sand	Sand	Lt Brown/Orange	

6. HOLE DIAM (in.)

	From (ft)	To (ft)
1	0	60.60

7. PLAIN CASING:

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
1	PVC		0	50.50

PERFORATED CASING: Screen Slot Size (in): 0.010

1	PVC		50.50	60.03

8. FILTER PACK:

Material Sand

Size _____

Interval 48.00-TD

9. PACKER PLACEMENT:

Type _____

Depth _____

10. GROUTING RECORD

Material	Amount	Density	Interval	Placement
Bentonite			1-48.00	

Remarks: _____

11. DISINFECTION: Type _____ Amt. Used _____

12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form Number GWS 39 Supplemental Well Test.

TESTING METHOD _____

Static Level _____ ft. Date/Time measured: _____, Production Rate _____ gpm.

Pumping Level _____ ft. Date/Time measured _____, Test Length (hrs) _____.

Remarks:

13. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402-2. The filing of a document that contains false statements is a violation of section 37-91-108(1)(e), C.R.S., and is punishable by fines up to $5000 and/or revocation of the contracting license. If filing online the State Engineer considers entering of licensed contractor name to be compliance with Rule 17.4

Company Name:	Phone w/area code:	License Number:
Pinyon Environmental	303.980.5200	38399

Mailing Address: 9100 W. Jewell Avenue, Lakewood, CO. 80232

Sign (or enter name if filing online)	Print Name and Title	Date
Russ Cirillo, PE	Russ Cirillo, Engineer	07/13/2016

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
(303) 866-3581 Fax (303) 866-3589 dwrpermitsonline@state.co.us

For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW2SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 710 FEDERAL BLVD, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 37 feet to 54 feet
BENTONITE	POUR	from 0 feet to 37 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
(303) 866-3581 Fax (303) 866-3589 dwrpermitsonline@state.co.us

For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW2SB02

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 710 FEDERAL BLVD, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 39 feet to 45 feet
BENTONITE	POUR	from 0 feet to 39 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
(303) 866-3581 Fax (303) 866-3589 dwrpermitsonline@state.co.us

For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW2SB03

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 710 FEDERAL BLVD, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 33 feet to 39.55 feet
BENTONITE	POUR	from 0 feet to 33 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
(303) 866-3581 Fax (303) 866-3589 dwrpermitsonline@state.co.us

For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW2SB04

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 710 FEDERAL BLVD, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 31.50 feet to 44.36 feet
BENTONITE	POUR	from 0 feet to 31.50 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW2SB05

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 710 FEDERAL BLVD, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 31.00 feet to 54.55 feet
BENTONITE	POUR	from 0 feet to 31.00 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW6SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 2970 W SEVERN PLACE, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

☒ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 29.00 feet to 37.50 feet
BENTONITE	POUR	from 0 feet to 29.00 feet
		from 0 feet to 0 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW6SB02

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 2970 W SEVERN PLACE, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 28.30 feet to 37.50 feet
BENTONITE	POUR	from 0 feet to 28.30 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055025 **Hole ID #/Name** RW9SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 750 FEDERAL BLVD, DENVER, CO

SW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 21.00 feet to 32.00 feet
BENTONITE	POUR	from 0 feet to 21.00 feet
		from 0 feet to 0 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

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Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
(303) 866-3581 Fax (303) 866-3589 dwrpermitsonline@state.co.us

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW14SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 830 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 26.40 feet to 40 feet
BENTONITE	POUR	from 0 feet to 26.40 feet
CONCRETE	PLACE	from 0 feet to 0.08 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW14SB02

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 816 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 21.20 feet to 35 feet
BENTONITE	POUR	from 0 feet to 21.20 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

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WELL ABANDONMENT REPORT

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW19SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 888 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 26.80 feet to 40.00 feet
BENTONITE	POUR	from 0 feet to 26.80 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

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Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW23SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 900 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 53.00 feet to 55.00 feet
BENTONITE	POUR	from 0 feet to 53.00 feet
CONCRETE	PLACE	from 0 feet to 0.08 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
(303) 866-3581 Fax (303) 866-3589 dwrpermitsonline@state.co.us

For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW25SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 950 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 57.00 feet to 63.30 feet
BENTONITE	POUR	from 0 feet to 57.00 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
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For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW28SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 970 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 56.00 feet to 68.60 feet
BENTONITE	POUR	from 0 feet to 56.00 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Form No. GWS-09 4/2012

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER
821 Centennial Bldg., 1313 Sherman St., Denver, CO 80203
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For Office Use Only

WELL ABANDONMENT REPORT

Use to report plugging and sealing of permitted wells, monitoring and other holes. This form can be computer generated, typed or printed in black or blue ink. Instructions and plugging standards are on reverse side of form.

Well Permit Number of the well being plugged_____ or
MH File Number MH- 055023 **Hole ID #/Name** RW31SB01

Individual/Company responsible for plugging and sealing the well:

Name(s) PINYON ENVIRONMENTAL, INC

Mailing Address 9100 WEST JEWELL AVE

City, St., Zip LAKEWOOD, CO 80232

Phone (area code & no.) 303.980.5200 Email: wardell@pinyon-env.com

Well (Hole) Owner:

NAME(S) CITY AND COUNTY OF DENVER Phone (include area code) 720.865.5356

Mailing Address, City, St., Zip 200 W. 14TH AVENUE, SUITE 310, DENVER, CO 80204

ACTUAL WELL LOCATION: County DENVER

Property Address, City, St, Zip 990 FEDERAL BLVD, DENVER, CO

NW 1/4 of the SE 1/4, Sec. 5, Twp. 4 ☐ N. or ☒ S., Range 68 ☐ E. or ☒ W., _____ P.M.

Distance from Section Lines _____ Ft. from ☐ N. or ☐ S., _____ Ft. from ☐ E. or ☐ W. Line.

Subdivision Name _____ Lot _____, Block _____, Filing/Unit _____

Optional: GPS well location information in UTM format. You must check GPS unit for required settings as follows:

Format must be UTM, zone 12 ☐ or zone 13 ☐; Units must be meters; Datum must be NAD83; Unit must be set to true north.

Easting _____ **Northing** _____

I (we) report the existing well (hole) was plugged and sealed on the date of 07/11/2016 for the following reason(s):

☐ The well was plugged and sealed as required under Well Permit Number _____.

☐ The well was not in use and was plugged and sealed.

■ Other (please explain) MONITORING WELL NO LONGER USED

The well was plugged with the following materials placed at the indicated intervals:

Amount and Type of Material	Method of Placement	Interval
SAND	POUR	from 52.60 feet to 63.0 feet
BENTONITE	POUR	from 0 feet to 52.60 feet
CONCRETE	PLACE	from 0 feet to 0.167 feet
Intervals of casing removed/ripped in feet		from 0 feet to 0 feet

Report must be signed or name entered by person who performed the well plugging work or by the well owner if this person is unknown or not reachable. I (we) have read the statements made herein, know the contents thereof, and that they are true to my (our) knowledge.

Sign or enter full name	If signing print name & title	Date (mm/dd/yyyy)
JAKE FRITZ	JAKE FRITZ, Environmental Scientist	07/15/2016

It is the responsibility of the well owner to have the well/hole properly plugged and sealed. The Well Construction Contractor is responsible for notifying the owner of this requirement.

Appendix D Soil Boring Logs

BORING: RW2SB01 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0			Concrete					
1–2	CL		7.5yr 4/3 brown; lean clay with some sand and gravel; loose; fine grained, well graded subrounded; gravels up to 0.25", subrounded; medium stiff; dry; low plasticity; cohesive; no odor; no staining. Clay 85%, Sand 10%, Gravel >5%		5/5	0.50		
3–5	ML		7.5yr 4/3 brown; silt with sand; loose; fine to coarse grained, well graded, subrounded; medium stiff; dry; low plasticity; non-cohesive; no odor; no staining.			0.30		
6–8	SW-SM		7.5 yr 4/3 brown; well graded sand with silt and gravel; dense; fine to coarse grained, subrounded; gravels up to 1", subrounded; dry; non-plastic; non-cohesive; no odor; no staining. Sand 65%, Gravel 25%, Silt 10%		3/5	0.40	RW02-SS01R-6-8	
9–10	CL		7.5 yr 4/3 brown; lean clay with some sand; stiff; fine grained, well graded, subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 75%, Silt 15%, Sand 10%			0.30		
11–13	CL		Same as above.		3/5	0.50		
14–17	CL		Same as above.		2/5	0.20		
18–22	CH		7.5 yr 4/3 brown; fat clay with some silt; medium stiff; damp; high plasticity; cohesive; no odor; no staining; some trash consisting of white resinous material encountered. Clay 85%, Silt 15%		3/5	0.50	RW02-SS01R-20-22, RW2SB01-DEB01(20-25)	
23–24								

PID (ppm) scale: 0 0.2 0.4 0.6 0.8

BORING: RW2SB01 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples
25–30	CH	Silty lean clay with some sand; dense; fine grained; moist; medium plasticity; no staining; no odor. Fines 90%, Sand 10%		3.0	0.60	
30–34	CH	Fat clay with some sand; fined grained; moist; high plasticity. Fines 90%, Sand 10%		4.0	0.80	
34–38	ML	Fat clay with silt and sand; very stiff; fine grained; dry; high plasticity; no odor; no staining. Fines 80%, Sand 20%		4.0	0.30	
38–40	ML	Fat clay with silt; stiff; dry; high plasticity; no odor; no staining.	▼	5.0	0.40	
40–43	CL	Lean clay with silt and sand; stiff; fine to medium grained; moist; medium plasticity; 1" thick saturated lense at 41' bgs. Fines 80 %, Sand 20%		3.0	0.80	
43–45	CL	Lean clay with silt; stiff; moist; medium plasticity. Fines 100%		5.0	0.40	
45–47	CL	Lean clay with silt; stiff; moist; medium plasticity. Fines 100%		5.0	0.40	
47–49	CL	Lean clay with silt; stiff; moist; medium plasticity. Fines 100%		5.0	0.00	

PID (ppm) scale: 0 0.2 0.4 0.6 0.8

Well Construction

BORING: RW2SB01 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm) 0 0.2 0.4 0.6 0.8	PID (ppm)	Lab Samples	Well Construction
50									
51	ML		Silt with intermitten lenses of sandy clay; stiff; sand is fine grained; moist; low plasticity. Fines 80%, Sand 20%		3.0		0.10		
52									
53									
54	BR		Bedrock; blackish blue. Fines 100%		3.0		0.10		
55									
56									

Notes:
Landfill Gas Readings:
CH4 = 0.0%, CO = 4 ppm, CO2 = 0.1% ppm, H2S = 2 ppm, O2 = 18.2%, Balance = 81.8%

BORING: RW2SB02 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0			Concrete			1.90		
1	SW-SM		7.5yr 4/3 brown; well graded sand with silt and gravel; loose; fine to coarse grained, well graded, subrounded; gravels up to 0.5", subrounded; dry; non-plastic; non-cohesive; no odor; no staining. Sand 75%, Gravel 15%, Silt, trace Clays					
2	SW-SC					0.50		
3	SM		7.5yr 4/3 brown; well graded sand with clay and trace gravels; loose; fine to coarse grained, subrounded; gravels up to 0.25", subrounded; dry; very low plasticity; non-cohesive; no odor; no staining. Sand 85%, Clay 10%, Gravel >5%		4/5	1.20		
4	SM		7.5yr 4/3 brown, silty sand with some clay; loose; fine grained, poorly graded, subrounded; dry; low plasticity; non-cohesive, no odor, no staining. Sand 80%, Silt 15%, Clay >5%			0.40		
5	SM		No recovery. 7.5yr 4/3 brown; silty sand with trace clay; loose; fine to coarse grained, well graded, subrounded; dry; low plasticity; non-cohesive; no odor; no staining. Sand 70%, Silt 20%, Clay >5%			1.20		
6								
7	SM		7.5yr 3/4 brown; silty sand with trace gravel; loose; gravels up to 0.5"; subrounded; dry; non-plastic; non-cohesive; no odor; trace amounts of oxidation from 6.5-7.5' bgs. Sand 70%, Silt 20%, Gravel >5%. Isolated suspect ACM at 5-10' bgs.		3.5/5	1.10	RW02-SS02R-6-8, RW2SB02-PM01(5-10)	
8								
9	CL		7.5 yr 4/3 brown; lean clay with few sands; medium stiff; fine grained, subrounded; dry; high plasticity; cohesive; no odor; no staining. Clay 90%, Sand 10%			1.40		
10								
11								
12	CL		Same as above.		5/5	1.90		
13								
14								
15								

BORING: RW2SB02 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
16	CL		Same as above.			2.30		
17					2.5/5			
18	SM		7.5 yr 3/4 brown; silty sand with trace clay; medium dense; fine grained poorly graded, subangular; dry; non-plastic; non-cohesive; no odor; no staining. Sand 70%, Silt 25%, Clay >5%			3.60		
19	CL		7.5 yr 3/4 brown; lean clay with sand; medium stiff; fine grained, well graded, subangular, medium plasticity; cohesive; moist; no odor; no staining. Clay 80%, Sand 20%			3.20		
20								
21								
22	CL		7.5 yr 3/4 brown; silty lean clay; stiff; dry; medium plasticity; cohesive; no odor; no staining. Clay 85%, Silt 15%		5/5	3.50	RW02-SS02R-23-25	
23								
24								
25								
26	CL		Silty lean clay; stiff; moist; medium plasticity; no odor; no staining.		2/2	0.50		
27								
28	ML		Silt with sand; hard; dry; sand is fine grained; low plasticity; no odor; no staining. Fines 90%, Sand 10%		3/3	0.50		
29								
30								
31								

BORING: RW2SB02 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
32–35	ML		Silt with sand; stiff; dry; sand is fine grained; low plasticity. Fines 70%, sand 30%		3/5	0.00		
35–40	ML		Silt with sand; stiff; dry; sand is fine grained; low plasticity. Fines 70%, sand 30%	▼	5/5	0.00		
40–46	ML		Silt with sand; stiff; moist; sand is fine grained; medium plasticity. Fines 80%, sand 20%		5/5			

PID (ppm) scale: 0 1 2 3

Notes:

Landfill Gas Readings:

CH4 = 0.0%, CO = 1 ppm, O2 = 19.5%, CO2 = 0.1%, H2S = 1 ppm, Balance = 80.4%

BORING: RW2SB03 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0			Concrete					
			No recovery					
1	CL		7.5 yr 3/3 dark brown, clay with silt; medium stiff; dry; medium plasticity; cohesive; no odor; no staining; building debris encountered from 0 to 5' bgs. Clay 70%, Silt 30%			1.70	RW2SB03-ASP01, RW2SB03-BR01 (0-5)	
2								
3	CL		7.5yr 3/4 brown; clay with trace gravels up to 0.25", subrounded; medium stiff; medium plasticity; cohesive; no odor; no staining. Clay 80%, Silt 10%, Sand >3%, Gravel >3%		5/5	1.60		
4	SM		7.5 yr 3/4 brown; silty sand with gravel; loose; fine to coarse grained, well graded, subrounded; gravels up to 0.5", subrounded; dry; non-plastic; non-cohesive; no odor; no staining. Sand 80%, Silt 15%, Gravel >5%			1.20		
5								
6								
7	CH		7.5 yr 3/4 brown; fat clay with sand; stiff; fine grained, well graded, subrounded; dry; high plasticity; cohesive; no odor; no staining; increased sand to 20% from 7.0 - 8.0' bgs. Clay 90%, Sand 10%		5/5	4.00	RW02-SS03R-6-8	
8								
9								
10								
11								
12	CH		7.5 yr 3/4 brown; fat clay with trace sand; stiff; fine grained, subrounded; dry; high plasticity; cohesive; no odor; no staining. Clay 95%, Sand >5%		5/5	3.40		
13								
14								
15								

BORING: RW2SB03 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm) 0 1 2 3 4	PID (ppm)	Lab Samples	Well Construction
16–17	SW-SM		7.5 yr 3/4 brown; well graded sand with silt and trace gravels; dense; fine to coarse grained, well graded, subrounded; gravels up to 0.5", subrounded; dry; non-plastic; non-cohesive; no odor; no staining. Sand 85%, Silt 10:, Gravels >5%		4.5/5		2.40	RW02-SS03 R-16-18	
18–19	CL		7.5 yr 3/4 brown; silty lean clay with little sands; medium stiff; fine to coarse grained, well graded, subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 75%, Silt 20%, Sand >5%				2.70		
20–22	CH		7.5 yr 3/4 brown; fat clay with little silt; very stiff; high plasticity; cohesive; no odor; no staining. Clay 90%, Silt 10%		3/5		3.50		
23–27	CL		Lean clay with sand; sand is fine to medium grained; moist; medium plasticity; no odor; no staining. Fines 60%, Sand 40%		2/5		0.00		
28–30									

BORING: RW2SB03 **DATE:** June 8 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

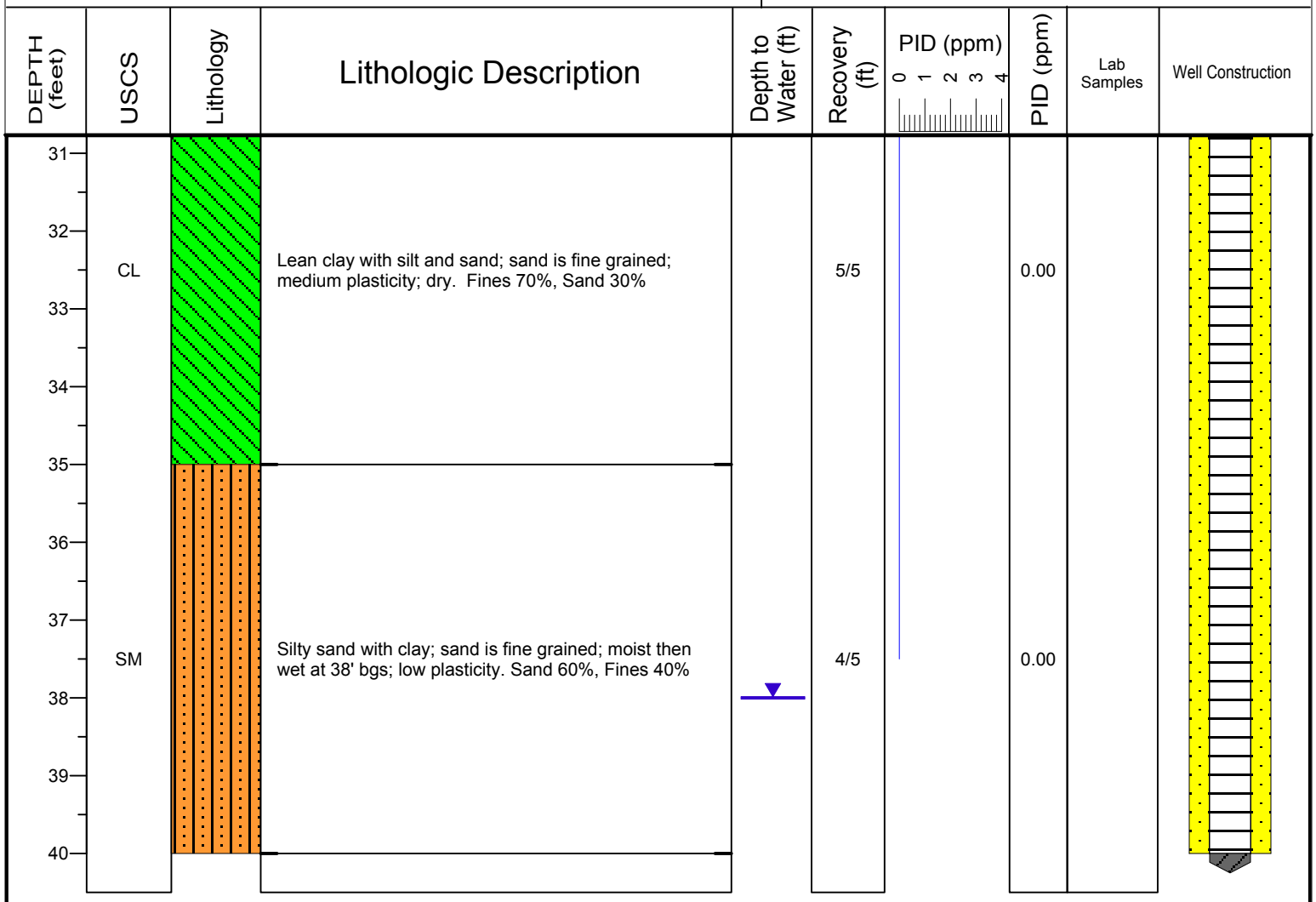
PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich



Notes:
Landfill Gas Readings:

CH4 = 0.0%	CO = 6 ppm
CO2 = 0.0%	H2S = 1 ppm
O2 = 17.6%	Balance = 82.4%

BORING: RW2SB04 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	PID (ppm)	Lab Samples	Well Construction
0			Concrete				0.50		
1	CL		7.5 yr 4/3 brown; lean clay with some sand and gravels; medium stiff; well graded, subrounded; gravels up to 0.25", subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 85%, Sand 10%, Gravel >5%				0.50		
2									
3	ML		7.5 yr 4/3 brown; silt with sand; loose; fine to coarse grained, well graded, loose, subrounded; dry; non-plastic; non-cohesive; no odor; no staining.		5/5		0.30		
4									
5									
6									
7	CL		7.5 yr 4/3 brown; lean clay with some silt and sand; medium stiff; fine grained, well graded, subrounded; dry; medium plasticity; cohesive; no odor; no staining. Clay 80%, Silt 15%, Sand >5%		5/5		0.60		
8									
9									
10									
11									
12	CL		7.5 yr 4/3 brown; lean clay with sand and few gravels; stiff; fine to coarse grained, well graded, subrounded; gravels up to 0.25", subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 70%, Sand 20%, Gravel > 5%		5/5		0.60	RW02-SS04 R-10-12	
13									
14									
15									

PID (ppm) scale: 0, 0.2, 0.4, 0.6

BORING: RW2SB04 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
16–17	CL	7.5 yr 3/4 brown; lean clay with some sand; stiff; fine to coarse grained, well graded, subrounded; dry; low plasticity; non-cohesive; no odor; no staining. Sand 75%, Sand 25%		4/5	0.40		
18–19	SM	7.5 yr 4/3 brown; silty sand; loose; fine to medium grained, well graded, subrounded; dry; non-plasticity; non-cohesive; no odor; no staining. Sand 75%, Silt 25%			0.30		
20–25	CH	7.5 yr 4/3 brown; fat clay with some silt; medium stiff; damp; high plasticity; cohesive; no odor; no staining. Clay 85%, Silt 15%		3/5	0.40	RW02-SS04 R-17. 5-20	
26–30	CH	Fat clay with sand; sand is fine grained; moist; high plasticity; no odor; no staining. Fines 60%, Sand 40%		3/5	0.30		

PID (ppm) 0 0.2 0.4 0.6

BORING: RW2SB04 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
31–35	CH		Fat clay; hard; moist; high plasticity; calcarious streaking; no odor; no staining. Fines 90%, Sand 10%		3/5	0.40		
35–40	CH		Fat clay with sand; sand is fine grained; moist; medium plasticity; no odor; no staining. Fines 60%, sand 40%		3/5	0.00		
40–45	CH		Fat clay with sand; sand is fine grained; moist; medium plasticity; calcarious streaking; no odor; no staining. Fines 70%, sand 30%		3/5	0.00		

PID (ppm) scale: 0, 0.2, 0.4, 0.6

Notes:
Landfill Readings: CH4 = 0.0%, CO = 1 ppm, CO2 = 0.1% H2S = 1 ppm, O2 = 17.4% , Balance = 82.6%

BORING: RW2SB05 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0			Concrete			0.00		
1	CL		7.5 yr 3/4 brown; lean clay with some silt and trace sand; medium stiff; fine grained; well graded, subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 80%, Silt 15%, Sand 5%			0.30		
2					5/5			
3	CL		7.5 yr 3/4 brown; lean clay with some silt and trace sand; medium stiff; fine grained, well graded, subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 70%, Silt 20%, Sand 10%			0.40		
4								
5								
6								
7	CL		7.5 yr 3/4 brown; lean clay with some silt and sand; stiff; fine grained, well graded, subrounded; dry; low plasticity; cohesive; no odor; no staining. Clay 70%, Silt 15%, Sand 15%		5/5	1.00		
8								
9								
10								
11								
12	CL		Same as above.			0.40		
13					5/5			
14								
15								

BORING: RW2SB05 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
16–18	SM		7.5 yr 3/4 brown; silty sand with little gravels; loose; fine to coarse grained, well graded, subrounded; gravels up to 0.25", subrounded; dry; non-plastic; non-cohesive; no odor; no staining. Sand 75%, Silt 15%, Gravel 10%		5/5	1.00		
18–20	CL		7.5 yr 4/3 brown; lean clay with silt; medium stiff; damp; medium plasticity; cohesive; no odor; no staining. Clay 80%, Silt 20%			0.50		
20–25	CH		7.5 yr 4/3 brown; fat clay; medium stiff; damp; high plasticity; cohesive; no odor; oxidation mottling from 21.0 - 24.0' bgs. Clay 85%, Silt 15%		5/5	1.10		
25–30	CL		Lean clay with sand; sand is fine grained; moist; medium plasticity; no odor; no staining. Fines 70%, Sand 30%		4/5	0.00		

PID (ppm) scale: 0, 0.5, 1

BORING: RW2SB05 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples
31–35	CL	Lean clay with sand; sand is fine grained; moist; medium plasticity; no odor; no staining. Fines 70%, Sand 30%		2/2	0.00	
35–40	SC	Clayey sand; fine grained; moist; medium plasticity; no odor; no staining. Sand 60%, Fines 40%	▼	3/3	0.00	
40–45	SC	Clayey sand; fine grained; moist; medium plasticity; no odor; no staining. Sand 60%, Fines 40%		5/5	0.00	
45–46	SC	Clayey sand; fine grained; moist; medium plasticity; no odor; no staining. Sand 50%, Fines 50%		5/5	0.00	

PID (ppm) scale: 0, 0.5, 1

Well Construction

BORING: RW2SB05 **DATE:** June 9 and June 22, 2016

PROJECT: Federal Blvd Phase II

PROJECT NUMBER: 1/16-007-02

PROJECT ADDRESS: 710 Federal Blvd

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Travis Gwin and Rachel Tometich

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	PID (ppm)	Lab Samples	Well Construction
47	SW		Well graded sand; wet; fine grained; low plasticity; no staining; no odor. Sand 100%		3/4		0.00		
48									
49	BR		Bedrock		1/1				
50									

PID (ppm) 0 0.5 1

Notes:
Landfill Gas Readings:
CH4 = 0.0% CO = 1 ppm
CO2 = 0.0% H2S = 2 ppm
O2 = 17.3%
Balance = 82.7%

BORING: RW6SB01 **DATE:** 3/1/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 2970 West Severn Pl., Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	PID (ppm)	Lab Samples	Well Construction
0–13	CL		Brown with calcarious and slight black streaks; lean clay; no odor; medium plasticity; dry.		3.0		0.0 0.7		
14–15	SM		Light brown; silty sand with orange, black, and white streaks, no odor; low plasticity; dry.		3.0		0.7		
15–19	CH		Brown; fat clay with orange and black streaks, no odor; high plasticity; dry.		4.0		0.4		
19–24	CH		Brown; fat clay; high plasticity; dry.		5.0		0.5		
24–25	SM		Brown; silty sand with orange and black streaks; low plasticity; dry.						
25–28	CH		Brown; fat clay; high plasticity; dry.		5.0		0.5		
28–31	CH		Brown; fat clay; high plasticity; dry.						
31–32	SM		Brown; silty sand; low plasticity; moist.	▼	5.0		0.4	RW6SS01 (30-35)	
32–38	CH		Brown; fat clay; high plasticity; dry.		2.5		0.5		

BORING: RW6SB02 **DATE:** 3/1/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 2970 West Severn Pl., Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0-5	CL	Brown; sandy lean clay; no odor; medium plasticity; dry.			6.4		
5-10	CL	Brown with slight black staining at 9 to 9.5' below ground surface (bgs); lean clay; no odor; high plasticity; dry.		3.0	9.7		
10-11	SM	Brown; silty sand; no odor; low plasticity; dry.					
11-13	CL	Brown; sandy lean clay; no odor; medium plasticity, dry		4.0	16.8		
13-20	CH	Brown; fat clay; no odor; high plasticity; dry.		3.0	23.3	RW6SS02 (15-20)	
20-25	CH	Brown with orange streaks; fat clay, slightly sandy clay from 22-23 feet bgs; no odor; high plasticity; dry.		5.0	7.5		
25-30	CH	Brown with orange streaks; fat clay; no odor; high plasticity; dry.		5.0	8.3		
30-33	CH	Brown; fat clay with sand layer from 30.5 to 31.5 feet bgs; no odor; high plasticity; moist.	▼	5.0	5.0		
33-36	CH	Brown; fat clay, slightly sandy from 33.5-34 feet bgs; no odor; high plasticity; moist.		3.0	5.0		
36-38	CH	Brown; fat clay; no odor; high plasticity; dry.					

BORING: PE8SB01 **DATE:** 3/1/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 749, 753-759 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm) 0.36 0.56 0.76 0.96	PID (ppm)	Lab Samples	Well Construction
0–5	SM		Brown; silty sand with three inches of concrete and black staining with no odor; low plasticity; dry.		1.0		0.4	PE8SS01 (0-5)	
5–10	CH		Brown; fat clay; no odor; high plasticity; dry.		4.0		1.0		

BORING: RW9SB01 **DATE:** 3/4/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 750 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	PID (ppm)	Lab Samples	Well Construction
0–5	SM		Brown; sandy loam to 3' below ground surface (bgs), reddish brown sand with black gravel to 5' bgs; no odor; low plasticity; dry. Historical Urban Fill from 4-25' bgs.		3.0		5.9		
5–10	SM		Light gray; silty sand with debris (brick, cementicious material, and black material); low plasticity; dry.		3.0		1.8	RW9SS01 (7.5-15)	
10–15	SM		Dark brown; gravelly sand with coal and brick debris; medium plasticity; dry.		3.0		14.1	RW9SS01 (10-15)	
15–23	CL		Brown; sandy lean clay; no odor; medium plasticity; dry.		3.0 4.0		2.3 1.2		
23–25	SM		Brown; silty sand with debris (brick and coal); no odor; low plasticity; dry.						
25–30	SM		Gray; silty sand; no odor; low plasticity; wet.	▼	4.0		1.2		
30–32	SW		Gray; well graded sand; no odor; low plasticity; wet.		2.0				

BORING: RW14SB01 **DATE:** 4/27/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 830 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm) 0.4 2.4 4.4 6.4	PID (ppm)	Lab Samples	Well Construction
0-5	CH		Brown; fat clay; high plasticity; dry.		0.0		6.1	RW14SS01 (0-5)	
5-10	CH		Brown; fat clay; high plasticity; dry.		5.0		0.9		
10-15	CH		Brown; fat clay with silty and sandy seam from 12.5-13.5 feet below ground surface (bgs); high plasticity; dry.		3.0		1.2		
15-20	CH		Brown; fat clay with a silty/sandy seam from 18-19' bgs; black staining with no odor at 17' bgs and calcarious streaks from 15-17' bgs; high plasticity; dry.		3.5		1.2		
20-25	CH		Brown; fat clay with orange streaks; high plasticity; dry.		5.0		0.5		
25-30	CH		Brown; fat clay with orange and calcarious streaks, and black specks with no odor; high plasticity; dry.	▼	5.0		0.8		
30-35	CH		Brown; fat clay with orange and calcarious streaks; high plasticity; dry.		5.0		0.8		
35-40	CH		Brown; fat clay with orange and calcarious streaks; high plasticity; dry.		5.0		0.5		

BORING: RW14SB02 **DATE:** 4/27/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 816 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0–3	SW	Brown; well graded sand with gravel; low plasticity; dry.		3.0	6.3	RW14SS02 (0-5)	
3–5	CH	Brown; fat clay; high plasticity; dry.		2.0	6.3		
5–9	CH	Brown; fat clay; high plasticity; dry.		1.5	2.6		
9–10	CL	Brown; lean clay with sand; medium plasticity; dry.		0.5	2.6		
10–15	CH	Brown from 10-14.5 feet below ground surface (bgs), gray from 14.5-15' bgs; fat clay; high plasticity; dry.		2.5	2.9		
15	CH	Brown; fat clay; high plasticity; dry.					
15–16	CL	Brown; sandy seam; medium plasticity; dry.					
16–20	CH	Brown; fat clay; high plasticity; dry.		5.0	2.5		
20–25	CH	Brown; fat clay with orange and white calcarious streaks; high plasticity; dry.		5.0	1.7		
25–30	CH	Brown; fat clay with orange streaks and reddish sand from 25-27' bgs; high plasticity; dry.		5.0	1.1		
30–35	CH	Brown; fat clay with orange streaks; high plasticity; dry.	▼	5.0	0.0		

BORING: RW19SB01 **DATE:** 3/2/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 888 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0–9	CL		Brown; lean clay; no odor; medium plasticity; dry.		4.0	0.4		
					4.0	0.7	RW19SS01 (5-10)	
9–10	CL		Brown; lean clay with sand; no odor; medium plasticity; dry.		1.0	0.7		
10–15	CH		Brown; fat clay with sand; no odor; high plasticity; dry.		5.0	0.6		
15–20	CL		Brown with orange streaks; lean clay with sandy seam from 16.5-17 feet below ground surface (bgs); no odor; medium plasticity; dry.		5.0	0.6		
20–25	CL		Brown; lean clay; no odor; medium plasticity; dry.		5.0	0.6		
25–30	CH		Brown with calcarious streaks; fat clay; no odor; high plasticity; dry.		5.0	0.2		
30–40	CH		Brown; fat clay; no odor; high plasticity; dry.	▼	5.0	0.3		
					5.0	0.1		

PID (ppm) scale: 0.08, 0.28, 0.48, 0.68

BORING: RW23SB01 **DATE:** 3/4/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 900 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push/Auger

SAMPLING METHOD: Continuous

Pinyon Environmental, Inc.

FIELD GEOLOGIST: Tim Grenier

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0-5	CL	Brown; lean clay with 3 inches of asphal and road base; no odor; medium plasticity; dry.		3.0	12.2		
5-10	CL	Brown; sandy lean clay; no odor; medium plasticity; dry.		1.5	15.8	RW23SS01 (5-10)	
10-15	CH	Brown; fat clay with calcarious streaks; no odor; high plasticity; dry.		5.0	8.3		
15-16.5	SM	Brown; silty sand with black streaks at 16.5 feet below ground surface (bgs); no odor; low plasticity; dry.		5.0	9.9		
16.5-20	CL	Brown with orange streaks; lean clay; no odor; medium plsticity; dry.					
20-22	CL	Brown; lean clay; no odor; medium plasticity; moist.		5.0	6.1		
22-23	SM						
23-25	CL	Brown with slight black streaks; silty sand; no odor; low plasticity; dry.					
25-27		Brown; lean clay with sand; no odor; high plasticity; dry.		5.0	6.7		
27-35	CH	Brown; fat clay; no odor; high plasticity; dry.		5.0	4.7		
35-45	CH	Brown with orange streaks; fat clay; no odor; high plasticity; dry.		5.0	4.2		
				5.0	3.1		
45-47	CH	Brown; fat clay; no odor; high plasticity; dry.		5.0	2.6		
47-52	CH	Gray; fat clay; no odor; high plasticity; dry.					
52-55	SW	Reddish orange mottled; well graded sand with gravel; no odor; low plasticity; dry.		3.5	2.6		

BORING: RW25SB01 **DATE:** 3/2/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 950 N Federal Boulevard, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push/Auger

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0-5	CL	Brown with calcarious streaks; lean clay; no odor; medium plasticity; dry.		3.5	0.40		
5-6	ML	Brown; sandy silt; no odor; low plasticity; dry.					
6-10	CL	Brown; lean clay; no odor; medium plasticity; dry.		5.0	0.50		
10-15	CH	Brown; fat clay; no odor; high plasticity; dry.		5.0	0.70		
15-19	CH	Brown; fat clay; no odor; high plasticity; dry.		5.0	0.70		
19-20	SM	Brown; silty sand; no odor; low plasticity; dry.					
20-25	CL	Brown with orange and black streaks; sandy lean clay; no odor; medium plasticity; dry.		3.0	0.70		
25-30	CH	Brown; fat clay; no odor; high plasticity; dry.		5.0	0.70		
30-35	CH	Brown with orange and calcarious streaks; fat clay; no odor; high plasticity; dry.		5.0	0.60		
35-50	CH	Brown; fat clay; no odor; high plasticity; dry.		5.0	0.40		
				5.0	0.40		
				5.0	0.40	RW25SS01 (50-55)	
50-51	CH	Brown to 51' bgs, gray from 51.5-52.5' bgs; fat clay with sandy layer at 51' bgs; no odor; high plasticity; dry.		5.0	0.30		
51-54	CH	Gray; fat clay with sandy gravel layer and refusal at 54.75' bgs, continued drilling with solid-stem auger; no odor; high plasticity; dry.					

PID (ppm) scale: 0.28, 0.38, 0.48, 0.58, 0.68

BORING: RW28SB01 **DATE:** 3/3/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 970 N Federal Boulevard, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push/Auger

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

DEPTH (feet)	USCS	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	Lab Samples	Well Construction
0-5	SW	Brown with black staining; well graded sand; no odor; low plasticity; dry.		2.0	2.0	RW28SS01 (0-5)	
5-15	SW	Dark brown; sand with gravel and debris (brick, glass, plastic, coal like material); no odor; low plasticity; dry. Historical Urban Fill from 0-20'.		2.0 2.0	1.7 1.4		
15-20	SM	Black; silty sand with glass and brick debris; organic/decomposition odor; low plasticity; dry.		2.0	1.6		
20-25	CL	Light brown; sandy lean clay; no odor; medium plasticity; dry.		3.0	1.8		
25-30	CH	Brown; fat clay; no odor; high plasticity; dry.		4.0	1.9		
30-35	CH	Brown with orange streaks; fat clay; no odor; high plasticity; dry.		5.0	1.5		
35-38	CH	Brown; fat clay; no odor; high platicity; dry.		5.0	1.6		
38-40	CH	Brown; fat clay with orange sand; no odor; high plasticity; dry.					
40-50	CH	Brown with orange streaks; fat clay; no odor; high plasticity; dry.		5.0 5.0	1.3 1.0		
50-52	CH	Brown; fat clay; no odor; high plasticity; dry.		2.0	1.0		
52-60	CH	Gray; fat clay, refusal at 52' below ground surface, continued with solid-stem auger; no odor; high plasticity; dry.					
60-68		No recovery, drilled with solid-stem auger.	▼				

PID (ppm) scale: 1, 1.25, 1.5, 1.75, 2

BORING: RW31SB01 **DATE:** 4/27/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 990 N Federal Blvd, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm)	PID (ppm)	Lab Samples	Well Construction
0-5	SW		Dark brown; well graded sand with silt and debris (glass, brick); low plasticity; moist.		0.0		0.0	RW31SS01 (0-5)	
5-9.5	SW		Reddish brown; well graded sand with white cementicious debris at 9 to 9.5 feet below ground surface (bgs); low plasticity; moist.		1.5		0.1	RW31-OT01(9-9.5)	
9.5-15			No recovery.		0.0				
15-18	SW		Dark brown; well graded sand with slight black color with no odor at 18-19' bgs; low plasticity; dry.		3.0		0.2	Landfill Gas Screening: CH4= 0.1% vol, CO2= 0.2% vol, O2= 20.8% vol, H2S= 0 ppm, CO= 0 ppm, BAL= 78.9	
18-23	CL		Brown; lean clay with sand seam at 24-24.5' bgs; medium plasticity; dry.		3.5		0.1		
23-28	CL		Brown; lean clay with sand seam at 27.5-28' bgs; medium plasticity; dry.		4.0		0.1		
28-33	CH		Brown; fat clay with orange streaks; high plasticity; dry.		5.0		0.3		
33-38					5.0		0.5		
38-43					5.0		0.1		
43-48					5.0		0.0		
48-50	CH		Brown; fat clay with sand; high plasticity; dry.		1.0		0.4		
50-53	CH		Gray; fat clay; high plasticity; dry.		3.0		0.4		
53-55	SW		Brown and pink; well graded sand with gravel; low plasticity; dry.		1.0		0.4		
55-58	SW		Light brown and pink; well graded sand with gravel; low plasticity; dry.		2.5		0.3		
58-61	CL		Gray; lean clay with sand; medium plasticity; dry.		2.5		0.0		
61-64	SW		Light brown/orange mottled; well graded sand; low plasticity; slightly moist at 62' bgs.		3.0		0.0		

BORING: RW32SB01 **DATE:** 3/2/16

PROJECT: Federal Boulevard Phase II

PROJECT NUMBER: 1/16-007-02.2102

PROJECT ADDRESS: 995 N Federal Boulevard, Denver, CO

CLIENT: City and County of Denver

DRILLING METHOD: Direct Push

SAMPLING METHOD: Continuous

FIELD GEOLOGIST: Tim Grenier

Pinyon Environmental, Inc.

DEPTH (feet)	USCS	Lithology	Lithologic Description	Depth to Water (ft)	Recovery (ft)	PID (ppm) 0.08 0.18 0.28 0.38	PID (ppm)	Lab Samples	Well Construction
0–10	SM		Brown; silty sand; no odor; low plasticity; dry.		3.0		0.3 0.4		
10–15	CL		Brown; sandy lean clay with slight black staining with no odor at 14 feet below ground surface (bgs); no odor; medium plsaticity; dry.		3.0		0.4	RW32SS01 (10-15)	
15–23	CL		Brown; sandy lean clay; no odor; medium plasticity; dry.		4.0		0.3	Landfill Gas Screening: CH4= 0% vol, CO2= 0.1% vol, O2= 19.4% vol, H2S= 0 ppm, CO= 0 ppm, BAL= 80.5	
23–24	SM		Brown; silty sand; no odor; low plasticity; dry.		3.0		0.1		
24–26	CL		Brown; lean clay with sand; no odor; medium plasticity; dry.						

Appendix E Top of Casing Elevation Survey

Points

Project : 1604-112

User name	user	**Date & Time**	9:06:55 AM 6/15/2016
Coordinate System	US State Plane 1983 (2011)	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (2011)		
Vertical Datum		**Geoid Model**	GEOID12A (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Point listing

Name	Northing	Easting	Elevation	Feature Code
100	1692014.213	3133597.434	5249.353	GROUND RW31GW01
101	1692014.018	3133597.443	5249.145	TOP CASING RW31GW01
102	1691933.896	3133610.070	5248.563	GROUND RW28GW01
103	1691933.665	3133610.012	5248.548	TOP CASING RW28GW01
104	1691805.463	3133603.907	5249.626	GROUND RW25GW01
105	1691805.200	3133603.970	5249.483	TOP CASING RW25GW01
106	1691652.498	3133604.242	5247.513	GROUND RW23GW01
107	1691652.448	3133604.221	5247.490	TOP CASING RW23GW01
108	1691405.808	3133590.199	5245.006	GROUND RW19GW01
109	1691405.652	3133590.222	5244.822	TOP CASING RW19GW01
110	1691078.979	3133604.378	5242.942	GROUND RW14GW01
111	1691078.746	3133604.364	5242.847	TOP CASING RW14GW01
112	1690921.942	3133658.982	5238.102	GROUND RW14GW02
113	1690921.798	3133658.993	5238.044	TOP CASING RW14GW02
114	1690831.931	3133628.693	5238.487	GROUND RW9GW01
115	1690831.925	3133628.775	5238.594	TOP CASING RW9GW01
116	1690522.894	3133647.136	5245.210	GROUND RW6GW02
117	1690522.636	3133647.244	5244.996	TOP CASING RW6GW02
118	1690481.186	3133600.718	5246.390	GROUND RW6GW01
119	1690480.985	3133600.749	5246.886	TOP CASING RW6GW01
120	1690261.819	3133718.597	5254.566	GROUND RW2SB01
121	1690261.638	3133718.580	5254.444	TOP CASING RW2SB01
122	1690329.048	3133720.981	5254.656	GROUND RW2SB02
123	1690328.877	3133720.879	5254.363	TOP CASING RW2SB02
124	1690329.120	3133661.902	5252.748	GROUND RW3SB03
125	1690328.879	3133661.929	5252.490	TOP CASING RW3SB03
126	1690334.507	3133615.233	5251.513	GROUND RW2SB05
127	1690334.278	3133615.215	5251.315	TOP CASING RW2SB05
128	1690258.795	3133627.869	5253.210	GROUND RW2SB04
129	1690258.960	3133627.703	5252.981	TOP CASING RW2SB04

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Points

Project : 1604-112

User name	user	**Date & Time**	9:18:09 AM 6/15/2016
Coordinate System	US State Plane 1983 (2011)(at ground)	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (2011)		
Vertical Datum		**Geoid Model**	GEOID12A (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Point listing

Name	Northing	Easting	Elevation	Feature Code
100	1692018.960	3133596.087	5249.353	GROUND RW31GW01
101	1692018.764	3133596.096	5249.145	TOP CASING RW31GW01
102	1691938.621	3133608.726	5248.563	GROUND RW28GW01
103	1691938.390	3133608.668	5248.548	TOP CASING RW28GW01
104	1691810.154	3133602.562	5249.626	GROUND RW25GW01
105	1691809.891	3133602.624	5249.483	TOP CASING RW25GW01
106	1691657.148	3133602.896	5247.513	GROUND RW23GW01
107	1691657.098	3133602.876	5247.490	TOP CASING RW23GW01
108	1691410.392	3133588.850	5245.006	GROUND RW19GW01
109	1691410.236	3133588.873	5244.822	TOP CASING RW19GW01
110	1691083.476	3133603.033	5242.942	GROUND RW14GW01
111	1691083.242	3133603.019	5242.847	TOP CASING RW14GW01
112	1690926.397	3133657.651	5238.102	GROUND RW14GW02
113	1690926.252	3133657.662	5238.044	TOP CASING RW14GW02
114	1690836.361	3133627.354	5238.487	GROUND RW9GW01
115	1690836.355	3133627.437	5238.594	TOP CASING RW9GW01
116	1690527.242	3133645.802	5245.210	GROUND RW6GW02
117	1690526.984	3133645.910	5244.996	TOP CASING RW6GW02
118	1690485.523	3133599.372	5246.390	GROUND RW6GW01
119	1690485.322	3133599.403	5246.886	TOP CASING RW6GW01
120	1690266.097	3133717.282	5254.566	GROUND RW2SB01
121	1690265.916	3133717.265	5254.444	TOP CASING RW2SB01
122	1690333.344	3133719.667	5254.656	GROUND RW2SB02
123	1690333.174	3133719.565	5254.363	TOP CASING RW2SB02
124	1690333.416	3133660.572	5252.748	GROUND RW3SB03
125	1690333.175	3133660.599	5252.490	TOP CASING RW3SB03
126	1690338.805	3133613.891	5251.513	GROUND RW2SB05
127	1690338.576	3133613.873	5251.315	TOP CASING RW2SB05
128	1690263.072	3133626.530	5253.210	GROUND RW2SB04
129	1690263.238	3133626.364	5252.981	TOP CASING RW2SB04

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Fixed width point lat/long/height listing

Project : 1604-112

User name	user	**Date & Time**	9:08:18 AM 6/15/2016
Coordinate System	US State Plane 1983 (2011)	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (2011)		
Vertical Datum		**Geoid Model**	GEOID12A (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Point listing

Name	Latitude	Longitude	Height	Feature Code
100	39°43'56.72515"N	105°01'29.96036"W	5193.904	GROUND RW31GW01
101	39°43'56.72322"N	105°01'29.96026"W	5193.696	TOP CASING RW31GW01
102	39°43'55.93075"N	105°01'29.80400"W	5193.114	GROUND RW28GW01
103	39°43'55.92847"N	105°01'29.80476"W	5193.098	TOP CASING RW28GW01
104	39°43'54.66180"N	105°01'29.89148"W	5194.178	GROUND RW25GW01
105	39°43'54.65920"N	105°01'29.89069"W	5194.035	TOP CASING RW25GW01
106	39°43'53.15008"N	105°01'29.89743"W	5192.067	GROUND RW23GW01
107	39°43'53.14958"N	105°01'29.89770"W	5192.044	TOP CASING RW23GW01
108	39°43'50.71284"N	105°01'30.09368"W	5189.568	GROUND RW19GW01
109	39°43'50.71130"N	105°01'30.09339"W	5189.383	TOP CASING RW19GW01
110	39°43'47.48216"N	105°01'29.93407"W	5187.502	GROUND RW14GW01
111	39°43'47.47985"N	105°01'29.93427"W	5187.407	TOP CASING RW14GW01
112	39°43'45.92738"N	105°01'29.24570"W	5182.660	GROUND RW14GW02
113	39°43'45.92595"N	105°01'29.24557"W	5182.602	TOP CASING RW14GW02
114	39°43'45.03939"N	105°01'29.63940"W	5183.048	GROUND RW9GW01
115	39°43'45.03932"N	105°01'29.63834"W	5183.155	TOP CASING RW9GW01
116	39°43'41.98431"N	105°01'29.42403"W	5189.774	GROUND RW6GW02
117	39°43'41.98176"N	105°01'29.42266"W	5189.559	TOP CASING RW6GW02
118	39°43'41.57453"N	105°01'30.02092"W	5190.961	GROUND RW6GW01
119	39°43'41.57254"N	105°01'30.02054"W	5191.457	TOP CASING RW6GW01
120	39°43'39.40049"N	105°01'28.52689"W	5199.128	GROUND RW2SB01
121	39°43'39.39870"N	105°01'28.52712"W	5199.006	TOP CASING RW2SB01
122	39°43'40.06477"N	105°01'28.49187"W	5199.217	GROUND RW2SB02
123	39°43'40.06309"N	105°01'28.49319"W	5198.924	TOP CASING RW2SB02
124	39°43'40.06854"N	105°01'29.24801"W	5197.313	GROUND RW3SB03
125	39°43'40.06616"N	105°01'29.24768"W	5197.054	TOP CASING RW3SB03
126	39°43'40.12419"N	105°01'29.84496"W	5196.080	GROUND RW2SB05
127	39°43'40.12193"N	105°01'29.84520"W	5195.882	TOP CASING RW2SB05
128	39°43'39.37530"N	105°01'29.68831"W	5197.777	GROUND RW2SB04
129	39°43'39.37694"N	105°01'29.69042"W	5197.548	TOP CASING RW2SB04

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Coordinate System Details

Project : 1604-112

User name	user	**Date & Time**	9:12:21 AM 6/15/2016
Coordinate System	US State Plane 1983 (2011)(at ground)	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (2011)		
Vertical Datum		**Geoid Model**	GEOID12A (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

```
Coordinate System
Coordinate System : US State Plane 1983 (2011)(at ground)
Zone              : Colorado Central 0502
Datum             : NAD 1983 (2011)
Ellipsoid Name    : Geodetic Ref System 1980
Geoid Model       : GEOID12A (Conus)
Site              : Not selected


Ellipsoid
Ellipsoid Name   : Geodetic Ref System 1980
Flattening 1/f   : 298.257
Semi Major Axis  : 20925604.474sft


Datum Transformation : Seven Parameter
WGS84 to Geodetic Ref System 1980
Translation X    :   3.259sft          Rotation X :  0°00'00.025915"
Translation Y    :  -6.244sft          Rotation Y :  0°00'00.009426"
Translation Z    :  -1.728sft          Rotation Z :  0°00'00.011599"
Scale Factor     : 0.0017150401 ppm


Lambert Conformal Conic Two Parallel Projection
Projection Origin                      False Origin
Latitude      :   37°50'00.00000"NFalse Northing  :  1000000.000sft
Longitude     :  105°30'00.00000"WFalse Easting   :  3000000.000sft
Height        :          N/A           False Elevation    :            N/A
Scale Factor  :          N/A


Shift grid name              :              None
Azimuth at projection centre :               N/A
Azimuth at equator           :               N/A
Projection Parallel 1        :   39°45'00.00000"N
Projection Parallel 2        :   38°27'00.00000"N
Projection Ferro Constant    :               N/A
```

Projection Point 1 Latitude	N/A
Projection Point 1 Longitude	N/A
Projection Point 2 Latitude	N/A
Projection Point 2 Longitude	N/A
Projection grid name	N/A

Local site settings

Project latitude	39°41'00.89454"N
Project longitude	105°00'26.65729"W
Project height	5337.404sft
Ground scale factor	1.0002671848
False northing offset	0.000sft
False easting offset	0.000sft

GPS Site Calibration Details

Horizontal Adjustment

North Origin	N/A	Translation North	N/A
East Origin	N/A	Translation East	N/A
Scale	N/A	Rotation	N/A

Vertical Adjustment

North Origin	1692523.808sft
East Origin	3133589.112sft
Vertical constant correction	-0.114sft
Slope North	0.000ppm
Slope East	0.000ppm

Network Adjustment Parameters

Longitude Deflection	N/A
Latitude Deflection	N/A
Azimuth Rotation	N/A
Network Scale	N/A
Distance Scale	N/A
Distance Constant	N/A
Height Constant	N/A

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Appendix F Soil and Groundwater Analytical Results Tables (Detected Parameters)

Table F-I **Soil Analytical Results (Detected Parameters)**

	Units	Industrial[1]	Residential[2]	Sample ID/Street Number/Sample Date																				
				RW02-SS01R (6-8)	RW02-SS01R (20-22)	RW02-SS02R (6-8)	RW02-SS02R (23-25)	RW02-SS03R (6-8)	RW02-SS03R (16-18)	RW02-SS04R (10-12)	RW02-SS04R (17.5-20)	RW02-SS05R (15-17)	RW02-SS05R (22-24)	RW6-SS01 (30-35)	RW6-SS02 (15-20)	PE8-SS01 (0-5)	RW9-SS01 (10-15)	RW14-SS01 (0-5)	RW14-SS02 (0-5)	RW19-SS01 (5-10)	RW23-SS01 (5-10)	RW25-SS01 (50-55)	RW28-SS01 (0-5)	RW31-SS01 (0-5)	RW32-SS01 (10-15)
				710	710	710	710	710	710	710	710	710	710	2970	2970	749,753 759	750	830	816	888	900	950	970	990	995
Chem Name				6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	3/1/2016	3/1/2016	3/1/2016	3/4/2016	4/27/2016	4/27/2016	3/2/2016	3/4/2016	3/2/2016	3/3/2016	4/27/2016	3/2/2016
Metals by 6010C/7471A																								
Arsenic[3]	mg/kg	11	**11**	4.84	3.92	4.73	4.38	4.46	6.09	4.29	3.87	3.71	3.67	<3.65U	<3.88U	1.49J	0.785J	4.05	3.96	1.89J	0.699J	2.06J	5.01	10.1	<3.67U
Barium	mg/kg	22000	**1500**	316	189	310	249	229	361	310	378	430	72.4	272	116	203	231	196	174	153	107	157	972	736	364
Cadmium	mg/kg	98	**7**	0.178J	<0.127U	<0.112U	<0.121U	0.14J	<0.113U	0.117J	0.129J	<0.11U	<0.122U	0.153J	0.152J	0.298J	0.513J	<0.574U	<0.485U	0.158J	0.13J	0.149J	1.25	0.477J	0.426J
Chromium (hexavalent)	mg/kg	6.3	**0.3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2.14J**	**2.5J**	-
Chromium (III+VI)	mg/kg	NV	**NV**	9.62	10.4	11.3	11.9	13.5	6.69	13.2	9.95	8.53	10.9	10.7	9.64	8.43	39.3	12.4	11.1	8.94	11.2	11.7	30	9.28	14.9
Copper	mg/kg	4700	**310**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	165	238	-
Lead	mg/kg	800	**400**	6.92	11.7	6.77	11.6	9.75	7.07	9.41	7.25	6.86	13.9	10.1	11.7	43.3	147	10.2	15.1	12.4	11.2	13.9	**580**	**1,620**	9.95
Mercury	mg/kg	4	**0.94**	0.00756J	0.0115J	0.00698J	0.00856J	0.00625J	0.00768J	0.00685J	0.00539J	0.00619J	0.00942J	0.0101J	0.0059J	0.125	0.0514	0.0052J	<0.0114U	0.0105J	0.00685J	0.011J	0.762	0.0863	<0.0124U
LeadTCLP	mg/L	NV	**NV**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.23	-
Selenium	mg/kg	580	**39**	<0.515U	<0.636U	0.824J	<0.604U	<0.561U	0.895J	<0.516U	<0.529U	<0.55U	<0.611U	<3.65U	<3.88U	<3.34U	<3.3U	0.585J	0.686J	<3.73U	<3.43U	<3.9U	1.22J	1.8J	1.26J
Silver	mg/kg	580	**39**	0.143J	0.243J	0.183J	0.251J	0.17J	0.125J	0.13J	<0.106U	0.136J	<0.122U	0.88		0.506J	2.05	0.33J	0.122J	0.873	0.73	0.883	1.84	4.44	1.54
Organics by EPA 8015C																								
Gasoline Range Organics[4]	mg/kg	500	**500**	-	<50Ua	-	<50Ua	-	<50Ua	-	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua
Diesel Range Organics[4]	mg/kg	500	**500**	-	<50Ua	-	<50Ua	-	<50Ua	-	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	<50Ua	122	123	361	<50Ua	<50Ua	<50Ua	**902**	92.5	<50Ua
PAH by 8270D SIM																								
Acenaphthene	mg/kg	4500	**350**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0205	<0.0366U	<0.0306U	<0.0271U	<0.00844U	<0.00779U	<0.00901U	0.0561	0.0103J	<0.00817U
Acenaphthylene	mg/kg	NV	**NV**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0144	<0.0366U	<0.0306U	<0.0271U	<0.00844U	<0.00779U	<0.00901U	0.0431	<0.0293U	<0.00817U
Anthracene (PAH)	mg/kg	23000	**1700**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0553	<0.0366U	0.00917J	<0.0271U	<0.00844U	<0.00779U	<0.00901U	0.211	0.019J	<0.00817U
Benzo(a)anthracene (PAH)	mg/kg	2.9	**0.15**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	**0.162**	0.102	0.0138J	0.00813J	<0.00844U	<0.00779U	<0.00901U	**0.837**	0.0718	<0.00817U
Benzo(a)pyrene (PAH)	mg/kg	0.29	**0.015**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	**0.148**	**0.15**	0.00917J	**<0.0271U***	<0.00844U	<0.00779U	**0.0473**	**0.947**	**0.0542**	<0.00817U
Benzo(b)fluoranthene (PAH)	mg/kg	2.9	**0.15**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	**0.18**	**0.234**	0.0199J	0.0122J	<0.00844U	<0.00779U	<0.00901U	**1.32**	0.085	<0.00817U
Benzo(g,h,i)perylene	mg/kg	NV	**NV**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0785	0.124	0.0122J	0.00678J	<0.00844U	<0.00779U	<0.00901U	0.658	<0.0293U	<0.00817U
Benzo(k)fluoranthene (PAH)	mg/kg	29	**1.5**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.072	0.0805	<0.0306U	<0.0271U	<0.00844U	<0.00779U	<0.00901U	0.539	0.0322	<0.00817U
Chrysene (PAH)	mg/kg	290	**15**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.165	0.128	0.0351	0.0244J	<0.00844U	<0.00779U	<0.00901U	1.03	0.104	<0.00817U
Dibenzo(a,h)anthracene (PAH)	mg/kg	0.29	**0.015**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	**0.0284**	**0.0457**	**<0.0306U***	**<0.0271U***	<0.00844U	<0.00779U	<0.00901U	**0.211**	**<0.0293U***	<0.00817U
Fluoranthene (PAH)	mg/kg	3000	**230**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.267	0.106	0.0351	0.0258J	<0.00844U	<0.00779U	<0.00901U	1.14	0.127	<0.00817U
Fluorene (PAH)	mg/kg	3000	**230**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0258	<0.0366U	0.00917J	<0.0271U	<0.00844U	<0.00779U	<0.00901U	0.0388J	<0.0293U	<0.00817U
Indeno (1,2,3-cd) pyrene (PAH)	mg/kg	2.9	**0.15**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0868	0.104	<0.0306U	<0.0271U	<0.00844U	<0.00779U	<0.00901U	**0.632**	<0.0293U	<0.00817U
Naphthalene (PAH)	mg/kg	17	**3.8**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.0186	0.0146J	0.0351	<0.0271U	<0.00844U	<0.00779U	<0.00901U	0.082	0.00879J	<0.00817U
Phenanthrene	mg/kg	NV	**NV**	-	-	-	-	-	-	-	-	-	-	0.00256BJ	0.00262BJ	0.212B	0.0585B	0.0825	0.0312	0.00253BJ	0.00234BJ	0.0027BJ	0.884B	0.149	<0.00817U
Pyrene (PAH)	mg/kg	2300	**170**	-	-	-	-	-	-	-	-	-	-	<0.00853U	<0.00873U	0.295	0.152	0.0611	0.0366	<0.00844U	<0.00779U	<0.00901U	2.08	0.186	<0.00817U
VOCs by EPA 8260C																								
Acetone	mg/kg	67000	**6100**	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	0.021	<0.02Ua	0.023	<0.02Ua	<0.02Ua	<0.02Ua	<0.02Ua	0.043	<0.02Ua	<0.02Ua	<0.02Ua

Notes:

mg/kg- milligrams per kilogram

1 - U.S. EPA Regional Screening Levels with a Total Hazard Quotient of 0.1 for Industrial Soils (EPA, 2016)

2 - U.S. EPA Regional Screening Levels with a Total Hazard Quotient of 0.1 for Residential Soils (EPA, 2016)

3 - Arsenic value is from Colorado Department of Public Health and Environment Risk Management Guidance for Evaluating Arsenic Concentrations in Soil (CDPHE, 2014)

4 - GRO and DRO value from TPH Threshold Concentration (OPS, 2005)

Ua - Sample is Non-Detect

U - Result not detected above detection limit

QR-03 - The RPD value for the sample duplicate of 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

QM-07 - The spike recover was outside acceptance limits for the MS and/or MSD. The batch was accepted base on acceptable LCS recovery.

J - Greater than detection limit but less than the reporting limit

BJ - Blank contamination. Greater than the detection limit but less than the reporting limit

B - Blank contamination

(-) - Not analyzed

NV - Non-value

< - Result not detected above the detection limit

** Non-detect. Reporting limit exceeded the RRSL.*

Bold *- value exceeds the residential regional screening level*

Gray Filled Cell - value exceeds both the residential and industrial regional screening levels

Table F-2 **Groundwater Analytical Results (Detected Parameters)**

Chemical Name	Units	Groundwater Standards[1]	Reg 31 Aquatic Life Segment, Acute[2]	Reg 31 Aquatic Life Segment, Chronic[2]	Reg 31 Human Health Segment, Fish Ingestion[2]	Reg 31 Human Health Segment, Water Supply[2]	Reg 31 Human Health Segment, Water+Fish[2]	Reg 38, Segment 14, hardness 200 mg/L - Chronic TVS (Reg 31 & 38) [3]	Sample ID/Street Number/Sample Date											
									RW2GW01	RW2GW02	RW2GW03	RW2GW04	RW2GW05	RW6GW01	RW6GW02	RW9GW01	RW14GW01	RW14GW02	RW19GW01	RW25GW01	RW28GW01
									710	710	710	710	710	2970	2970	750	830	816	888	950	970
									6/16/2016	6/16/2016	6/16/2016	6/16/2016	6/16/2016	5/4/2016	5/4/2016	5/4/2016	5/4/2016	5/4/2016	5/4/2016	5/4/2016	5/4/2016
Dissolved Metals by 6010C/7470A																				
Arsenic	mg/L	**0.01**						0.003	<0.005U	<0.005U	-	<0.005U	<0.005U	0.00695J	<0.03U	<0.03U	<0.03U	0.00684J	<0.03U	<0.03U	<0.03U
Barium	mg/L	**2**						1	0.0213	0.0414	-	0.034	0.0162	0.0615	0.0281	0.0604	0.0386	0.0376	0.00965J	0.0279	0.0265
Chromium (Total)	mg/L	**0.1**						0.05	<0.001U	0.00206J	-	<0.001U	<0.001U	0.00164J	0.00105J	0.00214J	0.00127J	0.00206J	0.00132J	0.0012J	0.00149J
Lead	mg/L	**0.05**						5.305254E-03	<0.0033U	<0.0033U	-	0.00396J	<0.0033U	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U
Selenium	mg/L	**0.02**						0.0046	**0.0645**	**0.0559**	-	**0.0501**	0.0144J	**0.031**	**0.042**	<0.03U	0.00954J	<0.03U	<0.03U	0.00947J	0.0173J
VOCs by EPA 8260C																				
Tetrachloroethylene (PCE)	µg/L	**5**	5280	840	62	5	5		<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	<1Ua	1.4

Notes:

1 - CDPHE Regulation 41 Basic Standards for Groundwater, Table A, 1, and 3 as applicable (CDPHE, 2013) and/or Groundwater Protection Values Soil Cleanup Table (CDPHE, 2014a)

2 - CDPHE Regulation 31 Basic Standards for Surface Water, June 30, 2016.

3 - CDPHE Regulation 28 Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republic River Basin, Smoky Hill River Basin, June 30, 2016.

Ua - Sample is Non-Detect

U - Result not detected above the detection limit

J - Greater than the detection limit but less than the reporting limit

Gray Filled Cells - Result exceeds CDPHE Groundwater Standards

(-) - Not analyzed

mg/L - milligrams per liter

µg/L - micrograms per liter

VOCs - Volatile Organic Compounds

< - Result not detected above the detection limit

Appendix G Laboratory Analytical Reports