

CITY AND COUNTY OF DENVER  
STATE OF COLORADO



Department of Public Works

Bid Form Packet

Contract Number: 201736166



BERKELEY TENNIS COURTS

AUGUST 2, 2017



## NOTICE OF APPARENT LOW BIDDER

Sport Court of the Rockies LLC  
5740 E. County Line Place, Unit 2  
Highlands Ranch, CO 80126

The EXECUTIVE DIRECTOR OF PUBLIC WORKS has considered the Bids submitted on **August 31, 2017**, for work to be done and materials to be furnished in and for:

### CONTRACT NO. 201736166 Berkeley Tennis Courts

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: **Base Bid lump sum (One [1] total bid item), plus the Add Alt 1 lump sum (One [1] total bid item)**, the total estimated cost thereof being: **Five Hundred Eighteen Thousand, Forty-Three Dollars, and Forty Cents, (\$518, 043.40)**.

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 B1.12.2 of the Charter of the City and County of Denver.

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



**NOTICE OF APPARENT LOW BIDDER**

CONTRACT NO. 201736166

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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 13<sup>th</sup> day of September 2017.

CITY AND COUNTY OF DENVER

By *George Delaney*  
" George Delaney  
Interim Executive Director of Public Works

cc: (CAO), (Treasury/Tax Compliance), (DSBO) Coordinator, David Brown (PM), Jason Himick (PM), (PW-Aud), File.

Denver Public Works/Office of the Executive Director  
201 West Colfax Avenue, Dept 608 | Denver, CO 80202  
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**CITY AND COUNTY OF DENVER  
DEPARTMENT OF PUBLIC WORKS  
Parks and Recreation**

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

**BIDDER'S CHECKLIST**

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

FORM/ PAGE NO.	COMMENTS	COMPLETE
BF-4 – BF-5	a.) Legal name, address, Acknowledgment signature and attestation (if required.)	<input checked="" type="checkbox"/>
BF-6+	a.) Fill in individual bid item dollars and totals in Numerical figures only b.) Complete all blanks c.) Legal name required	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>
BF-8	a.) List all subcontractors who are performing work on this project	<input checked="" type="checkbox"/>
BF-9 – BF-10	a.) Fully complete List of Proposed Minority /Woman Business Enterprise Bidders, Subcontractors, Suppliers, Manufacturers, or Brokers – check appropriate boxes.	<input checked="" type="checkbox"/>
BF-11	a.) Complete all blanks b.) If Addenda have been issued, complete bottom section.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
BF-12	a.) Complete appropriate sections - signature(s) required. b.) If corporation, then corporate seal required.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
BF-13	a.) Fully complete Commitment to Participation	<input checked="" type="checkbox"/>
BF-16	a.) If applicable, fully complete Joint Venture Affidavit (Submit 10 days prior to Bid Opening date)	<input checked="" type="checkbox"/>
BF-17 – BF-19	a.) If applicable, fully complete Joint Venture Eligibility Form (Submit 10 days prior to Bid Opening date)	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
BF-21- BF-24	a.) Each bidder, as a condition of responsiveness to this solicitation, shall <u>complete and return</u> the "Diversity and Inclusiveness in City Solicitations Information Request Form" with their Bid.	<input checked="" type="checkbox"/>

**Textura® Construction Payment Management System (CPM System)**

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

<b>PROJECT SIZE</b>	<b>FEE (% OF BID)</b>
<b>&lt; \$1,000,000</b>	<b>0.22% (.0022)</b>
<b>\$1,000,001 - \$5,000,000</b>	<b>0.17% (.0017)</b>
<b>\$5,000,001 - \$20,000,000</b>	<b>0.12% (.0012)</b>
<b>\$20,000,001 - \$50,000,000</b>	<b>0.10% (.0010)</b>
<b>\$50,000,001 - \$100,000,000</b>	<b>0.08% (.0008)</b>
<b>\$100,000,001 - \$500,000,000</b>	<b>0.05% (.0005)</b>
<b>&gt; \$500,000,000</b>	<b>CONTACT TEXTURA FOR PROGRAM PRICING</b>

For more information:

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

**CITY AND COUNTY OF DENVER  
DEPARTMENT OF PUBLIC WORKS  
Parks and Recreation**

**BID FORM AND SUBMITTAL PACKAGE ACKNOWLEDGMENT**

**CONTRACT NO. 201736166**

**Berkeley Tennis Courts**

**BIDDER:** SPORT COURT OF THE ROCKIES, LLC  
(Legal Name per Colorado Secretary of State)

**ADDRESS:** 5740 COUNTY LINE PL #2  
HIGHLANDS RANCH CO 80126  
\_\_\_\_\_  
\_\_\_\_\_

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. 201736166, Berkeley Tennis Courts**, made available to the undersigned bidder pursuant to Notice of Invitation for Bids dated August 2, 2017.

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

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

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

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

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

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

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

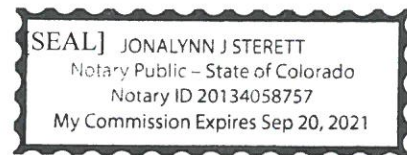
IN WITNESS WHEREOF, the undersigned bidder has signed personally or by duly authorized officer or agent and duly attested.

**BIDDER:**

Name: RANDY J. RESLEY  
 By: *RJR*  
 Title: OWNER

**ATTEST:**

By: *Jonalynn J. Sterett*



**CITY AND COUNTY OF DENVER  
DEPARTMENT OF PUBLIC WORKS  
Parks and Recreation**

**BID FORM**

**CONTRACT NO. 201736166  
Berkeley Tennis Courts**

**BIDDER** SPORT COURT OF THE ROCKIES, LLC  
(Legal Name per Colorado Secretary of State)

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

The Undersigned Bidder, having examined the plans, technical specifications, and remainder of the proposed Contract Documents as designated and enumerated in the General and Special Contract Conditions and any and all addenda thereto; having investigated the location of and conditions affecting the proposed Work; and being acquainted with and fully understanding the extent and character of the Work covered by this bid, and all factors and conditions affecting or which may be affected by Work, HEREBY SUBMITS THIS BID, pursuant to an advertisement of a Notice of Invitation for Bids as published on **August 2, 2017**, to furnish all required materials, tools, appliances, equipment and plant; to perform all necessary labor and to undertake and complete: **CONTRACT NO. 201736166, Berkeley Tennis Courts**, in Denver, Colorado, in full accordance with and conformity to the Plans, Technical Specifications, and Contract Documents hereto attached or by reference made a part hereof, at and for the following price(s) set forth on this Bid Form.

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

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



Item Description	Bid Amount
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**Berkeley Tennis Courts Replacement**

Bid Item Total Amount (lump sum)	\$ <u>492,000</u>
Textura ® Fee from table on Page BF-3 <u>.22</u> % of Bid Items	\$ <u>1082.40</u>
<b>Total Amount</b>	<b>\$ <u>493,082.40</u></b>
<b>Bid Item Total Amount plus Textura® Fee equals Total Base Bid Amount</b>	<b>\$ <u>493,082.40</u></b>

<p><b>Total Base Bid Amount:</b>  <u>Four hundred ninety three thousand eighty two &amp; 40/100 —</u>  <u>Dollars (\$ <u>493,082.40</u> )</u></p>
---

**Add Alternate #1**

**Refurbish Practice Court:**

**Amount of:** EIGHTEEN THOUSAND FIVE HUNDRED —  
Dollars (\$ 18,500.00 )

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

The \_\_\_\_\_, a corporation of the State of \_\_\_\_\_, 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 \_\_\_\_\_. 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: \_\_\_\_\_ Name: \_\_\_\_\_  
 Address: \_\_\_\_\_ Address: \_\_\_\_\_

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

3.5 ACRYLIC COLOR

- A. The mixture will be agitated in a one hundred (100) gallon paddled mortar mixer so as to provide a consistent and homogeneous solution. The mixture will be applied over the entire court surface using a rubber-tipped squeegee. The color is to be free of ridges and uniform.

3.6 PLAYING LINES

- A. One (1) coat of Line Tape Sealer shall be applied prior to applying textured line paint using a paint brush. Playing lines shall be two inches (2") wide and will be accurately located and marked by placing one inch (1") masking tape using a line taper. Textured white acrylic line paint will be applied to provide a uniform line. The lines shall have clear definition and ragged lines will not be accepted.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement for Athletic Surfacing will not be measured, but will be a lump sum item, in accordance with the Contract Drawings and Specifications and as directed by the Project Manager.

4.2 PAYMENT

- A. Payment shall be made at the lump sum bid price and shall include full compensation all of the Contractor's costs of whatever nature required to complete the surfacing in accordance with the Contract Drawings and Specifications. Payment shall include materials, labor and equipment required, furnishing and installation of surfacing in accordance with the Contract Drawings and Specifications.

END OF SECTION 32 18 23

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

Lesley B. Thomas  
 Lesley B. Thomas  
 City Engineer  
8.8.17  
 Date

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

R. J. [Signature]  
 Contractor  
8/30/17  
 Date

END OF ADDENDUM NO. 1

ATHLETIC SURFACING (ACRYLIC COLOR)  
32 18 23 - 3

Q12. Sod maintenance in spec. section 329223-9 3.6A calls for 2 years maintenance. Is this required once sod is established?

A12. No.

Q13. Winterization of the irrigation lines is called out in spec. 32 80 009 C2 is this up to GC or City doing that?

A13. The City will winterize the irrigation lines in fall, 2017.

Q14. Who's responsible for concrete and compaction testing GC or City?

A14. Specification Section 01 45 16, as well as Divisions 3 and 31 require the Contractor to provide concrete testing and compaction testing. Per Section 01 43 00, SC-11, and GC 1701, the Contractor shall cooperate and coordinate with the City for third party inspections.

Q15. Is Detail S103 on PT structural drawing plan sheet for the entire perimeter of the grade beam or is this just at each fence posts?

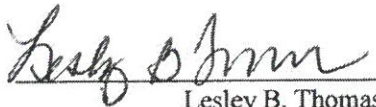
A15. The detail is intended to be the full perimeter.

Q16. Will alternate grade beams be considered from a Licensed Structural Engineer in CO since drawings are required for cables etc.?

A16. No substitutions will be considered during the bid phase. After the award of the contract, the Contractor may request substitutions per GC 406.

Attached is test data for the asphalt coating on the existing tennis courts. A trace amount of asbestos was found in the white coating; no asbestos was detected in the other areas that were sampled. Trace amounts are not regulated as asbestos containing materials (State Regulation #8) and do not require abatement actions. Trace amounts of asbestos should be handled under OSHA regulations. In preparing their bids, bidders are to assume that the white coating will not be disturbed during construction.


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

  
Lesley B. Thomas  
City Engineer

8.26.17

Date

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

  
Contractor  
8/30/17

END OF ADDENDUM NO. 2

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
FENCING	10%	SOUTHWEST CONSTRUCTION SALE & SUPPLY 2827 W. 9th AVE DENVER CO 80204

(Copy this page if additional room is required.)



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

City & County of Denver Contract No.: 201736166

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

**Prime Bidder**

Business Name: <u>SPORT COURT OF THE ROCKIES, LLC</u>		
Address: <u>5740 COUNTY LINE PL#2 HR CO 80126</u>		Contact Person: <u>RANDY RESLEY</u>
Type of Service: <u>sport court/Tennis Court Service</u>	Dollar Amount: \$: <u>493,082.40</u>	Percent of Project: <u>100%</u>

**Certified MWBE Prime Bidder**

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

**Subcontractors, Suppliers Manufacturers or Brokers (check one box)**

<input checked="" type="checkbox"/> Subcontractor (✓)	<input type="checkbox"/> Supplier (✓)	<input type="checkbox"/> Manufacturer (✓)	<input type="checkbox"/> Broker (✓)
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Business Name: <u>SOUTHWEST CONSTRUCTION SUPPLY &amp; SALES</u>			
Address: <u>2827 W. 9th AVE, Denver 80204</u>		Type of Service: <u>FENCING</u>	
Contact Person: <u>MIKE SANCHEZ</u>		Dollar Amount: \$: <u>47,601.-</u>	
Percent of Project: <u>10%</u>			
<input type="checkbox"/> Subcontractor (✓)	<input type="checkbox"/> Supplier (✓)	<input type="checkbox"/> Manufacturer (✓)	<input type="checkbox"/> Broker (✓)

Business Name:			
Address:		Type of Service:	
Contact Person:		Dollar Amount: \$:	
Percent of Project:			
<input type="checkbox"/> Subcontractor (✓)	<input type="checkbox"/> Supplier (✓)	<input type="checkbox"/> Manufacturer (✓)	<input type="checkbox"/> Broker (✓)

Business Name:			
Address:		Type of Service:	
Contact Person:		Dollar Amount: \$:	
Percent of Project:			
<input type="checkbox"/> Subcontractor (✓)	<input type="checkbox"/> Supplier (✓)	<input type="checkbox"/> Manufacturer (✓)	<input type="checkbox"/> Broker (✓)



Subcontractors, Suppliers Manufacturers or Brokers (check one box)							
<input type="checkbox"/>	Subcontractor (✓)	<input type="checkbox"/>	Supplier (✓)	<input type="checkbox"/>	Manufacturer (✓)	<input type="checkbox"/>	Broker (✓)
Business Name:							
Address:				Type of Service:			
Contact Person:				Dollar Amount: \$:		Percent of Project:	
<input type="checkbox"/>	Subcontractor (✓)	<input type="checkbox"/>	Supplier (✓)	<input type="checkbox"/>	Manufacturer (✓)	<input type="checkbox"/>	Broker (✓)
Business Name:							
Address:				Type of Service:			
Contact Person:				Dollar Amount: \$:		Percent of Project:	
<input type="checkbox"/>	Subcontractor (✓)	<input type="checkbox"/>	Supplier (✓)	<input type="checkbox"/>	Manufacturer (✓)	<input type="checkbox"/>	Broker (✓)
Business Name:							
Address:				Type of Service:			
Contact Person:				Dollar Amount: \$:		Percent of Project:	
<input type="checkbox"/>	Subcontractor (✓)	<input type="checkbox"/>	Supplier (✓)	<input type="checkbox"/>	Manufacturer (✓)	<input type="checkbox"/>	Broker (✓)
Business Name:							
Address:				Type of Service:			
Contact Person:				Dollar Amount: \$:		Percent of Project:	
<input type="checkbox"/>	Subcontractor (✓)	<input type="checkbox"/>	Supplier (✓)	<input type="checkbox"/>	Manufacturer (✓)	<input type="checkbox"/>	Broker (✓)
Business Name:							
Address:				Type of Service:			
Contact Person:				Dollar Amount: \$:		Percent of Project:	
<input type="checkbox"/>	Subcontractor (✓)	<input type="checkbox"/>	Supplier (✓)	<input type="checkbox"/>	Manufacturer (✓)	<input type="checkbox"/>	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 M/WBE(s) was furnished to the Bidder prior to the bid opening. The undersigned Bidder agrees that after the bid opening, it shall submit to the City an executed and completed W/MBE "Letter of Intent" in three working days (3) on each of its M/WBE subcontractors. The "Letter of Intent" form is contained in the Contract Documents.

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

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

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

Business Address of Bidder: 5740 COUNTY LINE PL #2

City, State, Zip Code: HIGHLANDS RANCH CO 80126

Telephone Number of Bidder: 303-805-2090 Fax No. 303-805-2098

Social Security or Federal Employer ID Number of Bidder: 45-5243462

Name and location of the last work of this kind herein contemplated upon which the Bidder was engaged:  
CITY OF LOVELAND; NORTHLAKE PARK - LOVELAND CO

For information relative thereto, please refer to:

Name: RANDY RESLEY

Title: OWNER

Address: \_\_\_\_\_

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

Addenda Number 2 Date 8-17-17

Addenda Number 1 Date 8-8-17

Addenda Number \_\_\_\_\_ Date \_\_\_\_\_

Dated this 30<sup>th</sup> day of August, 2017.

**Signature of Bidder:**

If an Individual: \_\_\_\_\_ doing business  
as \_\_\_\_\_.

If a Partnership: \_\_\_\_\_  
by: \_\_\_\_\_ General Partner.

If a Corporation: SPORT COURT OF THE ROCKIES LLC  
a LIMITED LIABILITY Corporation,  
by: [Signature], its President.

Attest:  
N/A  
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)



**COMMITMENT TO MWBE  
PARTICIPATION**

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

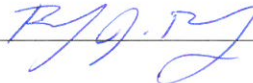
The Bidder/Proposer is committed to the minimum 6 % **MWBE** utilization on the project, and will submit Letters of Intent (LOI) for each subcontractor/subconsultant listed in the Bid Forms as follows:  
**Hard Bids:** Three (3) business days after the bid opening.  
**Request for Proposals/Qualifications:** With the proposal when due.  
**Compliance Plans:** With each task/work order

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

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

Bidder/Proposer (Name of Firm): SPORT COURT OF THE ROCKIES, LLC

Firm's Representative (Please print): RANDY RESLEY

Signature (Firm's Representative): 

Title: OWNER

Address: 5740 COUNTY LINE PL #2

City: HIGHLANDS RANCH

State: CO

Zip: 80126

Phone: 303-805-2090

Fax: 303-805-2098

Email: randy@sportcourtoftherockies.com

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



**Joint Venture Affidavit**

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: N/A

Title N/A

Signature: N/A

Date: N/A

**Notary Public**

County of N/A

State of N/A

My Commission Expires: N/A

Subscribed and sworn before me this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

Notary Seal

Notary Signature: \_\_\_\_\_

Notary Commission #: \_\_\_\_\_

Address: \_\_\_\_\_

Name of Firm: N/A

Print Name: N/A

Title N/A

Signature: N/A

Date: N/A

**Notary Public**

County of N/A

State of N/A

My Commission Expires: N/A

Subscribed and sworn before me this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

Notary Seal

Notary Signature: \_\_\_\_\_

Notary Commission #: \_\_\_\_\_

Address: \_\_\_\_\_





**JOINT VENTURE  
ELIGIBILITY FORM**

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

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

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

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

**Joint Venture Information**

Name: <i>N/A</i>	Contact Person: <i>N/A</i>
Address: <i>N/A</i>	
City: <i>N/A</i>	State: <i>N/A</i>   Zip: <i>N/A</i>   Phone: <i>N/A</i>

**Joint Venture Participants**

Name: <i>N/A</i>	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: <i>N/A</i>	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: \$ <i>N/A</i>	% <i>N/A</i>
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) *N/A*

**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) *N/A*

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

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

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

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

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

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: *N/A*

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?  
N/A

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?  
N/A

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

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

**JOINT VENTURE ELIGIBILITY FORM**

**General Information**

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

Who will they be employed by?  
N/A

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
N/A		

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.  
N/A

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

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.  
N/A

COMP-FRM-015

CITY AND COUNTY OF DENVER  
DEPARTMENT OF PUBLIC WORKS

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT Sport Court of the Rockies, LLC, as Principal, and American Southern Insurance Co., a corporation organized and existing under and by virtue of the laws of the State of Kansas, 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 Oblige, in full and just sum of THIRTY THOUSAND AND 00/100 Dollars, (\$ \*\*\*\$30,000.00\*\*\*), 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 August 31, 2017, for the construction of: **Contract No. 201736166, BERKELEY TENNIS COURTS**, as set forth in detail in the Contract Documents for the City and County of Denver, Colorado, and said Oblige 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 Oblige as liquidated damages, and not as a penalty, for the Principal's failure to perform.

The condition of this obligation is such that if the aforesaid Principal shall, within the period specified therefore, on the prescribed form presented to him for signature, enter into a written contract with the Oblige 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 Oblige, 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 Oblige 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 31st day of August, 2017.

ATTEST

Secretary

Sport Court of the Rockies, LLC

Principal

By

Title

Surety

By

American Southern Insurance Co.

Stefan E. Tauger - Attorney-in-Fact

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

[SEAL]



# AMERICAN SOUTHERN INSURANCE COMPANY

Home Office: 3715 Northside Parkway, NW  
Suite 4-800  
Atlanta, Georgia 30327

Mailing Address: P. O. Box 723030  
Atlanta, GA 31139-0030

## GENERAL POWER OF ATTORNEY

Know all men by these Presents, that the American Southern Insurance Company had made, constituted and appointed, and by these presents does make, constitute and appoint Stefan E. Tauger of Parker, Colorado; Scott E. Stoltzner of Hoover, Alabama; Arthur S. Johnson of Atlanta, Georgia; Andrew C. Heaner of Atlanta, Georgia; Jeffery L. Booth of Blacklick, Ohio; James E. Feldner of West Lake, Ohio; Patricia E. Martin of Lutz, Florida; David R. Brett of Columbia, South Carolina; Tirrell L. Moore of Monroe, North Carolina; Melanie J. Stokes of Atlanta, Georgia; Jason S. Centrella of Jacksonville, Florida; Michael K. Thompson of Atlanta, Georgia; Michael J. Brown of Cumming, Georgia; or Kelley E.M. Nys of Decatur, Georgia, EACH as its true and lawful attorney for it and its name, place and stead to execute on behalf of the said company, as surety, bonds, undertakings and contracts of suretyship to be given to all obligees provided that no bond or undertaking or contract of suretyship executed under this authority shall exceed in amount of the sum of \$1,000,000 (one million dollars), including but not limited to consents of surety for the release of retained percentages and/or final estimates on construction contracts or similar authority requested by the Department of Transportation, State of Florida; and the execution of such undertakings, bonds, recognizances and other surety obligations, in pursuance of the presents, shall be as binding upon the Company as if they had been duly signed by the President and attested by the Secretary of the Company in their own proper persons.

This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following Resolution adopted pursuant to due authorization by the Executive Committee of the Board of Directors of the American Southern Insurance Company on the 26th day of May, 1998:

RESOLVED, that the Chairman, President or any Vice President of the Company be, and that each or any of them hereby is, authorized to execute Powers of Attorney qualifying the attorney named in the given Power of Attorney to execute in behalf of the American Southern Insurance Company bonds, undertakings and all contracts of suretyship; and that any Secretary or any Assistant Secretary be, and that each or any of them hereby is, authorized to attest the execution of any such Power of Attorney, and to attach thereto the seal of the Company.

FURTHER RESOLVED, that the signature of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company when so affixed and in the future, with respect to any bond undertaking or contract of suretyship to which it is attached.

In Witness Whereof, the American Southern Insurance Company has caused its official seal to be hereto affixed, and these presents to be signed by its President and attested by its Secretary this 15<sup>th</sup> day of December, 2016.

Attest: *Gail A. Lee*  
Gail A. Lee, Secretary

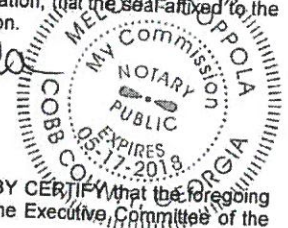
By: American Southern Insurance Company  
*Scott G. Thompson*  
Scott G. Thompson, President

STATE OF GEORGIA  
SS:

COUNTY OF FULTON  
On this 15<sup>th</sup> day of December, 2016, before me personally came Scott G. Thompson to me known, who being by me duly sworn, did depose and say that he resides in Atlanta, in the County of Fulton, State of Georgia, at 421 Hollydale Court; that he is the President of American Southern Insurance Company, the corporation described in and which executed the above instrument; that he knows the seal of the said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed and that he signed his name thereto pursuant to due authorization.

Melanie A. Coppola  
Notary Public, State of Georgia  
Qualified in Cobb County  
Commission Expires May 17, 2018

STATE OF GEORGIA  
SS:  
COUNTY OF FULTON



I, the undersigned, a Vice President of American Southern Insurance Company, a Kansas Corporation, DO HEREBY CERTIFY that the foregoing and attached Power of Attorney remains in full force and has not been revoked; and, furthermore, that the Resolution of the Executive Committee of the Board of Directors set forth in the Power of Attorney is now in force.

Signed and sealed at the City of Atlanta, Dated the 31<sup>st</sup> day of August, 2017.

*John R. Huot*  
John R. Huot  
Vice President

Power No. 43305



## 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: Randy@SportcourtoftheRockies.com

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

Agency Name:

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

Project Name: BERKELEY TENNIS COURTS

BID / RFP No.: 201736166

Name of Contractor/Consultant: SPORT COURT OF THE ROCKIES

What industry is your business? GENERAL CONSTRUCTION

Address:

5740 COUNTY LINE PL #2  
HIGHLANDS RANCH CO 80126

Business Phone No.: 303-805-2090

Business Facsimile No.: 303-805-2098

1. How many employees does your company employ?

- |  |                                   |
|--|-----------------------------------|
| <input checked="" type="checkbox"/> 1-10 | <input type="checkbox"/> 51-100   |
| <input type="checkbox"/> 11-50           | <input type="checkbox"/> over 100 |

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

Full-time 10 Part-Time \_\_\_\_\_

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?                | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2.2 Procurement and supply chain activities? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2.3 Customer service?                        | <input type="checkbox"/> Yes | <input type="checkbox"/> 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.

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

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

- Employee Training
- Pamphlets
- Public EEO postings
- Other
- Not Applicable

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

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

- Monthly                       Annually  
 Quarterly                       Not Applicable                       Other \_\_\_\_\_

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

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

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

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

8.1 If Yes, how often does it meet?

- Monthly                       Annually                       No Committee  
 Quarterly                       Other \_\_\_\_\_

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

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

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

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

If yes, please email [XO101@denvergov.org](mailto: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

8-9-17  
\_\_\_\_\_  
Date

RANDY J. REBLEY  
\_\_\_\_\_  
Printed Name of Person Completing Form

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

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

CITY AND COUNTY OF DENVER  
STATE OF COLORADO



Department of Public Works  
Bid Documents Package  
Contract Number: 201736166



**BERKELEY TENNIS COURTS**

**AUGUST 2, 2017**

**CITY AND COUNTY OF DENVER**  
**DEPARTMENT OF PUBLIC WORKS**  
**Parks and Recreation**

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Technical Specifications	278 pages
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**CITY AND COUNTY OF DENVER**  
**DEPARTMENT OF PUBLIC WORKS**  
**Parks and Recreation**

**NOTICE FOR INVITATION FOR BIDS**  
**FOR CONTRACT NO. 201736166**

**BERKELEY TENNIS COURTS**

**BID SCHEDULE:**  
**11:00 AM, Local Time**  
**AUGUST 31, 2017**

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., 2<sup>nd</sup> Floor, Denver, CO 80202 and/or [www.work4denver.com](http://www.work4denver.com).

**GENERAL STATEMENT OF WORK:**

The project includes the demolition and replacement of the south tennis courts at Berkeley Park. The new tennis courts will be a post tensioned design. Included in the scope is fencing, site amenities, lighting upgrades, a new electrical service, site work, landscaping and irrigation work. Refurbishment of the existing practice court is included as an add alternate.

**ESTIMATED CONSTRUCTION COST:**

The estimated cost of construction for this project is between \$392,635.80 and \$479,888.20.

**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](http://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](http://www.work4denver.com). To download digital Contract Documents at a cost of \$10.00 per download, reference eBid Document Number #5277418. Contact QuestCDN at 952-233-1632 or [info@questcdn.com](mailto:info@questcdn.com) for assistance.

**PRE-BID CONFERENCE:**

A pre-bid conference will be held for this Project at 9:30 AM, local time, on AUGUST 10, 2017. This meeting will take place at: 201 W. Colfax Ave., Room 4.I.5, Denver, CO 80202.

**DEADLINE TO SUBMIT QUESTIONS:** August 17, 2017 at 2:00 PM local time.

**PREQUALIFICATION REQUIREMENTS:**

Not applicable to this Project.

**MINORITY AND WOMAN BUSINESS ENTERPRISE PARTICIPATION:**

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

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

**6% Minority and Woman Business Enterprise (M/WBE) Participation**

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

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

**MISCELLANEOUS:**

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

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

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

Publication Dates: August 2, 3, 4, 2017  
Published In: The Daily Journal

**CITY AND COUNTY OF DENVER**  
**DEPARTMENT OF PUBLIC WORKS**  
**Parks and Recreation**

**INSTRUCTIONS TO BIDDERS**

**IB-1 INSTRUCTION TO BIDDERS**

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

**IB-2 BIDDING**

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

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

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

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

**IB-3 CONTRACT DOCUMENTS AS PUBLISHED BY CITY**

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

**IB-4 COMPLETING AND SIGNING THE BID FORMS**

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

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

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

**IB-5 UNACCEPTABLE BIDS**

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

**IB-6 INFORMAL AND UNBALANCED BIDS**

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

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

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

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

**IB-7 ONLY ONE BID ACCEPTED**

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

**IB-8 BID GUARANTEE**

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

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

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

**IB-9 SITE INSPECTION AND INVESTIGATIONS**

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

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

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

**IB-10 INCONSISTENCIES**

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

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

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

**IB-11 WITHDRAWAL OF BID**

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

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

**IB-12 CONTRACTOR'S BULLETIN BOARD**

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

**IB-13 PRE-BID MEETING**

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

**IB-14 ADDENDA**

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

**IB-15 BID OPENING**

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

**IB-16 EVALUATION OF BIDS AND BASIS OF BID SELECTION**

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

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

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

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

**IB-17 NOTICE TO APPARENT LOW BIDDER**

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

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

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

**IB-18 EXECUTION OF CONTRACT**

The process of executing a contract requires action by both the apparent low bidder and the City. After it notifies the Apparent Low Bidder, the City will prepare the Contract Documents by incorporating all of the documents submitted by the Apparent Low Bidder into one or more executable copies. Upon notification that contracts documents are ready for execution the Apparent Low Bidder shall execute the contract documents. At this time, the successful bidder shall also provide certain supplemental documents for incorporation into the Contract Documents. These supplemental documents shall include: the properly executed Certificate of Insurance Forms evidencing the apparent low bidder's satisfactory compliance with



the insurance requirements set forth in the Contract Documents; a properly executed Payment and Performance Bond Form and appropriate Power of Attorney evidencing the Apparent Low Bidder's satisfactory compliance with the bonding requirements set forth in the Contract Documents; and documentation of compliance with any other conditions precedent to execution of the Contract by the City set forth in the Contract Documents. The insurance and bond forms contained in the Contract Special Conditions Section of the Contract Documents must be used in satisfying these supplemental document requirements.

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

**IB-19 BONDING REQUIREMENTS**

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

**IB-20 INSURANCE REQUIREMENTS**

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

**IB-21 PERMITS AND LICENSES**

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

**IB-22 PREVAILING WAGE REQUIREMENTS**

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

Date bid or request for qualifications/proposals was advertised: August 2, 2017.

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

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

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

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

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

### **IB-23 TAX REQUIREMENTS**

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

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

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

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

### **IB-24 DIVERSITY AND INCLUSIVENESS IN CITY SOLICITATIONS**

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

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

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

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

Article III, Divisions 1 and 3 of Chapter 28, Denver Revised Municipal Code (D.R.M.C.), designated as Sections 28-31 – 28-36 and 28-52 – 28-90 D.R.M.C. and referred to in these Bid Documents as the “M/WBE Ordinance” and any Rules or Regulations promulgated pursuant thereto apply to this Project and are incorporated into these Bid Documents by reference. Generally, the M/WBE Ordinance provides for the adoption of a good faith goals program, to be administered by the Division of Small Business Opportunity (DSBO), devised to provide increased bidding opportunities for Minority and Woman Business Enterprises (M/WBEs). As such, each bidder must comply with the terms and conditions of the M/WBE Ordinance in making its bid and, if awarded the Contract, in performing all Work thereunder. A bidder’s failure to comply with the M/WBE Ordinance, any Rules or Regulations promulgated pursuant thereto, or any additional requirement contained herein shall render the bid non-responsive and shall constitute cause for rejection. Failure by the contractor awarded the contract to comply with M/WBE Ordinance requirements during the performance of the contract is a material breach of the contract, which may result in the imposition of sanctions on the Contractor, as deemed appropriate by DSBO. Copies of the M/WBE Ordinance and its accompanying Rules and Regulations are available for the use and review of bidders from DSBO. In order to comply with the bid requirements of the M/WBE Ordinance, a bidder shall either meet the established project goal or, in the alternative, demonstrate that the bidder has made sufficient good faith efforts to meet the goal in accordance with the M/WBE Ordinance.

### **Meeting Established Goal**

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

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

Bidders are encouraged to use the Directory to assist in locating M/WBEs for the work and supplies required on the Project. Bidders are reminded that changes may be made to the Directory at anytime in accordance with the City's M/WBE Ordinance and procedures established to administer this program and a current copy of the Directory must always be used in preparing a bid. M/WBE certification or listing in the Directory is not a representation or warranty by the City as to the qualifications of any listed M/WBE.

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

count at a one hundred percent (100%) level. Manufacturer's representatives and packagers shall be counted in the same manner as brokers.

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

#### **Good Faith Effort.**

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

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

- if the MBEs and WBEs are interested by demonstrating appropriate steps to follow up initial solicitations.
- c. The bidder or proposer must select portions of the work of the contract to be performed by MBEs and WBEs in order to increase the likelihood that the project goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MBE and WBE participation as subcontractors or joint venturers, and for bidder or proposer self-performed work, as suppliers, manufacturers, manufacturer's representatives and brokers, all reasonably consistent with industry practice, even when the bidder or proposer would otherwise prefer to perform these work items with its own forces. The bidder or proposer must identify what portions of the contract will be self-performed and what portions of the contract will be opened to solicitation of bids, proposals and quotes from MBE and WBEs. All portions of the contract not self-performed must be solicited for MBE and WBE participation. The ability or desire of a bidder or proposer to perform the work of a contract with its own forces does not relieve the bidder or proposer of the responsibility to meet the project goal or demonstrate good faith efforts to do so.
  - d. The bidder or proposer, consistent with industry practice, must provide MBEs and WBEs at a clearly stated location with timely, adequate access to and information about the plans, specifications, and requirements of the contract, including bonding and insurance requirements, if any, to assist them in responding to a solicitation.
  - e. The bidder or proposer must negotiate in good faith with interested MBEs and WBEs and provide written documentation of such negotiation with each such MBE or WBE.
  - f. For each MBE or WBE which contacted the bidder or proposer or which the bidder or proposer contacted or attempted to subcontract or joint venture with, consistent with industry practice, the bidder or proposer must supply a statement giving the reasons why the bidder or proposer and the MBE or WBE did not succeed in negotiating a subcontracting, supplier, manufacturer, manufacturer's representative, broker or joint venture agreement, as applicable.
3. The bidder or proposer must provide verification that it rejected each non-utilized MBE and WBE because the MBE or WBE did not submit the lowest bid or it was not qualified. Such verification shall include a verified statement of the amounts of all bids received from potential or utilized subcontractors, suppliers, manufacturers, manufacturer's representatives, brokers or joint venturers on the contract, whether or not they are MBEs or WBEs. In making such a determination of not being qualified, the bidder or proposer shall be guided by the definition of qualified in section 28-54(42), but evidence of lack of qualification must be based on factors other than solely the amount of the MBE's or WBE's bid. For each MBE or WBE found not to be qualified by the bidder or proposer, the verification shall include a statement giving the bidder's or proposer's reasons for its conclusion. A bidder's or proposer's industry standing or group memberships may not be the cause of rejection of an MBE or WBE. A bidder or proposer may not reject an MBE or WBE as being unqualified without sound reasons based on a reasonably thorough investigation and assessment of the MBE's or WBE's capabilities and expertise.
  4. If requested by a solicited MBE or WBE, the bidder or proposer must make reasonable efforts to assist interested MBEs and WBEs in obtaining bonding, lines of credit, or insurance as required by the City or by the bidder or proposer, provided that the bidder or proposer need not provide financial assistance toward this effort.
  5. If requested by a solicited MBE or WBE, the bidder or proposer must make reasonable efforts to assist interested MBEs and WBEs in obtaining necessary and competitively priced equipment, supplies, materials, or related assistance or services for performance under the contract, provided that the bidder or proposer need not provide financial assistance toward this effort.



6. The bidder or proposer must use the DSBO MBE/WBE directories to identify, recruit, and place MBEs and WBEs.
7. In determining whether a bidder or proposer has satisfied good faith efforts as to a project goal, the success or failure of other bidders or proposers on the contract in meeting such project goal may be considered.

### **Continuing Commitments.**

In accordance with the provisions of the M/WBE Ordinance, the bidder agrees that it is committed to meeting either the M/WBE participation goal or the M/WBE participation set forth in its statement of good faith. This commitment must be expressly indicated on the "Commitment to MWBE SBE Participation" form included with the Bid Form. This commitment includes the following understandings:

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

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

### **IB- 26 DISCLOSURE OF INFORMATION**

All submissions and other materials provided or produced pursuant to this Invitation for Bids may be subject to the Colorado Open Records Law, C.R.S. 24-72-201, et seq. As such, bidders are urged to review these disclosure requirements and any exceptions to disclosure of information furnished by another party and, prior to submission of a bid to the City, appropriately identify materials that are not subject to disclosure. In the event of a request to the City for disclosure of such information, the City shall advise the bidder of such request to give the bidder an opportunity to object to the disclosure of designated confidential materials furnished to the City. In the event of the filing of a lawsuit to compel such disclosure, the City will tender all such material to the court for judicial determination of the issue of disclosure and each bidder agrees to intervene in such lawsuit to protect and assert its claims of privilege against disclosure of such material. Each

bidder further agrees to defend, indemnify and save and hold harmless the City, its officers, agents and employees, from any claim, damages, expense, loss or costs arising out of the bidder's intervention to protect and assert its claims of privilege against disclosure under the Open Records Law including, but not limited to, prompt reimbursement to the City of all reasonable attorney fees, costs and damages that the City may incur directly or may be ordered to pay by such court.

**IB-27 GENERAL BIDDING INFORMATION**

Bidders are instructed to contact the Contract Administrator designated below for this Project for pre-bid, post-bid and general City bidding information. Bidders can also visit [www.work4denver.com](http://www.work4denver.com) for information, both general and project specific. The Contract Administrator assigned to this project is David Relaford who can be reached via email at [david.relaford@denvergov.org](mailto:david.relaford@denvergov.org).

**IB-28 PAYMENT PROCEDURE REQUIREMENTS**

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

<b>PROJECT SIZE</b>	<b>FEE (% OF BID)</b>
<b>&lt; \$1,000,000</b>	<b>0.22% (.0022)</b>
<b>\$1,000,001 - \$5,000,000</b>	<b>0.17% (.0017)</b>
<b>\$5,000,001 - \$20,000,000</b>	<b>0.12% (.0012)</b>
<b>\$20,000,001 - \$50,000,000</b>	<b>0.10% (.0010)</b>
<b>\$50,000,001 - \$100,000,000</b>	<b>0.08% (.0008)</b>
<b>\$100,000,001 - \$500,000,000</b>	<b>0.05% (.0005)</b>
<b>&gt; \$500,000,000</b>	<b>CONTACT TEXTURA FOR PROGRAM PRICING</b>

For more information:

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

**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**  
**Parks and Recreation**

**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.

**CITY AND COUNTY OF DENVER**  
**DEPARTMENT OF PUBLIC WORKS**  
**Parks and Recreation**

**APPENDIX F**

**AFFIRMATIVE ACTION REQUIREMENTS**

**EQUAL EMPLOYMENT OPPORTUNITY**

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

**NOTICE**

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

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

/s/ \_\_\_\_\_

Manager of Public Works  
City and County of Denver

**A. REQUIREMENTS - AN AFFIRMATIVE ACTION PLAN:**

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

**1. GOALS AND TIMETABLES:**

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

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

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

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

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

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

**2. SPECIFIC AFFIRMATIVE ACTION STEPS:**

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

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

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

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

**3. NON - DISCRIMINATION:**

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

**4. COMPLIANCE AND ENFORCEMENT:**

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

**B. CONTRACTORS SUBJECT TO THESE BID CONDITIONS:**

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

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

**C. OBLIGATIONS APPLICABLE TO CONTRACTORS:**

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

**D. GENERAL REQUIREMENTS:**

Contractors are responsible for informing their subcontractors in writing regardless of tier, as to their respective obligations. Whenever a Contractor subcontracts a portion of work in any trade covered by these Bid Conditions, **it shall include these Bid Conditions in such subcontracts and each subcontractor shall**



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

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

**CITY AND COUNTY OF DENVER**  
**DEPARTMENT OF PUBLIC WORKS**  
**Parks and Recreation**

**CONTRACT NO. 201736166**

**Berkeley Tennis Courts**

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

Sport Court of the Rockies LLC  
5740 E. County Line Place 32  
Highlands Ranch, CO 80126

**WITNESSETH**, Commencing on **August 2, 2017**, and for at least three (3) days the City advertised that sealed bids would be received for furnishing all labor, tools, supplies, equipment, materials, and everything necessary and required for the following:

**CONTRACT NO. 201736166**

**Berkeley Tennis Courts**

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

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

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

**1. CONTRACT DOCUMENTS**

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

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

*Equal Employment Opportunity Provisions (Appendix A and Appendix F)*  
*Bid Form*  
*Contract Form*  
*General Contract Conditions*  
*Special Contract Conditions*  
*Performance and Payment Bond*  
*Notice to Apparent Low Bidder*  
*Notice to Proceed*  
*Contractor's Certification of Payment Form*  
*Final/Partial Lien Release Form*  
*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 **210** (Two Hundred Ten 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 2 (lump sum + 1 alternate)**, the total estimated cost thereof being **Five Hundred Eighteen Thousand, Forty Three Dollars and Forty Cents, (\$518,043.40)**. 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 the Work under this Contract, the Contractor agrees not to refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, marital status, or physical or mental disability; and the Contractor further agrees to insert the foregoing provision in all subcontracts hereunder.

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

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

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

**7. WAGE RATE REQUIREMENTS**

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

**8. APPLICABILITY OF LAWS**

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

**9. APPROPRIATION**

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

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

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

**10. APPROVALS**

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

**11. ASSIGNMENT**

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

**12. DISPUTES RESOLUTION PROCESS**

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

mechanism that will be recognized by the parties for any claims put forward by the Contractor, notwithstanding any other claimed theory of entitlement on the part of the Contractor or its subcontractors or suppliers.

**13. CONTRACT BINDING**

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

**14. PARAGRAPH HEADINGS**

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

**15. SEVERABILITY**

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

**16. ELECTRONIC SIGNATURES AND ELECTRONIC RECORDS:**

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

**Contract Control Number:**

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

SEAL

**CITY AND COUNTY OF DENVER**

ATTEST:

By \_\_\_\_\_

\_\_\_\_\_

APPROVED AS TO FORM:

REGISTERED AND COUNTERSIGNED:

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_





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

Contract Control Number: 201736166

Vendor Name:

By: *RJR*

Name: Randy J. Resley  
(please print)

Title: owner  
(please print)

ATTEST: [if required]

By: \_\_\_\_\_

Name: \_\_\_\_\_  
(please print)

Title: \_\_\_\_\_  
(please print)



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

**General Contract Conditions**

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**CITY AND COUNTY OF DENVER**  
**DEPARTMENT OF PUBLIC WORKS**  
**Parks and Recreation**

**SPECIAL CONTRACT CONDITIONS**

**SC-1 CONSTRUCTION SPECIFICATIONS**

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

City and County of Denver:

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

*Transportation Standards and Details for the Engineering Division*

*City and County of Denver Traffic Standard Drawings*

Wastewater Management Division

– *Standard Detail Drawings*

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

Colorado Department of Transportation:

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

Federal Highway Administration:

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

Building & Fire Codes:

*Building Code of the City and County of Denver*

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

*National Fire Protection Association Standards*

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

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

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

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

**SC-2 DEPUTY MANAGER / CITY ENGINEER**

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

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

**SC-3 ENGINEERING DIVISION / CITY ENGINEER**

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

**SC-4 WASTEWATER MANAGEMENT DIVISION**

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

**SC-5 CITY DELEGATION OF AUTHORITY**

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

**Denver Department of Public Works / Engineering Division,**

Project Manager  
City Project Manager  
David Brown

Telephone  
  
(720) 865-3039

**SC-6 LIQUIDATED DAMAGES; MILESTONES; ACTUAL DAMAGES**

**General Condition: 602 LIQUIDATED DAMAGES; ADMINISTRATIVE COSTS; ACTUAL DAMAGES is hereby replaced in its entirety with the following:**

.1 Time is of the essence in performing the Contract. In the event the Contractor fails to achieve the milestones described below or fails to meet any other time requirement or the time limit set forth in the Contract (See Milestone Schedule 602.5), after due allowance for any extension or extensions of time made in accordance with the provisions herein set forth, the Contractor shall be liable to the City for liquidated damages, and not as a penalty, in the amount stipulated therefore in the Contract Form or in the Special Conditions. Such liquidated damages shall be assessed for each and every Day that the Contractor shall be in default, as established by said time limit or limits. The City shall have the right to deduct said liquidated damages from any amount due or that may become due the Contractor, or to collect such liquidated damages from the Contractor or its surety.

.2 Liquidated damages in the amount stipulated do not include any sums of money to reimburse the City for actual damages which may be incurred between Substantial Completion and Final Completion because of the

Contractor's failure to achieve Final Completion within the Contract Time. For such delay in Final Completion, the Contractor shall reimburse the City, as a mitigation of City damages and not as a penalty, those administrative costs incurred by the City as a result of such failure. Representative hourly rates for such administrative costs are set out in the Special Conditions. The Project Manager shall calculate the City's administrative costs based on such Special Conditions, as the same may be revised from time to time.

Representative hourly rates for the City administrative costs 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

.3 Liquidated damages in the amounts stipulated do not include any sums of money to reimburse the City for extra costs which the City may become obligated to pay on other contracts which were delayed or extended because of the Contractor's failure to complete the Work within the Contract Time. Should the City incur additional costs because of delays or extensions to other contracts resulting from the Contractor's failure of timely performance, the City will assess these extra costs against the Contractor, and these assessments will be in addition to the stipulated liquidated damages.

.4 The City reserves all of its rights to actual damages from the Contractor for injury or loss suffered by the City from actions or omissions of the Contractor, including but not limited to any other breach or default of the Contract, outside of the scope of the above sections of GC 602.

.5 The Parties recognize and agree that time is of the essence on this Contract. Due to the time sensitivities, the Contract establishes multiple milestones based on the date the Notice to Proceed is issued by the City. Milestone completion shall be achieved per the Milestone Schedule listed herein. Liquidated damages will be assessed by the City to the contractor in the amount of \$750.00 per calendar day for each and every day each individual milestone is not adequately completed. Completion for the purposes of this section 602.5 shall include all work completed per the Contract any executed change orders and any executed amendments.

**MILESTONE SCHEDULE**

- Based on an anticipated Notice to Proceed date of November 1, 2017, the post tensioned slab shall be in place no later than March 1, 2018.

**SC-7 SUBCONTRACTS**

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

**SC-8 RESERVED**

**SC-9 PAYMENTS TO CONTRACTORS**

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

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

<u>Agency/Firm</u>	<u>Name</u>	<u>Telephone</u>
Public Works/Engineering Division	David Brown	(303) 641-0934

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.

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**DEPARTMENT OF PUBLIC WORKS  
Engineering Division**

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

(PROJECT NO. and NAME)	Date: _____, 20__.
(NAME OF CONTRACTOR)	Subcontract #: _____.
(NAME OF SUBCONTRACTOR/SUPPLIER)	Subcontract Value: \$ _____.
Check Applicable Box:	Last Progress Payment: \$ _____.
<input type="checkbox"/> MBE <input type="checkbox"/> WBE	Date: _____.
	Total Paid to Date: \$ _____.
	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 save and hold harmless the City, its officers, employees, agents and assigns and the above-referenced Contractor from and against all costs, losses, damages, causes of action, judgments under the subcontract and expenses arising out of or in connection with any claim or claims against the City or the Contractor which arise out of the Undersigned's performance of the Work Effort and which may be asserted by the Undersigned or any of its suppliers or subcontractors of any tier or any of their representatives, officers, agents, or employees.

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

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

STATE OF COLORADO    ) ss. CITY OF _____ )	_____ (Name of Subcontractor)
Signed and sworn before me this day of _____, 20__.	By: _____
_____ Notary Public/Commissioner of Oaths My Commission Expires	Title: _____



**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

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/E DBE/ NON	Original Contract Amount	% Bid (A/II)	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)
<b>Totals</b>									

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 031816



## 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  
[DSBO@denvergov.org](mailto:DSBO@denvergov.org)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Rev: 031816



## **SC-10 CONTRACT FORMS**

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

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

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

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

## **SC-11 CONSTRUCTION INSPECTION BY THE CITY**

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

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

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

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

## **SC-12 DISPOSAL OF NON-HAZARDOUS WASTE AT DADS**

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

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

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

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

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

**SC-15 ATTORNEY'S FEES**

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

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

**SC-16 INSURANCE**

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

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

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

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

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

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

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

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

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

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

**(9) Additional Provisions:**

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

**SC-17 GREENPRINT DENVER REQUIREMENTS**

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

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

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

CITY AND COUNTY OF DENVER  
DEPARTMENT OF PUBLIC WORKS

Bond #: 66524

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Sport Court of the Rockies, LLC

a corporation organized and existing under and by virtue of the laws of the State of Colorado,  
hereafter referred to as the "Contractor", and American Southern Insurance Co.

a corporation organized and existing under and by virtue of the laws of the State of Kansas,

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 Five Hundred Eighteen Thousand Forty Three and 40/100

Dollars (\$ \*\*\*518,043.40\*\*\*).

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. 201736166 BERKELEY TENNIS COURTS**, 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 26<sup>th</sup> day of September, 2017.

Attest:

Secretary

Sport Court of the Rockies, LLC

Contractor

By:

President

American Southern Insurance Co.

Surety

By:

Attorney-In-Fact Stefan E. Tauger

(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:

EXECUTIVE DIRECTOR OF PUBLIC WORKS



# AMERICAN SOUTHERN INSURANCE COMPANY

Home Office: 3715 Northside Parkway, NW  
Suite 4-800  
Atlanta, Georgia 30327

Mailing Address: P. O. Box 723030  
Atlanta, GA 31139-0030

## GENERAL POWER OF ATTORNEY

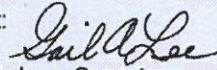
Know all men by these Presents, that the American Southern Insurance Company had made, constituted and appointed, and by these presents does make, constitute and appoint Stefan E. Tauger of Parker, Colorado; Scott E. Stoltzner of Hoover, Alabama; Arthur S. Johnson of Atlanta, Georgia; Andrew C. Heaner of Atlanta, Georgia; Jeffery L. Booth of Blacklick, Ohio; James E. Feldner of West Lake, Ohio; Patricia E. Martin of Lutz, Florida; David R. Brett of Columbia, South Carolina; Tirrell L. Moore of Monroe, North Carolina; Melanie J. Stokes of Atlanta, Georgia; Jason S. Centrella of Jacksonville, Florida; Michael K. Thompson of Atlanta, Georgia; Michael J. Brown of Cumming, Georgia; or Kelley E.M. Nys of Decatur, Georgia, EACH as its true and lawful attorney for it and its name, place and stead to execute on behalf of the said company, as surety, bonds, undertakings and contracts of suretyship to be given to all obligees provided that no bond or undertaking or contract of suretyship executed under this authority shall exceed in amount of the sum of \$1,000,000 (one million dollars), including but not limited to consents of surety for the release of retained percentages and/or final estimates on construction contracts or similar authority requested by the Department of Transportation, State of Florida; and the execution of such undertakings, bonds, recognizances and other surety obligations, in pursuance of the presents, shall be as binding upon the Company as if they had been duly signed by the President and attested by the Secretary of the Company in their own proper persons.

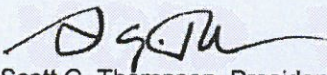
This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following Resolution adopted pursuant to due authorization by the Executive Committee of the Board of Directors of the American Southern Insurance Company on the 26th day of May, 1998:

RESOLVED, that the Chairman, President or any Vice President of the Company be, and that each or any of them hereby is, authorized to execute Powers of Attorney qualifying the attorney named in the given Power of Attorney to execute in behalf of the American Southern Insurance Company bonds, undertakings and all contracts of suretyship; and that any Secretary or any Assistant Secretary be, and that each or any of them hereby is, authorized to attest the execution of any such Power of Attorney, and to attach thereto the seal of the Company.

FURTHER RESOLVED, that the signature of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company when so affixed and in the future, with respect to any bond undertaking or contract of suretyship to which it is attached.

In Witness Whereof, the American Southern Insurance Company has caused its official seal to be hereto affixed, and these presents to be signed by its President and attested by its Secretary this 15<sup>th</sup> day of December, 2016.

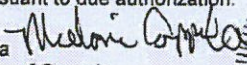
Attest:   
Gail A. Lee, Secretary

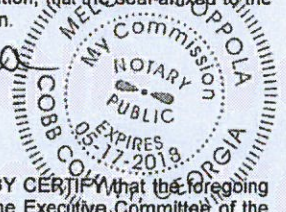
American Southern Insurance Company  
By:   
Scott G. Thompson, President

STATE OF GEORGIA  
SS:  
COUNTY OF FULTON

On this 15<sup>th</sup> day of December, 2016, before me personally came Scott G. Thompson to me known, who being by me duly sworn, did depose and say that he resides in Atlanta, in the County of Fulton, State of Georgia, at 421 Hollydale Court; that he is the President of American Southern Insurance Company, the corporation described in and which executed the above instrument; that he knows the seal of the said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed and that he signed his name thereto pursuant to due authorization.

STATE OF GEORGIA  
SS:  
COUNTY OF FULTON

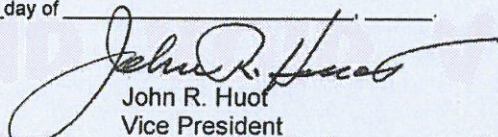
  
Melonie A. Coppola  
Notary Public, State of Georgia  
Qualified in Cobb County  
Commission Expires May 17, 2018



I, the undersigned, a Vice President of American Southern Insurance Company, a Kansas Corporation, DO HEREBY CERTIFY that the foregoing and attached Power of Attorney remains in full force and has not been revoked; and, furthermore, that the Resolution of the Executive Committee of the Board of Directors set forth in the Power of Attorney is now in force.

Signed and sealed at the City of Atlanta, Dated the \_\_\_\_\_ day of \_\_\_\_\_

Power No. 43406

  
John R. Huot  
Vice President





**PERFORMANCE AND PAYMENT BOND  
SURETY AUTHORIZATION**

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

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

RE: Sport Court of the Rockies LLC

Contract No: 201736166  
Project Name: Berkeley Tennis Courts  
Contract Amount: \$518,043.40  
Performance and Payment Bond No.: 66524

Dear Assistant City Attorney,


The Performance and Payment Bonds covering the above captioned project were executed by this agency, through AMERICAN SOUTHERN insurance company, on SEPTEMBER 22, 2017

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 303-694-4404

Thank you.

Sincerely,



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

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# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
9/22/2017

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  
Arthur J. Gallagher Risk Management Services, Inc.  
3005 Center Green Drive Suite 120  
Boulder CO 80301

CONTACT NAME:		
PHONE (A/C, No, Ext): 303-444-4666	FAX (A/C, No): 303-444-8481	
E-MAIL ADDRESS:		
INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A : Travelers Property Casualty Co of America		25674
INSURER B : Travelers Casualty Insurance Co of America		19046
INSURER C : Travelers Indemnity Company		25658
INSURER D : Pinnacol Assurance Company		41190
INSURER E :		
INSURER F :		

INSURED  
Sport Court of the Rockies LLC  
5740 E. County Line Place #2  
Highlands Ranch CO 80126

COVERAGES      CERTIFICATE NUMBER: 1343587583      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	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC <input type="checkbox"/> OTHER:	Y	Y	I6601C006885TIL17	5/24/2017	5/24/2018	EACH OCCURRENCE \$1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$300,000 MED EXP (Any one person) \$5,000 PERSONAL & ADV INJURY \$1,000,000 GENERAL AGGREGATE \$2,000,000 PRODUCTS - COMP/OP AGG \$2,000,000 \$
B	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input checked="" type="checkbox"/> OWNED AUTOS ONLY <input checked="" type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY	Y	Y	BA1C00737217SEL	5/24/2017	5/24/2018	COMBINED SINGLE LIMIT (Ea accident) \$1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
C	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input checked="" type="checkbox"/> RETENTION \$5,000	Y	Y	CUP1C00781A1742	5/24/2017	5/24/2018	EACH OCCURRENCE \$2,000,000 AGGREGATE \$2,000,000 \$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	4158255	9/1/2017	9/1/2018	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$1,000,000 E.L. DISEASE - EA EMPLOYEE \$1,000,000 E.L. DISEASE - POLICY LIMIT \$1,000,000
A	Equipment			I6601C006885TIL17	5/24/2017	5/24/2018	Rented/Leased Deductible \$150,000 \$500

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

Project: Berkeley Tennis Courts, Contract #201736166  
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 Liability and Business Auto. Waiver of Subrogation also applies. Coverage is primary and non-contributory.

### CERTIFICATE HOLDER      CANCELLATION

City and County of Denver  
Department of Parks and Recreation  
Finance and Administration Division  
Attn: Megan Allsop  
201 W. Colfax Avenue, Dept. 602  
Denver CO 80202  
USA

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



**PERFORMANCE AND PAYMENT BOND  
SURETY AUTHORIZATION  
(SAMPLE)**

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

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

RE: (Company name)

Contract No: 201736166  
Project Name: Berkeley Tennis Courts  
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,

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

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

Current Date

To:

Gentlemen:

The MANAGER OF PUBLIC WORKS has considered the Bids submitted on August 31, 2017 for work to be done and materials to be furnished in and for:

**PROJECT No. 201736166 BERKELEY TENNIS COURTS**

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

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

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

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

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

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

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

PROJECT NO. 201736166

Page 2

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

Dated at Denver, Colorado this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_.

CITY AND COUNTY OF DENVER

By \_\_\_\_\_

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](http://www.denvergov.org/dpw)  
p. 720.865.8630 | f. 720.865.8795

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Current Date

**NOTICE TO PROCEED  
(SAMPLE)**

Name  
Company  
Street  
City/State/Zip

**CONTRACT NO. 201736166, BERKELEY TENNIS COURTS**

In accordance with General Contract Condition 302 of the Standard Specifications for Construction, General Contract Conditions, 2011 Edition, you are hereby authorized and directed to proceed on \_\_\_\_\_ with the work of constructing contract number 201736166, as set forth in detail in the contract documents for the City and County of Denver.

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

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

Sincerely,

Lesley B. Thomas  
City Engineer

cc:

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

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Certificate of Contract Release  
(SAMPLE)

Date

Name  
Company  
Street  
City/State/Zip

RE: Certificate of Contract Release for  
**201736166, BERKELEY TENNIS COURTS**

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](http://www.denvergov.org/dpw)  
p. 720.865.8630 | f. 720.865.8795

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CITY AND COUNTY OF DENVER  
STATE OF COLORADO



Department of Public Works  
Prevailing Wage Rates  
Contract Number: 201736166



BERKELEY TENNIS COURTS  
AUGUST 2, 2017



**DENVER**  
THE MILE HIGH CITY

**Office of Human Resources**  
Denver's Human Resource Agency

201 W. Colfax, Department 412  
Denver, CO 80202  
p: 720.913.5751  
f: 720.913.5720  
[www.denvergov.org/humanresources](http://www.denvergov.org/humanresources)

TO: All Users of the City of Denver Prevailing Wage Schedules

FROM: Susan Keller, Human Resources Technician

DATE: Monday, June 12, 2017

SUBJECT: Latest Change to Prevailing Wage Schedules

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

The effective date for this publication will be **Friday, June 9, 2017** and applies to the City and County of Denver for **HEAVY CONSTRUCTION PROJECTS** in accordance with the Denver Revised Municipal Code, Section 20-76(c).

General Wage Decision No. CO170012  
Superseded General Decision No. CO20160012  
Modification No. 7  
Publication Date: 6/9/17  
(8 pages)

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

For questions please call (720) 913-5726.

Attachments as listed above.



General Decision Number: CO170012 06/09/2017 CO12

Superseded General Decision Number: CO20160012

State: Colorado

Construction Type: Heavy

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

HEAVY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.20 for calendar year 2017 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 \$10.20 (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 2017. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Modification Number	Publication Date
0	01/06/2017
1	01/20/2017
2	02/03/2017
3	04/07/2017
4	05/19/2017
5	05/26/2017
6	06/02/2017
7	06/09/2017

ASBE0028-001 07/01/2016

	Rates	Fringes
Asbestos Workers/Insulator (Includes application of all insulating materials, protective coverings, coatings and finishings to all types of mechanical systems).....	\$ 29.73	13.93

BRCO0007-004 01/01/2017

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

	Rates	Fringes
BRICKLAYER.....	\$ 26.62	7.99

BRCO0007-006 05/01/2017

EL PASO AND PUEBLO COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 25.32	9.90

-----  
 ELEC0012-004 09/01/2016

PUEBLO COUNTY

	Rates	Fringes
ELECTRICIAN		
Electrical contract over		
\$1,000,000.....	\$ 28.00	11.00+3%
Electrical contract under		
\$1,000,000.....	\$ 24.85	11.00+3%

-----  
 ELEC0068-001 06/01/2017

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

	Rates	Fringes
ELECTRICIAN.....	\$ 34.70	14.97

-----  
 \* ELEC0111-001 01/01/2017

	Rates	Fringes
Line Construction:		
Groundman.....	\$ 24.87	22.25%+\$5.75
Line Equipment Operator.....	\$ 30.36	22.25%+\$5.75
Lineman and Welder.....	\$ 43.51	25.25%+\$5.75

-----  
 ELEC0113-002 06/01/2017

EL PASO COUNTY

	Rates	Fringes
ELECTRICIAN.....	\$ 31.00	15.38

-----  
 ELEC0969-002 06/01/2015

MESA COUNTY

	Rates	Fringes
ELECTRICIAN.....	\$ 24.00	7.92

-----  
 \* ENGI0009-001 05/01/2017

	Rates	Fringes
Power equipment operators:		
Blade: Finish.....	\$ 27.92	10.10
Blade: Rough.....	\$ 27.60	10.10
Bulldozer.....	\$ 27.60	10.10
Cranes: 50 tons and under..	\$ 27.75	10.10
Cranes: 51 to 90 tons.....	\$ 27.92	10.10

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

-----  
IRON0024-003 05/01/2017

	Rates	Fringes
Ironworkers:.....	\$ 26.30	21.45
Structural		

-----  
LABO0086-001 05/01/2009

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

-----  
PLUM0003-005 06/01/2017

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

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

-----  
PLUM0058-002 07/01/2016

EL PASO COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 35.60	13.65

-----  
PLUM0058-008 07/01/2016

PUEBLO COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 35.60	13.65

-----  
PLUM0145-002 07/01/2016

MESA COUNTY

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

-----  
PLUM0208-004 06/01/2016

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

	Rates	Fringes
PIPEFITTER.....	\$ 37.10	16.62
-----		
SHEE0009-002 07/01/2016		
	Rates	Fringes
Sheet metal worker.....	\$ 32.56	15.96
-----		
TEAM0455-002 07/01/2016		
	Rates	Fringes
Truck drivers:		
Pickup.....	\$ 20.16	4.02
Tandem/Semi and Water.....	\$ 20.79	4.02
-----		
SUCO2001-006 12/20/2001		
	Rates	Fringes
BOILERMAKER.....	\$ 17.60	
Carpenters:		
Form Building and Setting...	\$ 16.97	2.74
All Other Work.....	\$ 15.14	3.37
Cement Mason/Concrete Finisher...	\$ 17.31	2.85
IRONWORKER, REINFORCING.....	\$ 18.83	3.90
Laborers:		
Common.....	\$ 11.22	2.92
Flagger.....	\$ 8.91	3.80
Landscape.....	\$ 12.56	3.21
Painters:		
Brush, Roller & Spray.....	\$ 15.81	3.26
Power equipment operators:		
Backhoe.....	\$ 16.36	2.48
Front End Loader.....	\$ 17.24	3.23
Skid Loader.....	\$ 15.37	4.41
-----		

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

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

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

POWER EQUIPMENT OPERATOR CLASSIFICATIONS  
(TUNNELS ABOVE AND BELOW GROUND, SHAFTS, AND RAISES):

GROUP 1 - Brakeman

GROUP 2 - Motorman

GROUP 3 - Compressor

GROUP 4 - Air Tractors; Grout Machine; Gunnite Machine; Jumbo Form

GROUP 5 - Concrete Placement Pumps; Mucking Machines and Front End Loaders, Underground, Slusher; Mine Hoist Operator; Mechanic

GROUP 6 - Mechanic Welder

GROUP 7 - Mole

*NOTE: Any equipment listed below being used in tunnel work, below or above ground shall be paid not less than \$2.00 per hour above the listed wage rates.*

POWER EQUIPMENT OPERATOR CLASSIFICATIONS:

GROUP 1 - Air compressor, brakeman, drill operator - smaller than Watson 2500 and similar, operators of 5 or more light plants, welding machines, generators, single unit conveyor, pumps, vacuum well point system, tractor, under 70 hp with or without attachments compressors, 360 C.F.M. or less.

GROUP 2 - Conveyor, handling **building** materials, ditch witch and similar trenching machine, haulage motor man, pugmill, portable screening plant with or without a spray bar, screening plants, with classifier.

GROUP 3 - Asphalt screed, asphalt plant, backfiller, bituminous spreader or laydown machine; cableway signalman, caisson drill, William MF, similar or larger; C.M.I. and similar, concrete batching plants, concrete finish machine, concrete gang saw on concrete paving, concrete mixer, less than 1 yd., concrete placement pumps, under 8 inches, distributors, bituminous surfaces dozer, drill, diamond or core, drill rigs, rotary, churn, or cable tool, elevating graders, elevator operator, equipment, lubricating and service engineer, grout machine, gunnite machine, hoist, 1 drum, horizontal directional drill operator, sandblasting machine, single unit portable crusher, with or without washer, tie tamper, wheel mounted, tractor, 70 hp and over with or without attachments, trenching machine operator, winch on truck.

GROUP 4 - Cable operated power shovels, draglines, articulated truck operator, clamshells, and backhoes, 5 cubic yards and under, concrete mixer over 1 cubic yard, concrete paver 34E or similar, concrete placement pumps, 8 inches and over, grade checker, hoist, 2 drums, hydraulic backhoe, 3/4 yds and over, loader, over 6 cubic yards, mechanic, mixer mobile, multiple unit portable crusher, with or without washer; pile driver, tractor with side boom, roto- mill and similar, welder.

GROUP 5 - Cable operated power shovels, draglines, clamshells and backhoes over 5 cubic yards, caisson drill Watson 2500 similar or larger, hoist 3 drum or more, mechanic – welder (heavy-duty).

GROUP 6 - Cableway, derrick, quad nine push unit, wheel excavator, belt or elevating loader

GROUP 7 - tower cranes all types

LABORER CLASSIFICATIONS:

GROUP 1 –Erosion Control, Dowel Bars; Fence Erectors; Gabion Basket and Reno mattresses; Signaling, Metal Mesh; Stake Caser; Traffic Control Devices; Tie Bars and Chairs in Concrete; Paving; Waterproofing Concrete; Air, Gas, Hydraulic Tools and Electrical Tool Operators; Barco Hammers; Cutting Torches; drill; diamond and core drills; Core, diamond, air track including but not limited to; Joy, Mustang, PR-143, 220 Gardner-**Denver**, Hydrosonic, and water blaster operator; Chuck Tender; Electric hammers; Jackhammers; Hydraulic Jacks; Tampers; Air Tampers; Automatic Concrete Power Curbing Machines; Concrete Processing Material; Concrete Tender; Operators of concrete saws on pavement (other than gangsaws); Power operated Concrete Buggies; Hot Asphalt Labor; Asphalt Curb Machines; Paving Breakers; Transverse Concrete Conveyor Operator; Cofferdams; Boxtenders; Caisson 8' to 12'; Caisson Over 12'; Jackhammer Operators in Caissons over 12'; Labor applicable to Pipe coating or Wrapping; Pipe Wrappers, Plant and Yard; Relining

Pipe; Hydroliner (a plastic may be used to waterproof); Pipelayer on Underground Bores; Sewer, Water, Gas, Oil Conduit; Enamalers on Pipe, inside and out, Mechanical Grouters; Monitors; Jeep Holiday Detector Men; Pump Operators; Rakers; Vibrators; Hydro- broom, Mixer Man; Gunnite Nozzlemen; Shotcrete Operator; and chain saws, gas and electric; Sand Blaster; Licensed Powdermen; Powdermen and Blaster; Siphons; Signalmen; Dumpman/spotter; Grade Checker.

GROUP 2 - Plug and galleys in dams; Scalars; any work on or off Bridges 40' above the ground performed by Laborers working from a Bos'n Chair, Swing Stage, Life Belt, or Block and Tackle as a safety requirement.

### TUNNEL LABORER CLASSIFICATIONS:

GROUP 1 - Outside Laborer - Above ground

GROUP 2 - Minimum Tunnel Laborer, Dry Houseman

GROUP 3 - Cable or Hose Tenders, Chuck Tenders, Concrete Laborers, Dumpmen, Whirley Pump Operators

GROUP 4 - Tenders on Shotcrete, Guniting and Sand Blasting; Tenders, core and Diamond Drills; Pot Tenders

GROUP 5 - Collapsible Form Movers and Setters; Miners; Machine Men and Bit Grinders; Nippers; Powdermen and Blasters; Reinforcing Steel Setters; Timbermen (steel or wood tunnel support, including the placement of sheeting when required); and all Cutting and Welding that is incidental to the Miner's work; Tunnel Liner Plate Setters; Vibrator Men, Internal and External; Unloading, stopping and starting of Moran Agitator Cars; Diamond and Core Drill Operators; Shotcrete operator; Gunnite Nozzlemen; Sand Blaster; Pump Concrete Placement Men.

Laborers (Removal of Asbestos) Removal or encapsulation of Asbestos Material (including removal of asbestos from mechanical systems that are going to be scraped) and work involving the removal, handling, or dealing with toxic or hazardous waste.

### TRUCK DRIVER CLASSIFICATIONS:

GROUP 1 - Sweeper Truck, Flat Rack Single Axle and Manhaul, Shuttle Truck or Bus.

GROUP 2 - Dump Truck Driver to and including 6 cubic yards, Dump Truck Driver over 6 cubic yards to and including 14 cubic yards, Straddle Truck Driver, Liquid and Bulk Tankers Single Axle, Euclid Electric or Similar, Multipurpose Truck Specialty and Hoisting.

GROUP 3 - Truck Driver Snow Plow.

GROUP 4 - Cement Mixer Agitator Truck over 10 cubic yards to and including 15 cubic yards.

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  
Technical Specifications  
Contract Number: 201736166



BERKELEY TENNIS COURTS  
AUGUST 2, 2017

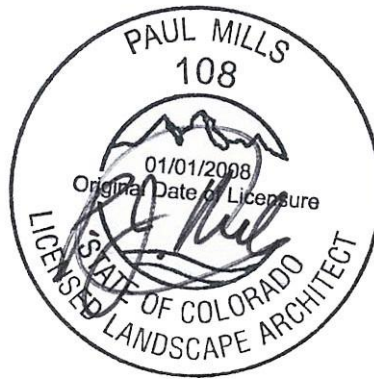


**PROJECT MANUAL**

for

**Berkeley Park – Tennis Court Replacement**

**Prepared for:  
Denver Parks and Recreation  
201 West Colfax Avenue  
Denver, Colorado 80202**



**March 28, 2016**

**TECHNICAL SPECIFICATIONS**

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**APPENDIX**

Subsurface Exploration, Soil Testing and Post Tensioned Slab Recommendations – Berkeley Park Tennis Courts Denver, CO

**PART 1 - GENERAL****1.1 SUMMARY**

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

**1.2 SITE CONDITIONS**

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

**1.3 DESCRIPTION OF WORK**

- A. The following work items are included in these specifications: Removal and recycling of tennis court surface and any associated court equipment that can be recycled. Removal and retention of existing site furnishings. Installation of post tension concrete court, new tennis court net and associated striping on court. Installation of site furnishings, including: tables, benches (backless and backed) trash receptacles. Installation of tennis court fencing and gates. Resetting of refurbished lighting standards. Resetting to proposed grade of existing light standards. The materials and installation methods specified herein are to be considered standard for all work

ordered by and performed for the Department of Parks and Recreation in the construction of new facilities in the parks.

## PART 2 - PRODUCTS (Not used)

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S DUTIES

- A. Except as otherwise specified, furnish the following to the full extent required by the contract:
  - 1. Labor, superintendence, supervision and products.
  - 2. Construction equipment, tools, machinery and materials.
  - 3. Utilities required for construction and related activities.
  - 4. Other facilities and services necessary to properly execute and complete the Work, including security for worksite, testing and storage and protection of all materials awaiting incorporation into the Work, providing a safe working environment for workers, City and County of Denver representatives, and the public in accordance with all local, state and federal requirements.
  
- B. Prosecute the Work as specified and in a timely manner. Submit a schedule of Work that will be performed at times other than during the eight-hour working day of Monday through Friday, daylight hours. Submit this schedule five working days prior to the beginning of Work to the Project Manager for review and acceptance. Approval to work at night may be obtained after Contractor presents a written program outlining special precautions to be taken to control the extraordinary hazards presented by night work. That program shall include, but not limited to, supplementary lighting of work areas, availability of medical facilities, security precautions, and noise limitations.

### 3.2 COORDINATION

- A. Coordinate prosecution of the Work with those public utilities, governmental bodies, private utilities and other contractors performing work on and adjacent to the worksites. Eliminate or minimize delays in the Work and conflicts with those utilities, bodies and contractors. Schedule governmental, private utility and public utility work that relies upon survey points, lines and grades established by the Contractor to occur immediately after those points, lines and grades have been established. Confirm coordination measures for each individual case with the City in writing.
  
- B. In the coordination effort of work by others, the Contractor shall obtain and refer to equipment locations and other layouts, as available, to avoid interface problems.
  
- C. The City reserves the right to permit access to the site of the Work for the performance of work by other contractors and persons at such times that the City deems proper. The exercise of such reserved right shall in no way or to any extent relieve the Contractor from liability for loss and damage to the work due to or resulting from its operations or from responsibility for complete execution of the Contract. The Contractor shall cooperate with other contractors and persons in all matters requiring common effort.

## SUMMARY OF WORK

### 3.3 CONTRACTOR USE OF WORKSITE

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

### PART 4 - MEASUREMENT AND PAYMENT

#### 4.1 MEASUREMENT

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

#### 4.2 PAYMENT

- A. No separate payment will be made for work under this section including any and all necessary relocations requested by the City. The cost of the work described in this section shall be included in the Contract price.

**END OF SECTION 01 11 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This section includes administrative and procedural requirements for alternates.

**1.3 DEFINITIONS**

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if City decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

**1.4 PROCEDURES**

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. The project plans and specifications shall be used to achieve the work described under each alternate.

**1.5 SCHEDULE OF ALTERNATES**

- A. Alternate 1: Practice Court Renovation
  - 1. Remove and dispose of chain link fence on north and south sides of practice court

2. Install new chain link fence
3. Clean and repair trench drain at base of practice wall
4. Replace practice court surface material and acrylic surfacing
5. Repaint practice wall and net line

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for each alternate.

4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include required materials, transportation, equipment, labor, erosion and sediment control, and permits as required in accordance with the Contract Drawings and Specifications.

**END OF SECTION 01 23 00**



**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 QUALITY CONTROL**

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

**1.4 SUBMITTAL**

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

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

#### 1.5 INFORMATION

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

#### 1.6 SUBSTITUTION REQUEST

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

#### 1.7 CONDITIONS

- A. As a condition for submitting a Request for Substitution the Contractor waives all rights to claim for extra cost or change in contract time other than those outlined in the request and approved by the Denver Project Manager. The Contractor, by submitting a Request for

### SUBSTITUTIONS

Substitution, also accepts all liability for cost and scheduling impact on other contractors or the City due to the substitution.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 25 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 DESCRIPTION****A. General:**

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

**B. Measurement:**

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

**C. Units:**

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

**D. Payment:**

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

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

**END OF SECTION 01 29 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section consists of preparing and submitting the Schedule of Values ("Schedule") as referenced in the General Contract Conditions Section 903.
  - 1. No later than thirty (30) calendar days prior to the issuance of the first pay application, , the Contractor shall submit the Schedule of Values
- A. Reference the General Conditions as listed:
  - 1. Article 902 "Payment Procedure".
  - 2. Article 903 "Schedule of Values in Lump Sum Contracts".
  - 3. Article 906 "Applications for Payment".
- B. Related Sections:
  - 1. Division 01 Section "Submittals".
  - 2. Division 01 Section "Shop and Working Drawings, Product Data, and Samples".

**1.3 SUBMITTAL**

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

**1.4 REVIEW AND RESUBMITTAL**

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

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 PREPARING SCHEDULE OF VALUES

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

### 3.2 PREPARING SCHEDULE OF STORED MATERIAL

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

### 3.3 PAYMENT FOR STORED MATERIALS

- A. Only materials that are described in the specifications and on the drawings will be considered permanent materials. Permanent materials are materials that will be left in the work after the contract is completed.
- B. Nothing in these specifications shall be interpreted as requiring the City to pay for stored materials. The Project Manager shall decide on a case-by-case basis whether stored materials shall be paid for. No payment will be made for stored materials which have not been submitted and accepted.
- C. The Contractor must, at all times, store permanent materials in accordance with manufacturer's recommendations. Any material not properly stored will not be paid for. Amounts will be deducted from payments for any stored permanent material previously paid for and subsequently found to be improperly stored or not present, based upon a physical inventory of stored permanent material.
- D. Only the neat line quantity of material needed for the finished product may be paid for.
- E. All requests for stored permanent material payment must be accompanied by paid invoices clearly showing the quantity of permanent material, the type of permanent material and

## SCHEDULE OF VALUES

discounts or rebates and the net amount paid to the supplier along with a certificate stating that the permanent material is free of any liens or judgments preventing its use by the City.

- F. All permanent material stored off site, for which payment is being requested must be insured and stored in bonded, insured warehouses.
- G. Any permanent material on which payment is requested must be in such a form that it cannot be used on work other than this contract, or stored in a manner acceptable to the Project Manager to ensure that the permanent material cannot be used on work other than this contract.

#### 3.4 ALLOWANCE AUTHORIZATION AND PAYMENT

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

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.1 MEASUREMENT

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

##### 4.2 PAYMENT

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

**END OF SECTION 01 29 73**



**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes:
  - 1. Requirements for project and construction coordination, supervision, and administration for the Work, including but not necessarily limited to:
    - a. Coordination.
    - b. Administrative and supervisory personnel.
    - c. General installation provisions.
    - d. Cleaning and protection.
    - e. Utilities and site work.
- B. Reference General Contract Conditions as listed:
  - 1. Title 3 “Contractor Performance and Services”.
  - 2. Article 301 “Consideration (Contractor’s Promise of Performance)”.
  - 3. Article 308 “Communications”.
- C. Related Sections:
  - 1. Division 01 Section “Layout of Work & Surveys”.
  - 2. Division 01 Section “Administration, Procedures, Codes”.
  - 3. Division 01 Section “Project Meetings”.

**1.3 GENERAL COORDINATION**

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

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

#### 1.4 COMPLETE SYSTEMS

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

#### 1.5 COMPATIBILITY

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

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION PROCEDURES

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

### 3.2 CLEANING AND PROTECTION

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

**END OF SECTION 01 31 13**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 OTHER MEETINGS**

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

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

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

- j. Scheduling and coordination requirements.
  - k. Quality Control/Quality Assurance procedures.
  - l. Environmental requirements and permits.
  - m. Milestones for Substantial Completion and Final Acceptance.
  - n. As-built documents.
  - o. Project closeout requirements.
- B. The Contractor will introduce the Contractor's representatives and briefly describe each person's responsibilities. The Contractor shall provide the following:
- 1. A list of all subcontractors.
  - 2. Office, storage areas, and construction area layouts, along with temporary easements.
  - 3. Safety, first aid, emergency and security procedures, including the name and contact information for the Contractor's insurance company.
  - 4. 60 day preliminary schedule.
  - 5. Sequence of Work.
  - 6. Construction methods, general worksite layout, and haul plan.
  - 7. Housekeeping procedures.
  - 8. The Contractor's general erosion and sedimentation control plans, noise, hazardous material, air and water pollution control plans, and Quality Control Plan.
  - 9. Coordination and notification requirements for utility work.
  - 10. Deliveries and priorities of major equipment.
  - 11. Submittal schedule.
- C. Explanations provided by the City will not amend, supersede, or alter the terms or meaning of any contract document, and the Contractor shall not claim reliance on such explanations as a defense to any breach or failure by the Contractor to perform as specified in the contract.

### 3.2 CONSTRUCTION PROGRESS MEETINGS

- A. Progress meetings will be scheduled as necessary by the Project Manager to promote the competent and timely execution of the contract.
- B. The meetings will be held at the worksite or at a location selected by the Denver Project Manager. Meetings will be chaired by the Contractor.
- C. The Contractor's personnel, as listed in Paragraph 3.1.A, above, shall attend unless otherwise agreed by the Denver Project Manager.
- D. The Contractor's Project Manager will be responsible for publishing minutes of the meetings.
- E. At a minimum, the following items will be addressed at each meeting. The items addressed in the meeting do not waive notification or submittal requirements as required elsewhere in the contract.
  - 1. Safety: Contractor shall report any safety issues.
  - 2. Quality Control:
    - a. The Contractor's Quality Control Representative shall present and discuss the Independent Testing Agency weekly test report and/or testing schedule.
    - b. The Contractor's Quality Control representative shall report on inspections by other agencies and any follow-up activity required.
    - c. The Project Manager shall present and discuss issues regarding quality control.

3. Quality Assurance: The Project Manager shall present and discuss issues regarding quality assurance.
4. Design Activities: Open discussion.
5. Shop Drawings / Submittals / Material Procurement:
  - a. The Contractor shall provide and review the submittal schedule and provide any updated information and/or changes to the schedule.
  - b. The Contractor shall provide information on the status of submittals requiring re-submittal.
  - c. The Contractor shall review any accepted submittals that the Contractor plans to re-submit with changes.
  - d. Contractor shall provide the status of material procurement for long-lead items (long-lead items are materials and equipment that have a fabrication and/or delivery duration that exceeds 15 working days).
    - 1) This information shall be provided by the Contractor in a format satisfactory to the City Project Manager and shall include, at a minimum:
      - a) Submittal/shop drawing preparation duration.
      - b) Review duration.
      - c) Fabrication duration.
      - d) Delivery duration.
    - 2) All long-lead items shall be identified with a separate activity on the approved CPM project schedule.
6. Construction Activities: Open discussion to include coordination items with other Contractors and / or agencies.
7. Schedule:
  - a. The Contractor shall provide to the Project Manager the Contractor's three week look-ahead schedule and review at the meeting the items on the schedule. The schedule shall be in bar chart format based on the approved CPM, and shall include dates of testing activities, items in progress, percentage of completion of items, responsible subcontractor for the items.

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.1 MEASUREMENT

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

##### 4.2 PAYMENT

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

**END OF SECTION 01 31 19**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work of this Section includes the preparation of a preliminary schedule, construction schedule, related narratives, and monthly progress reports, all encompassing complete performance of contract requirements.
- B. The Contractor shall schedule and coordinate the work of all of its subcontractors and suppliers including their use of the worksite. The Contractor shall keep the subcontractors and suppliers informed of the project construction schedule to enable the subcontractors and suppliers to plan and perform their work properly.
- C. The Contractor shall, in accordance with the requirements of the technical specifications, submit a construction schedule that shall provide for the expeditious and practicable execution of the Work.
- D. The construction schedule for the performance of the Work shall be a Critical Path Method (CPM) system in bar chart format, unless an alternate system is specifically identified in the technical specifications, with reasonable detail including a time scaled network and computer printout as more fully detailed in the technical specifications.
- E. Float or slack is defined as the amount of time between the early start date and the late start date or the early finish date and the late finish date of any activities in the schedule. Float or slack is not time for the exclusive use or benefit of either the Contractor or the City.
- F. The Contractor shall submit a monthly progress report and schedule update in accordance with the scheduling provisions of the technical specifications.
- G. The Contractor shall complete the Work within the contract time and in accordance with the most recent schedule submittal that has been approved in writing by the Project Manager.
- H. Reference the General Contract Conditions as listed:
  - 1. Article 306 "Working Hours and Schedule".
  - 2. Article 603 "Delay Damages".
  - 3. Article 909 "Additional Withholding of Progress Payments".
  - 4. Article 1103 "Contractor Change Request".
  - 5. Article 1202 "Submittal of Claims".

**1.3 PLANNING**

- A. The schedule shall show total contract time, including project milestones, as indicated in the Special Conditions or elsewhere in the contract documents.

- B. The Contractor shall prepare a work plan to complete the work within the contract time and complete those portions of work relating to each milestone date and other contract requirements.
  - 1. The Contractor shall generate a computerized Critical Path Method (CPM) schedule in the Precedence Diagram Method (PDM) format for the Work.
  - 2. The computerized format shall be compatible with the City's Primavera system, version 3.1 or Microsoft Office Project Professional 2003 or later.
  - 3. The Schedule shall be submitted electronically to the Project Manager in a dynamic format which will allow review and manipulation of any part of the schedule, and in reproducible hard copy.
  - 4. The schedule activities shall be resource loaded showing labor man hours by crafts, major construction equipment by type and value of the work.
  - 5. The value of the work shall summarize each pay item shown in the Schedule of Values and balance to their amount.
  
- C. In addition to the construction activities, the schedule shall include activities for furnishing materials and equipment and vendor shop drawing preparation.
  - 1. The construction schedule, a supporting narrative, and the overall progress curve shall be submitted for approval within 10 days after Notice to Proceed.
  - 2. Within 10 days the City will respond with approval or direction to revise and resubmit within ten days.
  - 3. Failure of the Contractor to have a construction schedule approved by the City will be considered cause for withholding progress payment(s).
  
- D. To the extent that the construction schedule or any revisions thereof contains anything not jointly agreed upon in writing, or fails to show anything jointly agreed upon in writing, it shall not be considered to have the approval of the City.
  - 1. Failure to include any work item required for performance of this contract shall not excuse the Contractor from completing all work within applicable completion dates, regardless of the City's approval of the schedule.
  
- E. Failure of the Contractor to comply with this Section will be considered cause for withholding progress payment(s) or termination for default.

#### 1.4 SUBMITTALS

- A. Refer to Division 01 Section "Submittals" for submittal procedures. Submit the following as indicated:
  - 1. Preliminary schedule (with narrative).
  - 2. Construction schedule data and work plan (with narrative).
  - 3. Monthly progress report.
  - 4. Construction schedule change request (as needed).
  - 5. As built construction schedule.

### PART 2 - PRODUCTS

#### 2.1 PLOT AND REPORT FORMAT

- A. All plots shall be either 24- x 36-inches or 36- x 44-inches. They shall contain a title block with a minimum 18-point font showing:
  - 1. Contractor's name.



2. Contract number and title.
3. Plot date.
4. Data date.
5. Symbol definitions.
6. List of all approved changes to the original approved schedule.

B. Plots shall contain a time line at the top.

C. Reports shall be submitted on 8-1/2- x 11-inch paper with a one-inch margin in a 3-ring binder, or as directed by the Project Manager.

## PART 3 - EXECUTION

### 3.1 PRELIMINARY SCHEDULE

- A. The Contractor shall prepare a preliminary schedule covering the first 90 calendar days of the contract. All reports shall be on 8-1/2- x 11-inch paper. This preliminary schedule shall be submitted at the Preconstruction Meeting and shall be accompanied by a narrative description of the work plan. Within 14-days, the City will respond with acceptance or direction to revise and resubmit within ten days.
- B. The preliminary schedule shall show all significant work tasks that occur in the first 90 days, including planning, mobilization, shop submittals and approvals, procurement, fabrication and construction. It shall identify work items or milestones that affect or are affected by the City, other Contractor's work, utilities and other third parties, and it shall list major data submittals required by the contract.
- C. The preliminary schedule shall be accompanied by a narrative describing the Contractor's approach to mobilization, procurement and construction during the first 90 days. The narrative shall elaborate on the basis of duration, production rates, major equipment to be used, and shall identify all major assumptions used to develop the schedule.

### 3.2 CONSTRUCTION SCHEDULE

- A. The construction schedule shall be a computerized CPM schedule that includes:
  1. Work items identified in a Work Breakdown Structure (WBS) format that corresponds with the technical specifications.
  2. The order, sequence and interdependence of all significant work items including construction, procurement, fabrication, testing, startup and inspection and delivery of critical or special materials and equipment, submittals and approvals of critical samples, shop drawings, procedures, or other documents that could have a schedule impact.
  3. Work items by the City, other Contractors, utilities and other third parties that may affect or be affected by Contractor's activities.
  4. Proper referencing of all work items to identify applicable subcontractors or other performing parties.
  5. Work item duration not to exceed 20 working days. No more than 25% of the work item may be on the critical path.
  6. Work items shall be resource loaded to show the direct craft man-hours estimated to perform the work including work by subcontractors.

7. A narrative that explains the basis for the Contractor's determination of construction logic. It shall include estimated quantities and production rates, hours per shift, work days per week, and types, number and capacities of major construction equipment to be used and whether the Contractor plans to work weekends or holidays.
- B. The construction schedule shall be prepared to include the data for the total contract duration, and the critical path shall be identified, including critical paths for interim completion dates. Scheduled start or completion dates imposed on the schedule by the Contractor shall be consistent with contract milestone dates. Milestone events shall be the schedule dates specified in the Special Conditions and shall be prominently identified and connected to the appropriate work item, denoting its start or completion. Work items related to any interim milestones shall be coded for that milestone.
- C. The Contractor shall submit the following documents to the City upon completion of preparation of the construction schedule:
1. A time phased plot of the CPM schedule in PDM format showing all logic ties and an electronic copy in dynamic format.
  2. Various computer generated construction schedule reports that contain the following data for each work item: Identification, description, responsibility, duration, early start and early finish, late start and late finish, total float, and resources. The work items shall be sorted by float, early start, subcontractor or other sorts mutually agreed to. The reports shall also show the logic ties of successor and predecessor work items.
  3. A physical progress curve showing either manpower or other appropriate key contract items derived from the construction schedule and against which physical progress performance will be measured for schedule and payment purposes.
  4. The narrative described in paragraph 3.2.A.7, above.

### 3.3 PROGRESS REPORTING

- A. The Contractor shall submit a monthly progress report at the end of each month following the Notice to Proceed. At the end of each month, the Contractor and Project Manager shall agree on the progress of the work and the Contractor shall update the construction schedule accordingly. The updated construction schedule is a prerequisite to the submittal of the Contractor's application for progress payment. The schedule shall be made in accordance with Article 3.2, above. This review does not constitute an approval of the construction schedule and shall not be used for the purposes of modifying the initially approved construction schedule.
- B. The Contractor shall submit the monthly progress report consisting of a written narrative and various construction schedule reports. This report will be reviewed in a meeting between the Contractor and Project Manager.
1. The narrative report shall describe overall progress of the work, provide a critical path analysis, discuss significant problems with proposed corrective action, and show the status of major changes and any other changes in sequence of the Work.
  2. The construction schedule reports shall include tabular reports showing the status of resources for completed and in progress work items and for work items scheduled to start in the next 30 days. The report shall include all the information outlined in paragraph 3.2.C.2, above.
  3. A bar chart format schedule shall be provided showing the Contractor's completion status (progress) on each work item along with plots described in paragraph 3.2.C.1, above.
  4. The physical progress curve shall be updated to show actual progress.

- C. The latest completion time for any work item does not fall within the time allowed by the construction schedule, the sequence of work and/or duration shall be revised by the Contractor through concurrent operations, additional manpower, additional shifts or overtime, additional equipment or alternative construction methods until the schedule produced indicates that all significant contract completion dates, occupancy dates and milestones will be met. No additional costs will be allowed if such expediting measures are necessary to meet the agreed completion date or dates except as provided elsewhere in the contract documents.

### 3.4 SCHEDULE CHANGES

- A. The Contractor's request for construction schedule changes shall be made on the latest approved construction schedule and shall be accompanied by a narrative description and justification for the change, and shall be submitted in accordance with the General Conditions Article 1105 "Time Extensions" on changes in time. Minor revisions submitted at monthly progress review meetings are not considered as changes in this context.
- B. The construction schedule may be changed when one or more of the following occur:
  - 1. When a change order significantly affects the contract completion date or sequence of work items.
  - 2. When the Contractor elects to change the sequence or duration of work items affecting the critical path.
  - 3. When the City directs a change that affects a milestone date(s) specified in the Special Conditions or alters the length of a critical path.
- C. If, after submitting a request for change to the construction schedule, the Project Manager does not agree with the request, the Project Manager will schedule a meeting with the Contractor to discuss the differences. If a settlement cannot be reached on the change in the construction schedule or if the Contractor has failed to submit revisions to the network, the Project Manager has the option of providing suggested logic and/or duration times in all subsequent updating reports. The suggested logic and/or duration times will remain in effect until the change in the construction schedule is settled or until the logic and duration are superseded.
  - 1. If the Contractor has any objections to the data furnished by the Project Manager, he shall advise the Project Manager within ten days in writing, fully supporting the objections with a counter plan. The revisions suggested by the Project Manager shall be used for updating reports until the Project Manager approves the counter plan.
  - 2. If the Contractor does not submit a counter plan and data within ten days after the date of the Project Manager's suggested logic, the Contractor is deemed to concur with the Project Manager's suggested logic/duration time changes. The Project Manager's plan will be the basis of negotiations for any adjustment of the time and cost for performance of the Work.

### 3.5 CONTRACT EXTENSIONS

- A. If the Contractor is granted an extension of time for completion of any milestone or contract completion date under the provisions of the contract, the determination of the total number of extended days will be based upon the current analysis of the schedule and upon all data relevant to the extension. Such data shall be incorporated in the next monthly update of the schedule.
- B. The Contractor acknowledges and agrees that delays in work items which, according to schedule analysis do not affect any milestone dates or contract completion date shown on the CPM network at the time of the delay will not be the basis for a contract extension.

3.6 AS-BUILT CONSTRUCTION SCHEDULE

- A. After all contract work items are complete, the Contractor shall submit an as built construction schedule showing actual start and finish dates for all work items and milestones.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 32 13**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section summarizes the requirements for the submittal of documents to the City that are defined in these Specifications. It also describes the procedures for “supplemental” submittals.
- B. Reference the General Contract Conditions as listed:
  - 1. Article 309 “Contractor Submittals and other Written Communications to the City”.
  - 2. Article 405 “Shop Drawings, Product Data, and Samples”.

**PART 2 - PRODUCTS****2.1 SUBMITTAL SCHEDULE**

- A. The Contractor shall provide a submittal schedule within 14 days after Notice to Proceed. The Submittal Schedule shall be directly related to the CPM schedule, shall identify all the submittals, and shall include the following information for each submittal item:
  - 1. Specification section, contract article, or special condition.
  - 2. Specification Subparagraph.
  - 3. Item description.
  - 4. Date the submittal shall be submitted.
  - 5. Name of subcontractor or supplier.
- B. The submittal schedule shall be updated every two weeks by the Contractor and submitted with the progress payment request.
- C. One electronic submittal submitted on a single CD-ROM or DVD-ROM.

**2.2 ELECTRONIC SUBMITTALS**

- A. All submittals shall be delivered to the Denver Parks Project Manger and Designer in electronic format.
  - 1. Acceptable electronic formats:
    - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0. File shall have no security and bookmark every applicable submittal.
  - 2. Formats are acceptable only with written permission of the Project Manager or required by individual spec sections:
    - a. Microsoft Office 2003 (2007 preferred) or newer. All files shall be fully compatible with Microsoft Office 2003.

- b. AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.
    - 1) AutoCAD files shall include any related x-ref files, plot files and pen settings.
  - c. Other files pre-approved by the Denver Project Manager.
3. Electronic file names: Each electronic document shall have a unique file name. File name convention shall be as follows unless otherwise agreed to by Denver Project Manager: AAA-BBBBBB-CCC-RZ:
- a. AAA = sequential submittal number starting at 001.
  - b. BBBBBB = specification section containing submittal requirements.
  - c. CCC = sequential specification submittal number starting at 001.
  - d. RZ = sequential revision number. RZ not required on initial submittals.
  - e. Example A: 005-012973-002”, five submittals have been logged overall with two submittals made to Division 01 Section “Schedule of Values”.
  - f. Example B: 009-012973-002-R3, nine submittals made overall and three revisions to submittal 012973-002.

### 2.3 INITIAL SUBMITTAL

- A. Each submittal document shall include a title block showing the following information:
  - 1. Date of submittal and revision dates.
  - 2. Contract title and number.
  - 3. The names of Contractor, subcontractor, supplier, manufacturer and when applicable, the seal and signature of an engineer registered in the State of Colorado, for the involved discipline.
  - 4. Identification of product by either: description, model number, style number or lot number.
  - 5. Subject identification by contract drawing or specification reference.
- B. On each submitted drawing, include a blank space on each sheet, three inches by four inches, in the lower right corner, just above the title block, in which the City or the Designer of Record may indicate the action taken.
- C. Make submissions sufficiently in advance so that the Designer and City review may be completed before any material procurement or Work represented by those submittals is scheduled to be performed.
- D. Allow a minimum cycle of 10 working days for review of each submittal by the City.
- E. The Contractor shall at the time of submission describe variations from the contract documents in writing, separate from the submittal document. If the Project Manager approves any such variations, an appropriate contract change order shall be issued except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued. If a submission contains variations and the variation column is not marked on the transmittal form, it will not be considered for review and acceptance. Along with marking the transmittal as a variation, a description must be included which outlines all the differences including maintenance and utility services along with any cost savings from an item not containing the variation.

- F. Changes in accepted submittal documents will not be permitted unless those changes have been accepted, in writing, by the City.
- G. The form and quality of submittal documents shall comply with Article 2.2, above.

#### 2.4 SUPPLEMENTAL SUBMITTALS

- A. Supplemental submittal documents initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals with the appropriate primary transmittal referenced.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S REVIEW

- A. The Contractor shall review submittal documents, stamp and sign as reviewed and approved as complying with contract documents prior to submission to the City.

#### 3.2 CITY REVIEW

- A. Submittal documents will be reviewed by the Designer and the Project Manager for conformance to requirements of the contract drawings and specifications. Review of a separate item will not constitute review of an assembly in which the item functions. The Designer or the Project Manager will withhold approval of submittals that depend on other submittals not yet submitted. Review and acceptance will not relieve the Contractor from his responsibility for accuracy of submittals, for conformity of submittal document to requirements of contract drawings and specifications, for compatibility of described product with contiguous products and the rest of the system, or for protection and completion of the contract in accordance with the contract drawings and specifications.
- B. The Designer, and/or the Project Manager will review the submittal documents for general conformance with the contract documents and mark the Action Code, sign and date the transmittal.
- C. The Action Codes have the following meanings:
  1. A - ACCEPTED is an approval, and means that the illustration and description appears to conform to the respective requirements of the contract documents.
  2. B - ACCEPTED AS NOTED is an approval, and means that the illustration and description will conform to the respective requirements of the contract documents after changes in recognition of the reviewer's comments. Submittals so marked need not be resubmitted.
  3. C - REVISE AND RESUBMIT means that the submittal is unacceptable and must be revised and resubmitted.
  4. E - NOT ACCEPTED means that the submittal is not approved and that a new submittal in accordance with the contract documents shall be made.

#### 3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Coordinate each submittal document with the requirements of the Work; place particular emphasis upon ensuring that each submittal of one trade is compatible with other submittals of

that trade and submittals of other trades including producing as needed drawings showing the relationship of the work of different trades.

- B. Contractor's responsibility for errors and omissions in submittal documents and associated calculations is not relieved by the City's review, correction and acceptance of submittals.
- C. Contractor's liability to the City, in case of variations in the submittal document from the requirements of the contract documents, is not relieved by the City's review and acceptance of submittals containing variations unless the City expressly approves the deviation in writing, in which the City describes the variation.
- D. The Contractor shall maintain a file of all approved submittal documents at the worksite. The complete file of approved submittal documents shall be turned over to the City with the as-built documents at the end of the job.
- E. Schedule impact due to resubmittal requirements is the responsibility of the Contractor.

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.1 MEASUREMENT

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

##### 4.2 PAYMENT

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

**END OF SECTION 01 32 19**



## **SECTION 01 33 23 SHOP AND WORKING DRAWINGS, PRODUCT DATA, AND SAMPLES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. The Work specified in this Section includes the preparation and submitting shop and working drawings, product data, samples, and record documents required by other specifications sections.
  - 1. The Contractor shall submit all shop and working drawings, product data and samples, as defined in the General Contract Conditions, to the Designer and Project Manager in accordance with the requirements in the specifications. The Project Manager will return one copy of the shop and working drawings, and product data to the Contractor with a written transmittal within the time periods noted in the specifications.
- B. Reference the General Contract Conditions as listed:
  - 1. Article 111 "Final Completion".
  - 2. Article 117 "Shop Drawings".
  - 3. Article 405 "Shop Drawings, Product Data, and Samples".

#### **1.3 SUBMITTALS**

- A. Refer to Division 01 Section "Submittals" for submittal procedures.
- B. All submittals shall be delivered to the Designer and Project Manager in electronic format. All submittals must be of a consistent format (all Acrobat or all Word, etc). No combination of electronic file types will be allowed unless required by a specific specification section.
  - 1. Acceptable electronic formats:
    - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0.
    - b. Formats are acceptable only with written permission of the Project Manager or required by individual spec sections:
      - 1) Microsoft Office 2003 (2007 preferred) or newer. All files shall be fully compatible with Microsoft Office 2003.
      - 2) AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.
        - a) AutoCAD files shall include any related x-ref files, plot files and pen settings.
      - 3) Other files pre-approved by the Denver Project Manager.
  - 2. Adobe Acrobat Requirements:
    - a. Drawings shall have security set to "No Security". Commenting, printing, adding photos, filling in form fields, and document signing must be allowed.
    - b. PDF submittals shall be one continuous file. No external links are allowed.

- c. All individual components of submittals shall be bookmarked inside the PDF file.
  - d. All original documents shall be directly converted from the original electronic format to PDF. Scanning of files shall only be allowed by the Project Manager when the original electronic information is not obtainable.
  - e. Failure to comply with these requirements will result in a return of file to the Contractor for immediate revision.
3. Electronic file names: Each electronic document shall have a unique file name. File name convention shall be as follows unless otherwise agreed to by Denver Project Manager: AAA-BBBBBB-CCC-RZ.
- a. AAA = sequential submittal number starting at 001.
  - b. BBBBBB = specification section containing submittal requirements.
  - c. CCC = sequential specification submittal number starting at 001.
  - d. RZ = sequential revision number. RZ not required on initial submittals.
  - e. Example A: 005-012973-002”, five submittals have been logged overall with two submittals made to Division 01 Section “Schedule of Values”.
  - f. Example B: 009-012973-002-R3, nine submittals made overall and three revisions to submittal 012973-002.

C. Quantities:

- 1. Post electronic submittals as PDF electronic files directly to Designer’s FTP, Contractors FTP site, or a site specifically established for the Project.
  - a. The Contractor should send an email for each submittal posted to all parties notifying them the submittal is available for review.
  - b. The Project Manager or Designer will send an email to the Contractor when the submittal review is complete.
- 2. Contractor can submit electronic submittals via email as PDF electronic files if approved by the Denver Project Manager.
- 3. Samples: Submit 4 samples of each item specified in the various specification sections, unless otherwise specified.
- 4. Note: If manufacturer’s printed information is in color, all copies of submittals must be in color.
  - a. Printed information is only allowed when electronic copies are not possible.

D. Review:

- 1. Submittal review comments by the City and the Designer will be in electronic form and incorporated into the electronic submittal file.
- 2. Comments from City and Designer will be formatted as described in Division 1 Section “Submittals”.
- 3. Resubmittals of electronic documents shall modify the original electronic file with new information and include the City and the Designer’s comments with appropriate responses and additional information.

1.4 CHANGES

- A. Changes in products for which shop or working drawings, product data or samples have been submitted will not be permitted unless those changes have been accepted and approved in writing by the City and County of Denver.

## PART 2 - PRODUCTS

### 2.1 SHOP AND WORKING DRAWINGS

- A. Include the following as they apply to the subject:
  - 1. Contract title, work order and number.
  - 2. Respective contract drawing numbers.
  - 3. Applicable specification section numbers.
  - 4. Relation to adjacent structure or materials.
  - 5. Field dimensions clearly identified as such.
  - 6. Applicable standards such as ASTM or Federal Specification number, and pertinent authority specifications or standards.
  - 7. Identification of deviations from the contract drawings and specifications.
  - 8. Drawing name, number, and revision.
  - 9. Contractor's stamp, initialed or signed, certifying:
    - a. Verification of field measurements.
    - b. Review of submittals for compliance with contract requirements.
    - c. Compatibility of the Work shown thereon with that of affected trades.
  - 10. Blank space on each sheet per Division 01 Section "Submittals", paragraph 2.3.B.
- B. Drawings of equipment and other items that contain multiple parts shall include exploded views showing the relationship of parts and the description of the parts into the smallest units that may be purchased or serviced.

### 2.2 PRODUCT DATA

- A. Modify manufacturer's standard and/or schematic drawings to delete information which is not applicable to the contract. Supplement standard information with additional information applicable to this contract.
- B. Modify manufacturer's standard(s), diagrams, schedules, performance charts, illustrations, calculations and other descriptive data to delete information which is not applicable to the contract. Indicate dimensions, clearances, performance characteristics and capacities. Include with the submittal electrical, plumbing, HVAC and any other diagrams, as applicable.
- C. Modify erection, application and placing instructions to delete information that is not applicable to the contract or work order.
- D. Include the following:
  - 1. Contract title, work order and number.
  - 2. Respective contract drawing numbers.
  - 3. Applicable contract technical specification section numbers.
  - 4. Applicable standards such as ASTM or Federal Specification number, and pertinent authority specification or standards.
  - 5. Identification of deviations from the contract drawings and specifications.
  - 6. Contractor's stamp, initialed or signed, certifying:
    - a. Dimensional compatibility of the product with the space in which it is intended to be used.
    - b. Review of submittals for compliance with contract requirements.

- c. Compatibility of the product with other products with which it is to perform or which will be next to it.
  - d. The products electrical, plumbing, control and HVAC requirements conform to contract documents and the necessary utilities are provided for in the contract documents.
- E. Certificates of compliance shall be submitted for all products. The certificates shall:
- 1. State that the product complies with the respective specification and contract drawing requirements.
  - 2. Be accompanied by a certified copy of test results pertaining to the product
  - 3. Show the submittals date, Contractor's name and address, contract title and number, product represented and its location in the contract, producer's name, product trade name and catalog number, place of product origin, test date, testing organization's name and address, quantity of the product to be furnished and related contract drawing and specification section numbers.
  - 4. Be signed by an officer or another authorized representative of the producer and notarized.
  - 5. Submit one electronic copy.
  - 6. Be received by the City not later than 30 days before the acceptance is needed of the products for ordering.

## 2.3 SAMPLES

- A. Submit samples of sizes and quantities to clearly illustrate full color range and functional characteristics of products and materials including attachment devices.
- B. Erect field samples and mock ups at the worksite as specified in the several technical specifications sections and at locations acceptable to the Denver Project Manager. All field samples shall be erected in a location that will be readily visible throughout the life of the contract to allow comparison of the work as it progresses to the field sample.
- C. The Contractor shall verify, through appropriate inspections and tests, that the samples submitted meet the specifications and shall provide inspection and test data with the samples. The review and comments on the sample shall not relieve the Contractor of his responsibility for completion of the contract.
- D. Show the following information:
  - 1. Contract title and number.
  - 2. Respective contract drawing numbers.
  - 3. Applicable technical specification section numbers.
  - 4. Applicable standards such as ASTM or Federal Specification number.
  - 5. Identification of deviations from the contract drawings and specifications.
  - 6. Contractor's stamp, initialed or signed, certifying:
    - a. Dimensional compatibility of the product with the space in which it is intended to be used.
    - b. Review of submittals for compliance with contract requirements.
    - c. Compatibility of the product with other products with which it is to perform or which will be next to it.
  - 7. If multiple samples are submitted and the Project Manager is requested to make a choice, each sample shall have a unique identification number attached to it so the returned

transmittal can state the identification number of the accepted sample and the Contractor will know which one it is.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, catalog numbers and similar data.
- B. The Contractor shall not start work for which submittals are required until a transmittal has been received by the Contractor showing acceptance or acceptance as noted by the Denver Project Manager.
- C. Before making submittals ensure that products will be available in the quantities and at the times required by the contract.
- D. Submit final, corrected, electronic drawings of contract and shop and working drawings showing the Work as actually installed, placed, erected and applied. Refer to Division 01 Section "Contract Closeout".

#### 3.2 REVIEW BY THE CITY

- A. One electronic copy of the marked-up shop and working drawing and one electronic copy of the product data will be returned to the Contractor by the Denver Project Manager. Only the transmittal form, appropriately marked, and two samples will be returned on sample submittals. Contractor shall maintain one approved sample on site for the duration of the project.
- B. Contractor's responsibility for errors and omissions in submittals for compatibility will not be reduced, waived or otherwise limited by the review and acceptance of submittals by the City.

### PART 4 - MEASUREMENT AND PAYMENT

#### 4.1 MEASUREMENT

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

#### 4.2 PAYMENT

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

**END OF SECTION 01 33 23**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section includes construction safety precautions and programs by the Contractor and the basis for reviews by the Denver Project Manager.
- B. Reference the General Contract Conditions as listed:
  - 1. Article 801 "Safety of Persons".
  - 2. Article 802 "Protective Devices and Safety Precautions".
  - 3. Article 803 "Protection of Property and Work in Progress".

**1.3 RESPONSIBILITY**

- A. The General Contract Conditions make it clear that all safety precautions during the construction process are the responsibility of the Contractor. The Contractor is responsible for the health and safety of his employees, agents, subcontractors and their employees, and other persons on the worksite; for the protection and preservation of the work and all materials and equipment to be incorporated therein; and for the worksite and the area surrounding the worksite. The Contractor shall take all necessary and reasonable precautions and actions to protect all such persons and property.
- B. This Section shall be interpreted in its broadest sense for the protection of persons and property by the Contractor and no action or omission by the Project Manager or his authorized representatives shall relieve the Contractor of any of its obligations and duties hereunder.

**1.4 SUBMITTAL**

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for the process. A safety plan shall be submitted by the General Contract prior to commencing any work.

**1.5 DENVER PROJECT MANAGER'S REVIEW**

- A. The Contractor shall provide 2 copies of its safety program to the Project Manager for review at least ten days before on-site construction begins. The Contractor's program must meet as a minimum all applicable federal, state and local government requirements.
  - 1. The Contractor must, as part of the Contractor's safety program, submit one electronic file in the form of a security-free, fully bookmarked PDF file compatible with Adobe Acrobat 8.0 or newer and one body hard copy of the following information for acceptance by the Project Manager prior to construction:
    - a. Name of the Contractor's site safety representative.

- b. If the Contractor is running multiple shifts or working more than 40 hours per week, the name of an assistant Contractor's safety representative who can act in the absence of the site safety representative.
  - c. 24 hours per day emergency phone numbers of Contractor site management to be used in case of injury or accident. Provide at least four contacts.
  - d. The Contractor's method of ditching and trenching excavation to be used, including how slopes will be stabilized with calculations showing the slope stability.
    - 1) The Contractor shall also show how material will be stored beside the excavation.
    - 2) Stored material will include the excavated and backfilled material.
  - e. How injuries or accidents will be handled including samples of the forms used to report injuries or accidents.
  - f. How employees will be handled who are unable to safely perform their duties, including how the Contractor will determine whether an employee is unable to safely perform his duties.
  - g. How and when equipment will be checked to see that it is safe, that all safety guards are in place and that the equipment is being used for its designed purpose and within its rated capacity.
  - h. How and when all electric devices will be checked for proper grounding and insulation. What system will be used to lock out electric systems that should not be energized.
  - i. How trash and human organic waste will be disposed.
  - j. How snow and ice will be removed within the project area by the Contractor.
  - k. How concrete forms will be anchored to ensure their stability, including calculations showing that the forms will safely hold the maximum construction loads.
  - l. How flammable materials will be stored and handled, and how any spills will be cleaned up and removed for disposal.
  - m. What system will be used to prevent fires, and if fires do occur who will be trained to fight them. Also what firefighting equipment the Contractor will have available and how this equipment's condition will be monitored.
  - n. How materials will be received, unloaded, stored, moved, and disposed of.
  - o. How personnel working above ground level will be protected from falling.
  - p. How people working underneath work will be protected.
  - q. What will be done to protect personnel in case of severe weather.
  - r. How adequate lighting will be provided and monitored.
  - s. How the safety of work platforms, man lifts, material lifts, ladders, shoring, scaffolding, etc. will be ensured relating to load capacity and the protection of personnel using or working around them.
- B. Prior to the start of any work by a contractor or subcontractor employee, the Contractor shall provide the Project Manager with a list of its employees, subcontractor's employees, and other personnel the Contractor has requested to work on site, who have signified in writing that they have been briefed on, or have read and understand, the Contractor's Safety Plan.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S SAFETY PLAN

- A. Provide a Contractor's Safety Program as described in Division 01 Section "Summary of Work".

PART 3 - EXECUTION

3.1 IMPLEMENT CONTRACTOR'S SAFETY PLAN

- A. Implement the approved Contractor's Operational Safety Plan as described in Part 1 of this section.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 35 23**



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section identifies primary compliance with the State, and City and County of Denver's regulatory requirements including:
  - 1. Colorado Department of Transportation (CDOT).
  - 2. Department of Public Works (including The Division of Wastewater Management).
- B. Construction shall be based on the latest edition of the referenced codes including additions and revisions thereto that are in effect at the time of project bidding.

1.3 BUILDING CODE

- A. All design and construction work shall be governed by the Building Code for the City and County of Denver, latest edition. This is based upon the International Building Code of the International Code Council with Denver Amendments to this code.

1.4 DENVER BUILDING DEPARTMENT

- A. For review and approval of all construction documents for compliance to the Denver Building Code:

City and County of Denver  
Community Planning and Development  
Building Inspection Division  
201 West Colfax Avenue, Dept 205  
Denver, Colorado 80202  
Telephone 720-865-2720  
Fax 720-865-2880

1.5 DENVER FIRE DEPARTMENT

- A. For review and approval of plans for compliance with the Denver Fire Department's requirements as they apply to projects for the Department of Public Works:

Denver Fire Department  
745 W. Colfax Ave.  
Denver, Colorado 80204  
Telephone 720-865-2833

- B. The Contractor is advised that the Denver Fire Department – Fire Prevention Bureau requires permitting for the following activities as they apply to the scope of work. The Contractor is

responsible for obtaining the appropriate permits necessary to complete the work. All costs associated with this permitting and policy compliance shall be the responsibility of the Contractor. The policies all reference the International Fire Code (IFC).

1. Hot Work: "Hot work" shall be defined as the operation of any equipment or tool that creates sparks, hot slag, or radiant or convective heat as a result of the work. This includes, but is not limited to, welding, cutting, brazing, or soldering.
2. Use and storage of compressed gas for both temporary storage and permanent facility installation. This includes, but is not limited to, flammable gas (excluding propane-LPG), oxidizer (including oxygen), and inert and/or simple asphyxiates.
3. Tank installation, which includes above-ground storage tanks (AST) and underground storage tanks (UST) for both temporary tanks and permanent facility installations.

- C. In addition to the above permits, the Denver Fire Department may require other permits that are associated with the specific work in the Contract Documents. Policies provided by the Denver Fire Department are meant to provide basic information for the most common conditions and situations. In any given occupancy, many other International Fire Code (IFC) requirements may be enforced. These should be addressed with the Denver Fire Department before construction begins and during construction with premise inspection(s). Any questions can be addressed to the Fire Prevention Bureau between 6:30 A.M. and 9:00 A.M. Monday-Friday at 720-913-8242 or 720-913-8237.

#### 1.6 The Denver Office of Disability (ADA) compliance

- A. For review and approval of all construction documents for compliance with the Denver ADA standards\*:

City and County of Denver

Human Rights and Community Partnerships

Office of Disability Rights

201 West Colfax Avenue, Dept 1102

Denver, CO. 80202

\*Note: Currently the 2010 ADA standards for accessible design and the Transportation Standards and Details for the Engineering Division, Denver Public Works Department, 7.0-7.8 are being used as reference documents to review all plan approval requests.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PERMITS AND CERTIFICATIONS

- A. The Contractor shall maintain records on site of all permits acquired by federal, state, and local agencies. Posting of permits shall conform to requirements of the respective agencies.
- B. At the completion of any inspection by other agencies, the Contractor shall forward copies of the status of the inspection and copies of any approved or “signed-off” inspections by the respective agencies to the Denver Project Manager.
- C. At the time of request for Substantial Completion, the Contractor shall forward to the Project Manager all permits approved by the respective agencies.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 42 10**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- 1.3 This Section contains a list of definitions of words or phrases and grammatical or contextual conventions commonly used in these contract documents. DEFINITIONS

## A. Alphabetical Listing of Definitions

1. As Indicated: Shown on the drawings by graphic indication, notes or schedules, or written in the specifications or elsewhere in the contract documents.
2. As directed, as approved, or as requested: Unless otherwise indicated, these terms imply “by the Denver Project Manager” and require that an instruction be obtained by the Contractor from the Denver Project Manager.
3. Concealed: Embedded in masonry, concrete or other construction; installed in furred spaces; within double partitions or hung ceilings; in trenches; in crawl spaces or in enclosures.
4. Ensure: To make certain in a way that eliminates the possibility of error.
5. Exposed: Not installed underground or “concealed” as defined above.
6. Furnish or Provide: To supply, install and connect complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
7. As Indicated, As Shown, or As Noted: As depicted on drawings or specifications.
8. Install: To erect, mount and connect complete with related accessories.
9. Or equal, or Approved Equal: Refers to products which, in the opinion of the Denver Project Manager, are similar in all respects to products specified by proprietary brand name.
  - a. Refer to Division 01 Section “Substitutions” for procedures for submittal of proposed substitutions.
10. Rework: To repair existing items or work required to be removed and replaced in order to accomplish the Work in accordance with the contract documents.
11. Related Work: Includes, but not necessarily limited to, mentioned work associated with, or affected by, the work specified.
12. Reviewed, Satisfactory, Accepted, or Directed: Assumes by or to the Denver Project Manager.
13. Similar, or Equal: Same in materials, weight, size, design, construction, capacity, performance and efficiency of specified product.
14. Supply: To purchase, procure, acquire and deliver complete with related accessories.
15. Unless Otherwise Indicated and Unless Otherwise Noted: General note to perform work as indicated or shown on drawings or in specifications unless specifically directed otherwise elsewhere in the contract documents; may be abbreviated “U.O.N.”, “U.O.I.”, or “U.N.O.”

## 1.4 CONVENTIONS

- A. Specifications Format: In order to standardize the location of information in the Contract Documents, the specifications generally are organized in the following format:
  - 1. The 2012 edition of “MASTERFORMAT” published by the Construction Specifications Institute.
- B. Organization of Drawings and Specifications: Organization of the specifications into divisions and sections, and arrangement or numbering of drawings is intended solely for the convenience of the Contractor in his responsibilities to divide the Work among subcontractors or to establish the extent of work to be performed by any trade.
  - 1. Neither the City nor the Project Manager assume any liability arising out of jurisdictional issues or claims advanced by trade organizations or other interested parties based on the arrangement or organization of drawings or specifications.
- C. Gender and Number: For convenience and uniformity, parties to the Contract, including the City, Contractor, and Denver Project Manager, and their subcontractors, suppliers, installers, consultants or other interested parties are referred to throughout the contract documents as if masculine in gender and singular in number. Such reference is not intended to limit the meaning of the contract documents to the masculine gender or singular number.
- D. Singular vs. Plural: Materials, products, equipment or other items of work referred to in the singular shall be construed as plural where applicable by the intent of the contract documents and shall not limit quantities to be provided by the Contractor.
- E. Imperative Mood: Specifications and notes on the Drawings or elsewhere in the contract documents are generally written in the imperative mood as instructions to the Contractor, whether the Contractor is specifically addressed or not.
- F. References to Subcontractors or Trades: References to subcontractors, trades, or other entities which are not parties to the contract shall be construed as meaning the Contractor whose responsibility it shall be to divide the Work among subcontractors or trades. Such references are used as a matter of convention, and are not intended to preclude or direct the Contractor’s responsibility to divide the Work.
- G. Abbreviations: Abbreviations are believed to be those in general use in the construction industry. Contact the Project Manager for clarification of abbreviations for which the meaning is not clear.
  - 1. Review the contract drawings for additional abbreviations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

A. No separate payment will be made for work under this Section.

**END OF SECTION 01 42 16**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The Work specified in this Section includes general administrative requirements and procedures, and related applicable codes.

1.3 CODES

- A. Obtain all permits and licenses in accordance with General Contract Conditions Article 317 – “Permits and Licenses”.
- B. Publication Dates: Comply with General Contract Conditions Article 401 – “Review and Interpretation” Paragraph 401.2.

1.4 EXISTING UTILITIES

- A. Locate and protect existing utilities in accordance with General Contract Conditions Article 804 – “Protection of Municipal, Public Service, or Public Utility Systems”.
- B. Although existing utilities may be shown on the drawings, their location is not guaranteed. Contractor is required to call Utility Notification Center of Colorado (UNCC) at 811 three days (72 hours) prior to starting any work.

1.5 CONTRACTOR’S CONSTRUCTION SCHEDULE

- A. Furnish construction schedule, as required by General Contract Conditions Article 306 – “Working Hours and Schedule”.
- B. IMPORTANT: Prior to beginning work on project site, the Contractor shall give minimum 48 hour notification to both the Project Manager and the District Superintendent.
- C. The schedule may be used as a tool in analyzing any requests for the extension of the contract completion date due to changes in the Work or abnormal weather conditions. Normal weather conditions are based on the 10-year historical weather information provided by the National Climatic Data Center for the Denver Metropolitan area. Normal weather conditions shall be incorporated into the bar chart schedule. Additional time will be added to the Contract time only if the activities involved will affect the project’s Completion Date because of the criticality of the activities changed or altered.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Properly carton, crate, cover, and protect materials, products and equipment for shipping, handling and storing. Use appropriate means for hoisting and loading which will prevent damage or overstress to items being handled or shipped. Store them under roof in controlled environment whenever feasible; otherwise store off the ground under suitable coverings properly secured against wind and weather. Protect all items from rain, snow, moisture, wind, cold, heat, frost, sun, staining, discoloration, deterioration and physical damage from any cause. Refer to individual sections for specific requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT (Not Used)

**END OF SECTION 01 42 23**



**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section identifies inspection activities to be performed by inspectors employed by the City and working under the direction of the Denver Project Manager.
  - 1. Inspection and tests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards.
  - 2. The inspection and approval of work by other agencies above does not constitute inspection or acceptance of work required by the City. Technical specifications may contain requirements more stringent than Building Inspection Division or other code agency requirements.
- B. Reference General Contract Conditions as listed:
  - 1. Article 1701 "Construction Inspection by the City".
  - 2. Article 1702 "Authority of Inspectors".
  - 3. Article 1703 "Observable Defects".
  - 4. Article 1704 "Defects – Uncovering Work".
  - 5. Article 1705 "Latent Defects".
  - 6. Article 1706 "Removal of Defective Materials and Work".
- C. Related Sections:
  - 1. Division 01 Section "Contractor Quality Control".
  - 2. Division 01 Section "Submittals".
  - 3. Division 01 Section "Shop and Working Drawings, Product Data, and Samples".

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION****3.1 CONTRACTOR'S QUALITY CONTROL SYSTEM**

- A. The Contractor is responsible for quality control of the Construction. All acquisition of materials, sequence of construction (except as otherwise indicated), and means and methods of construction shall be the responsibility of the Contractor. Establish system to perform sufficient inspection and tests of all items of work, including that of subcontractors, to ensure conformance to Contract Documents for materials, workmanship, construction, finish, functional performance and identification.
  - 1. Control System: Establish for all construction except where Contract Documents provide for specific compliance tests by testing laboratories and engineers employed by the City.

2. Control System: Specifically include all testing required by various sections of Specifications.
  3. Quality Control System: Means by which Contractor assures himself that construction complies with requirements of Contract Documents.
    - a. Controls: Adequate to cover all construction operations and keyed to proposed construction schedule.
- B. The Contractor shall be responsible for assuring compliance with the quality standards as indicated in the Contract Documents. In addition, the Contractor shall be responsible for:
1. Review of submittals prior to their being forwarded to the Designer and the Project Manager for review. The Contractor shall mark submittals with comments and shall indicate the date and party conducting the Contractor's review of each submittal.
  2. Final inspection of the project prior to calling for the Designer and City to conduct a final inspection. The Contractor shall provide his inspection comments to the Designer and City prior to the scheduled final inspection.
  3. Verification of completion of punch-list items prior to calling for verification inspection by the Designer and the City.
- C. Records: Maintain correct records on appropriate forms for all inspections and tests performed, instructions received from the Designer and actions taken as result of those instructions.
1. Records: Include evidence that required inspections or tests have been performed (including type and number of inspections or tests, nature of defects, causes for rejection, etc.) proposed or directed remedial action, and corrective action taken.
  2. Document inspections and tests as required by each section of Specifications.
- D. The Contractor is responsible for complying with the requirements of the Contract Documents. Additional testing may be performed as determined by the City's Agents. Such additional testing will be paid for by the City. Contractor shall not rely upon these tests as sufficient to assure compliance with the Contract Documents. The Contractor shall procure and pay for testing necessary to assure that the construction is in compliance with the Contract Documents.
- E. Quality Control Plan: Submit with proposed Schedule of Values and Construction Progress Schedule. Plan shall include:
1. Personnel, procedures, instructions, and records to be used.
  2. List of control tests which Contractor understands he and his subcontractors are to perform.
  3. Procedures for reviewing and approving shop drawings, product data, samples and other submittals before submission to the Designer and Denver Project Manager. Include procedures for obtaining field measurements.
  4. Method of documenting quality control operation, inspection and testing including samples of proposed forms.

### 3.2 STANDARDS

- A. Generally accepted Construction Industry standards for materials, products, quality, and workmanship shall supplement the Specifications.
1. Where industry standards are less than the Specifications and Drawings require, the Contract Documents shall govern.
  2. The Contractor shall provide materials and products which conform to industry standards of quality.

- B. Construction tasks shall be performed by craftsmen skilled and experienced in the trades required. Work shall be subject to review by the City and the Designer.
- C. Work and/or materials which fail to meet accepted industry standards of performance, quality, and/or appearance will be rejected and shall be brought into compliance or replaced by the Contractor at no additional cost to the City.

### 3.3 MATERIAL AND WORKMANSHIP

- A. Unless otherwise specified, or indicated on the Drawings, material shall be new, of best quality, and without flaws, and delivered upon completion in an undamaged condition.
- B. Workmanship shall be the best of its respective kind. Labor shall be performed in a thorough workmanlike manner by qualified, efficient, and skilled mechanics, acceptable to the City, Designer and other trades involved on the job requiring acceptable substrate for the performance of their work.

### 3.4 TESTING – GENERAL

- A. Testing Laboratory and/or Engineering services are required for quality control in portions of the work identified in other sections of these specifications.
- B. Tests required by these Specifications shall be performed in strict accordance with referenced testing methods, procedures, and conditions. Pertinent data shall be included in clear, comprehensive written forms according to the Designer's or Engineer's requirements.
- C. Contractor: Provide equipment and facilities as required for testing at no additional cost, subject to City's review, for conducting field tests and for collecting and forwarding samples.
  - 1. Do not use materials or equipment represented by samples until tests, if required, have been made and materials or equipment found to be acceptable.
  - 2. Do not incorporate any product into work which becomes unfit for use after acceptance thereof.
- D. Testing: Materials or equipment proposed to be used may be tested at any time during their preparation or use. Furnish required samples without charge and give sufficient notice of placing of orders to permit testing. Products may be sampled either prior to shipment or after being received at site of work.
- E. Tests: Made by accredited testing laboratory selected by City. Except as otherwise provided, sampling and testing of materials and laboratory methods and testing equipment shall be in accordance with latest standards and tentative methods of ASTM.
  - 1. Specific information concerning testing methods, sample sizes, etc., is included under applicable sections of Specifications.
  - 2. Any modification of, or elaboration on, these test procedures included for specific materials under their respective sections in Specifications shall take precedence over these procedures.

### 3.5 COST OF TESTING

- A. Contractor is responsible for all costs associated with testing in accordance with the Contract Documents.

- B. Unless indicated otherwise, additional testing required by the City's Agents as described in 3.5.D. below shall be performed by the City's authorized agents, at the City's expense.
- C. Costs for re-testing of non-complying work shall be borne by the Contractor.
- D. According to the judgment of the City and/or Designer, ANY portion of the work in this contract may be tested at any time for any reason. Costs for such testing shall be borne by the Contractor only if such tests indicate that work does not meet Contract Document requirements.

### 3.6 OTHER TESTING

- A. Following Testing: Performed at expense of Contractor:
  - 1. Any additional tests required because of any tests that fail subject to following conditions:
    - a. Quantity and Nature of Tests: Determined by the Designer.
    - b. Tests: Taken in presence of the City and/or the Designer.
    - c. Proof of Noncompliance: Contractor liable for corrective action which the City and/or the Designer feels is required including complete removal and replacement of defective material.
  - 2. Material Substitution: Any tests of material or equipment offered as substitute for specified item on which test may be required in order to prove its compliance with Specifications.
- B. Contractor: May have tests performed on material and equipment for his own information and job control so long as the City does not assume responsibility for costs or for giving them consideration when appraising quality of materials.

### 3.7 EQUIPMENT TESTING

- A. Equipment testing shall be as determined appropriate by the City to assure proper performance according to the manufacturer's specifications for each equipment item.
- B. After all utility connections to equipment have been completed, the Contractor shall conduct final tests of equipment in presence of the City and the Designer.
- C. Unless waived in writing by the City, the requirements of this section shall apply to all installed equipment items having utility connections.

### 3.8 NOTIFICATION

- A. The Contractor shall be responsible for notifying the City and Designer at least 3 working days prior to commencing work which is identified as requiring testing.
- B. The Contractor shall be responsible for scheduling and coordinating all required testing with the City and, when required by the City's Agents, the City's Independent Testing Agency.

### 3.9 TEST REPORTS

- A. Test reports, whether performed for the City or the Contractor, shall be submitted to the City and Contractor as soon as results are available. Reports shall be clear, concise, comprehensive written forms containing required test results.
- B. Reports of tests made by testing laboratories shall be distributed by testing laboratory as follows:
  - 1. 1 Copy – Denver Project Manager.
  - 2. 1 Copy – Contractor.
  - 3. 1 Copy – Applicable Supplier or Subcontractor.
  - 4. 1 Copy – Designer and Applicable Engineer.

### 3.10 MANUFACTURING AND FABRICATION INSPECTIONS

- A. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacturer, the shipping point, or at the destination to verify conformance to applicable specifications. Inspections and tests performed by the City shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered to be a guarantee for acceptance of materials that will be delivered at a later time.
- B. The Project Manager or his authorized representative may inspect at its source any material or assembly to be used in the Work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the Work and to obtain samples for testing and further inspection.
- C. Should the Project Manager conduct plant inspections the following conditions shall exist:
  - 1. The Project Manager shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
  - 2. The Project Manager shall have full access during scheduled production or warehousing working hours to parts of the plant that are concerned with the manufacture, production, storage or shipping of materials being furnished.
  - 3. The Contractor shall arrange for adequate office or working space that can reasonably be needed for conducting a plant inspection. Office or working space shall be conveniently located with respect to the plant and/or warehouse as required by the Denver Project Manager.
- D. It is understood and agreed that the City shall have the right to re-test, at the City's expense, any materials that have been tested and accepted at the source of supply after it has been delivered to the site.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 43 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section identifies the Quality Control activities to be performed during all phases of the contract by the Contractor.
- B. The Contractor shall have in place his Quality Control Program as necessary to ensure that all materials and work are completed in compliance with contract documents. The Contractor is solely responsible for Quality Control with the exception of those tests and/or audits that will be conducted by the City as defined in the contract documents.
- C. Test schedules and/or testing requirements for materials used on this project are included in the technical specifications. Laboratory and field testing identified in the technical specifications shall be conducted by an Independent Testing Agency (ITA) retained by the Contractor.

**1.3 LEVEL OF CONTROL**

- A. The intent of this section is to enable the Contractor to establish a necessary level of control that will:
  - 1. Adequately provide for the production of acceptable quality materials.
  - 2. Provide sufficient information to ensure both the Contractor and the Project Manager that the specification requirements are being met.
  - 3. Allow the Contractor as much latitude as possible to develop his or her own standards of control.

**1.4 SUBMITTALS**

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples", and Division 01 Section "Quality Assurance" for submittal requirements.
- B. Quality Control Plan: Within 10-days after Notice to Proceed, the Contractor shall submit a Quality Control Plan for review and acceptance. Acceptance by the Project Manager does not relieve the Contractor of compliance with the contract requirements. The Contractor Quality Control Plan shall address the following as a minimum:
  - 1. Provide a general description of Quality Control monitoring to be performed until final acceptance by the City. Include monitoring activities of Work and the worksite during times no construction activity is scheduled to take place.
  - 2. The Contractor shall designate an employee as the Quality Control Manager qualified to perform quality control monitoring of the Work. The designated individual shall have the authority to direct work changes required to bring the Work into conformance with contract requirements including stopping non-conforming work in progress.

3. The Quality Control Plan shall address each technical specification division's requirements for quality control. The Contractor shall identify each item requiring submittal and approval/acceptance prior to installation of work. Also, the Contractor shall identify each item of work requiring testing by the independent testing agency.
  4. The Quality Control Plan shall address and establish controls and documentation format to ensure that items or materials that have been accepted through receiving inspection are used or installed. Identification and traceability shall be provided throughout all inspections, test activities and records. For stored items, provisions shall be made for the control of item/material identification, consistent with the expected duration and type of storage.
  5. Provide methodology of monitoring, testing and exercising of all equipment, valves and/or assemblies to ensure the Work installed is in proper working order.
- C. List of Suppliers and Subcontractors: Submit a list of suppliers and subcontractors, including items to be supplied by each supplier and/or subcontractor. Identify work to be performed by each subcontractor. The list shall be updated and resubmitted as required.
- D. Emergency Contact List: Submit a list of emergency contact information including name, company, title, work phone number, home phone number, and other means of contact for at least four individuals.
1. Review the Emergency Contact list on a daily basis. In the event there is any change in any of the information, the Contractor shall forward the updated list to the Denver Project Manager.
  2. The Emergency Contact list shall include the project number, project title, and date of issue.
- E. Daily Quality Control Report:
1. The Daily Quality Control Report shall be submitted daily in the format detailed in Division 01 Section "Standard Forms". The report shall address as a minimum the following: identify number of workers on site each day by trade, identify notifications and discussions with/by DIA Quality Assurance Inspectors and other agency inspectors, identify quality of work placed that day and any deviations and/or corrections required to bring the Work into conformance with the contract. Daily reporting may be computerized or typed, but must contain an electronic signature. Legible, hand written reports on the approved form shall be accepted. Scanned copies of daily reports are acceptable.
  2. Submit one electronic copy of the Daily Quality Control Report to the Project Manager the day following the work. The report shall be signed by the Contractor's Quality Control Representative and the Contractor's Superintendent.
- F. Corrective Action Report (CAR): Conditions adverse to quality will be reviewed by the Contractor to determine the cause and to recommend a corrective action that will preclude recurrence.
1. The condition, its cause, and the corrective action planned shall be reported to the Project Manager prior to implementation.
  2. Follow-up action shall be taken to verify implementation of the corrective action.
  3. The Contractor will document the corrective action and a copy of the Corrective Action Report (CAR) will be transmitted to the Denver Project Manager.



## 1.5 DOCUMENTATION

- A. The Contractor shall not change or alter approved submittals, procedures, specifications, drawings, or other pertinent documentation without the Denver Project Manager's written authorization.
- B. All records and documents that are quality related shall be prepared, identified, and maintained by the Contractor and shall be made available to the City upon request. Records shall be protected from damage, deterioration or loss. A copy of the records and documents shall be maintained at the Work site at all times unless the Project Manager has approved other locations in writing. Retention time for all quality records shall be not less than three years from date of Final Acceptance of the contract.
- C. The Contractor shall maintain records at the actual worksite and at Contractor's office to show the inspection status of materials and items installed in order to ensure that the required inspections and tests have been performed in a timely and correct manner.

## 1.6 INSPECTIONS AND TESTS

- A. Inspections, tests, and system shut down requests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards. The Contractor's designated Quality Control Representative shall inspect the work and shall ensure the work complies with the contract requirements prior to any requests for inspection or testing.
- B. When the specifications, laws, ordinances, rules, regulations or orders of any public agency having jurisdiction require the Denver Project Manager's surveillance of inspections or tests, the Contractor shall notify the Project Manager of the place, date and time 48-hours prior to the inspection and/or test. The Contractor shall be responsible for notifying and requesting inspection by other agencies including but not limited to the Denver Building Inspection Division, Denver Fire Department, Denver Wastewater Management Division and Denver Water . Prior to request for other agency inspections, the Contractor shall meet and plan inspection times with the Project Manager and or his designated representative.
- C. Special inspections or tests may be required by the technical specifications, City, State and/or Federal Agencies in addition to those tests already performed. The Contractor shall notify the Project Manager at least 48 hours in advance of the additional inspections or tests.

## 1.7 INSPECTION PLAN

- A. The Contractor shall utilize the following six-point inspection plan to ensure the conformance of the Work performed by the Contractor meets the requirements of the contract drawings and specifications, the referenced codes and standards and the approved submittals:
  - 1. **Pre-work Coordination:** Prior to the start of construction work on the contract and prior to the start of work under each separate specification section and prior to the start of work where a change in a construction operation is contemplated by the Contractor and prior to a new subcontractor starting work, a coordination meeting will be held with the Contractor's superintendent, Quality Control, and Safety representative(s), and the ITA representative. Supervisory, Safety, and Quality Control representatives of all applicable subcontractors shall also attend. The Contractor's Quality Control Representative shall

chair the meeting, and prepare and distribute minutes of Quality Control meetings. Meeting minutes shall be electronically distributed within 24 hours of the meeting.

2. The purpose of the meeting is to ensure that the Contractor's personnel have no misunderstandings regarding their safety and quality procedures as well as the technical requirements of the contract. The following items shall be presented and reviewed by the Contractor:
  - a. Contract requirements and specifications.
  - b. Shop drawings, certifications, submittals and as-built drawings.
  - c. Testing and inspection program and procedures.
  - d. Contractor's Quality Control program.
  - e. Familiarity and proficiency of the Contractor's and subcontractor's workforce to perform the operation to required workmanship standards including certifications of installers.
  - f. Safety, security, and environmental precautions to be observed.
  - g. Any other preparatory steps dependent upon the particular operation.
  - h. The Contractor's means and methods for performing the Work.
3. Initial Inspection: Upon completion of a representative sample of a given feature of the Work and no later than two weeks after the start of a new or changed operation, the Project Manager and/or his designated representative will meet with the Contractor's Quality Control representative and applicable subcontractor's supervisor and their Quality Control representatives to check the following items, as a minimum:
  - a. Workmanship to established quality standards.
  - b. Conformance to contract drawings, specifications and the accepted shop drawings.
  - c. Adequacy of materials and articles utilized.
  - d. Results of inspection and testing methods.
  - e. Adequacy of as-built drawings maintained daily.
4. Once accepted, the representative sample will become the physical baseline by which ongoing work is compared for quality and acceptability. To the maximum practical extent, approved representative samples of work elements shall remain visible until all work in the appropriate category is complete. Acceptance of a sample does not waive or alter any contract requirements or show acceptance of any deviation from the contract not approved in writing by the Denver Project Manager.
5. Follow-up Inspection: The Contractor's Quality Control representative will monitor the work to review the continuing conformance of the work to the workmanship standards established during the preparatory and initial inspections.
6. Completion Inspection: 48 hours prior to the completion of an item or segment of work and prior to covering up any work, the Contractor will notify the Project Manager who will verify that the segment of work is substantially complete, all inspections and tests have been completed and the results are acceptable.
  - a. The purpose of this inspection is to allow further corrective work upon, or integral to, the completed segment of work.
  - b. **THIS IS NOT AN ACCEPTANCE INSPECTION.** If any items are determined to be deficient, need correction or are non-conforming, a Deficiency List will be

- prepared and issued to the respective Contractor for correction, repair or replacement of any deficient or non-conforming items.
- c. The Project Manager and Contractor's Quality Control representative will verify the correction of the deficient and/or non-conforming items prior to the start of the next operation.
7. Pre-Final Acceptance Inspection: Prior to requesting a Pre-Final Acceptance Inspection by the City, all work and operational systems to be inspected shall be satisfactorily completed and tested by the Contractor.
    - a. The Contractor's written request for this inspection shall be made 72-hours in advance.
    - b. With the request shall come a list of any known deficiencies and when they will be corrected.
    - c. If the list is too large or contains too many significant items, in the opinion of the Denver Project Manager, no inspection will be held because of the incompleteness of the work.
  8. The Project Manager will schedule the Pre-Final Acceptance Inspection and will prepare a list of deficient items (punch list) discovered during the inspection.
    - a. If during the inspection the list becomes too large or too many significant items are on the list, the inspection will be canceled.
    - b. After the inspection is completed, the Deficiency List will be transmitted to the Contractor for correction of the deficient items.
  9. Final Acceptance Inspection: After the Contractor has completed all items on the Deficiency List (generated from the Pre-Final Acceptance Inspection) he shall request a Final Acceptance Inspection. The request shall be made in writing at least 72 hours in advance of the inspection.
    - a. All areas must be cleaned and ready for turnover prior to this inspection. The Denver Project Manager, the design consultant, a representative of the funding agency (if applicable) and other interested parties will inspect the subject Work to ensure that all deficiencies have been satisfactorily attended to and that no new deficiencies have appeared and that all systems are completely functional.
    - b. Any outstanding or additional deficient items will be noted and handled per the requirements of the Pre-Final Acceptance Inspection noted above until the Work is acceptable to the Denver Project Manager.

#### 1.8 SAMPLES

- A. The Contractor shall maintain at the worksite a copy of all samples submitted and accepted by the City. Samples shall be made available to the designer or the Denver Project Manager's designated representatives for review and comparison in the field. The Project Manager prior to use on the project must accept all items and materials.
- B. The installed work will be compared to the samples and if any of the work is not of the same quality, material, finish, color, texture or appearance as the sample, that portion that is not the same will be considered defective and in nonconformance.
- C. Contractor selection of samples will only be considered if taken at random. The Contractor shall permit representatives of the City to witness the selection of samples. Inspection or tests

of items or materials that fail shall be sufficient cause to terminate further inspections/tests of the same brand, make or source of that product.

- D. The Contractor is obligated to correct any item deemed deficient.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 REQUIREMENTS

- A. All materials required for the contract shall be new except where specified otherwise. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by the City shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered a guarantee for acceptance of materials that will be delivered at a later time.
- B. The Contractor is obligated to correct or remove non-conforming materials, whether in place or not. If necessary, the Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the Project Manager may order correction, removal and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.
- C. Materials accepted on the basis of a Certificate of Compliance may be sampled and inspected/tested by the Project Manager or its Designer at any time. The fact that the materials were accepted on the basis of such certification shall not relieve the Contractor of his responsibility to use materials that conform to the specifications.
- D. The Contractor shall impose upon his suppliers the same quality control requirements, including inspection and test procedures, as imposed upon him by the specifications and referenced standards. The Contractor shall apply appropriate controls, designed to ensure that all materials supplied meet the requirements and specifications.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

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

### 4.2 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Contract price. If the City is required to re-inspect work or conduct a special test because a previous inspection, requested by the Contractor, showed that the work was defective or not in conformance, the Manager or authorized representative may deduct from the contract value the cost of re-inspection at the rate of seventy-five dollars (\$75.00) per man-hour.

**END OF SECTION 01 45 16**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section includes furnishing, installing, operating, maintaining, and removing temporary construction barriers, enclosures and field facilities including the Contractor's construction offices, staging areas, yards, storage areas, electrical power, telephone, water, fire protection, and sanitary service.
- B. Yards and Storage Areas:
  - 1. Temporary facilities which the Contractor desires to locate in staging areas adjacent to the Work or within the project limits are subject to approval by the Denver Project Manager.
- C. Water Service: The Contractor shall make all connections and extensions required and shall make use of water in direct support of the Work. The Contractor shall install an approved Water Department tap at the City's water source prior to obtaining any water. The Contractor shall arrange and pay for its supply/distribution system from the City's point of connection. The location and alignment of the Contractor's temporary supply/distribution system must be approved by the Project Manager prior to its installation. The Contractor shall leave in place all above ground and underground water distribution facilities unless otherwise directed by the Denver Project Manager.
  - 1. The Contractor shall not use in place fire hydrants or standpipes as sources for construction water or potable water.
- D. Fire Protection: Furnish, install and maintain temporary portable fire protection equipment throughout the construction period at all buildings (including the project site), maintenance shops, and fuel storage on all large construction equipment and at the location of any flammable materials or construction materials.
- E. Sanitary Service: Furnish, install and maintain temporary sanitary facilities and services throughout the construction period.
  - 1. Ensure that separate or single user toilets shall be provided to ensure privacy between the sexes.
  - 2. Provide general washing facilities adequate for the number of employees.
  - 3. Provide special washing facilities adequate for the number of employees engaged in the application of paints, coating and other volatile or hazardous materials.

**1.3 QUALITY CONTROL**

- A. Provide products for, and the execution of, the Work of this Section that will satisfy the requirements of the NEC, OSHA, and local codes. Provide products that satisfy requirements of NEMA and are UL listed.

#### 1.4 SUBMITTALS

- A. Refer to Division 01 Sections “Submittals” and “Shop and Working Drawings, Product Data, and Samples” for submittal procedures.
- B. Submit a shop drawing within five days of the Notice to Proceed that shows the following:
  - 1. Temporary facilities equipment and materials (include manufacturer’s literature).
  - 2. Details and layout of temporary installations including fences, roads, parking, storage areas, and drainage plans.

### PART 2 - PRODUCTS

#### 2.1 DRINKING WATER SERVICE

- A. Provide sanitary materials and equipment that satisfies the requirements of codes and regulations pertaining to temporary water systems. Bottled products may be used if those products comply with codes. Clearly label portable containers having a dispensing tap and used only for drinking water. Provide single service disposable cups and a sanitary container for dispensing cups. A trash receptacle shall be provided and maintained beside each portable water supply.

#### 2.2 FIRE PROTECTION

- A. Fire extinguishers shall be UL rated and shall comply with the current City fire code.

#### 2.3 SANITARY SERVICE

- A. Provide materials and equipment adequate for the intended purposes, which will neither create unsanitary conditions nor violate the codes applicable to temporary sanitary facilities. Enclosures for toilet and washing facilities shall be weatherproof, sight proof, ventilated and sturdy.
- B. Provide portable type toilet facilities that satisfy the requirements of OSHA.
- C. Provide washing facilities as needed. Furnish soap, single-service paper towels, towel dispenser and towel receptacle. If paints, coatings and other volatile or hazardous materials injurious to humans will be applied as part of the contract, provide washing facilities with warm water of approximately 120-degrees F.

### PART 3 - EXECUTION

#### 3.1 WATER SERVICE

- A. Install the systems in a neat and orderly manner. Make them structurally and mechanically sound. Provide continuous service. Modify, relocate and extend the systems as the work progresses.

### TEMPORARY FACILITIES AND CONTROLS

- B. Locate systems where they will be convenient to work stations, sanitary facilities and first aid station but will not interfere with traffic, work areas, materials handling equipment, storage areas or the work of other contractors.
- C. Install vacuum breakers, backflow preventers and similar devices in a manner and location which will prevent temporary water from returning to the water mains.
- D. Do not incorporate any part of temporary water distribution system into the permanent water distribution system.

### 3.2 FIRE PROTECTION

- A. Install products in conformance with the requirements of the applicable Denver Fire Department and OSHA regulations.
  - 1. Provide functional fire extinguishers that are clearly identified for fire and an accessible supply of water during the period of construction. These fire extinguishers shall remain in place until permanent fire protection systems are functional.
  - 2. Furnish not less than one 20-pound fire extinguisher, type 2A-20ABC within ten feet of cutting and welding operations.
  - 3. Provide 20-pound fire extinguishers, type 2A-20ABC no further than 100 feet apart in buildings.
  - 4. Provide not less than one 20-pound fire extinguisher, type 2A-20ABC on any equipment of 75 horsepower or more.
- B. Instruct construction personnel as to location and use of temporary fire protection equipment.
- C. Fire extinguishers shall be located for easy access. Their location shall be clearly marked so that they can be seen at least 75 feet away.

### 3.3 SANITARY SERVICE

- A. Place temporary sanitary (and washing) facilities within the limits of the work and convenient to the work stations. Make these facilities structurally and mechanically sound. Modify, relocate and extend the facilities as required by progress of the work.
- B. Service toilets at those time intervals which will minimize the accumulation of wastes and prevent creation of unsanitary conditions, but not less than once a week.
- C. The waste from the sanitary and wash facilities shall be disposed of in accordance with all applicable rules, regulations and laws and with the least environmental impact.

### 3.4 FENCING

- A. Contact all utility service companies prior to planning fence location and post locations for certification of current utilities. Locate pothole posts planned within 5-feet of known utilities. Submit fencing plan and typical details to Project Manager at least seven days before planned execution for review and acceptance.



### 3.5 SIGNS

- A. Contractor shall not provide any signage for temporary facilities without prior approval from the Denver Project Manager.

### 3.6 REMOVAL

- A. The Contractor shall locate all temporary facilities including the underground utilities so they can be completely removed without damaging permanent work or the worksite of other contractors.
- B. The Contractor shall remove all temporary facilities, including all underground utilities, and restore the site to the condition in which the City initially provided it to the Contractor or per the construction documents.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

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

### 4.2 PAYMENT

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

**END OF SECTION 01 50 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work of this section consists of retention and protection of trees during the construction of the project.

**1.3 GENERAL REQUIREMENTS**

- A. There should be daily supervision of field crews by the City Forestry Staff or Appointee during the critical phases of the project: for example: demolition of existing concrete, root pruning, construction of retaining walls, and construction of new curb or sidewalk in tree protection areas. City Forester may require a consulting arborist be hired to oversee the project.
- B. If it appears that the completion of the construction may cause damage to the branches of any tree, the Contractor shall contact the City Forester's Office. The City Forester will make a determination as to whether such damage is imminent.
- C. To prevent or minimize soil compaction, designated routes for equipment and foot traffic by work crews shall be determined prior to commencing construction activities, and shall be indicated in the tree protection plan to be submitted by Contractor. These routes shall be marked at the site, prior to commencement of construction, with tree protection fencing and signage as specified in Articles 3.6 and 3.7 of this section. A Tree Protection Plan shall be submitted for approval by the City Forester.
- D. Motorized equipment and trailers, including tractors, bobcats, bulldozers, rubber tired excavators, tracked excavators, trucks, cars, and carts shall not be allowed access within tree protection areas. Should access be necessary within designated tree protection areas, the existing grade shall be covered with 12-inches of wood mulch with overlapping 3/4-inch thick plywood on top to help distribute the weight of equipment and to minimize soil compaction and rutting. Plywood and/or mulch are not acceptable bridging materials for driving over exposed tree roots. Exposed tree roots shall not be driven over. The City Forester or Project Consulting Arborist shall be notified and shall approve of the access and driving surface prior to its use. If long term access is necessary aeration at 12" centers shall be completed after removal of mulch and plywood.
- E. Materials and supplies shall not be stockpiled or stored within the tree protection area, no exceptions.
- F. Under no circumstances shall any objects or materials be leaned against or supported by a tree's trunk, branches, or exposed roots. The attachment or installation to trees of any sign, cable, wire, nail, swing, or any other material that is not needed to help support the natural structure of the tree is prohibited. Standard arboricultural techniques such as bracing or cabling that are

performed by professional arborists are acceptable upon approval by the City Forester or Project Consulting Arborist.

- G. Appropriate tree pruning and/or removal permits must be secured prior to beginning work.

#### 1.4 DEFINITIONS

- A. Tree Protection Area: The tree protection area should consist of the ground encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater (see definition of drip line, below). Areas of ground covered by pavement, buildings, or other permanent structures where the presence of roots is minimal or negligible are excluded. The area under or within the tree's drip line is also referred to as the "Critical Root Zone" (see definition of critical root zone, below).
  - 1. With groups of trees or where an array effect is present, there may be discontinuous (non-overlapping) perimeters of tree protection areas, which result in difficult to maintain or ineffective tree protection fencing. In these cases, even though tree protection areas do not overlap, they should be treated as though they do if the distance between the perimeters of such areas is less than 30-feet. In effect, this will artificially enlarge the area of tree protection, but will result in a more clearly defined, manageable area.
- B. Drip Line: The outermost edge of the tree's canopy or branch spread. The area within a tree's drip line is all the ground under the total branch spread.
- C. Critical Root Zone: Shall be defined as the tree protection area encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater.
- D. Diameter (Caliper): The size (in inches) of a tree's trunk is measured at:

Trunk Size	Where Measured
< 4"	6" above grade
4" – 8"	12" above grade
> 8"	54" above grade

Note: All measurements should be rounded up to the nearest inch.

- E. High Value Shrub: Any specimen shrub with an appraised value of one-hundred dollars (\$100.00) or more.
- F. Project Consulting Arborist: An independent consultant with a degree in a horticulture, arboriculture, and/or ISA Certified Arborist, and at least five years field experience in tree preservation or on-site monitoring of public works or construction projects involving tree retention and protection. The Consultant should be an active member in the American Society of Consulting Arborists and/or International Society of Arboriculture.

#### 1.5 REFERENCE STANDARDS AND GUIDELINES

- A. Contractor shall comply with applicable requirements and recommendations of the most current versions of the following standards and guidelines. Where these conflict with other specified requirements, the more restrictive requirements shall govern.

#### TREE RETENTION AND PROTECTION

1. ANSI Z133.1-2006: American National Standard for Tree Care Operations.
2. ANSI A300: Tree, Shrub, and Other Woody Plant Management – Best Management Practices.
3. Guide for Plant Appraisal – Current Edition: Authored by the Council of Tree and Landscape Appraisers; published by the International Society of Arboriculture.

#### 1.6 SUBMITTALS

- A. Tree Protection Plan: Submit tree protection plan for approval by the City Forester.
- B. Maintenance Schedule: Submit maintenance schedule to City Forester for approval.

#### PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

##### 3.1 CONSTRUCTION REQUIREMENTS

- A. This section provides standards and guidelines for the retention and protection of trees and high-value shrubs for any proposed construction project.

##### 3.2 DEMOLITION OF EXISTING CONCRETE

- A. Caution should be used during removal of existing street, curb, gutter, sidewalk, drain inlets, and other concrete and asphalt demolition, to minimize injury to tree root systems. The following procedures should be used when removing existing concrete.
- B. Breaking of the existing concrete and asphalt for removal should be done in a manner that will minimize ground disturbance and vibration.
- C. Curbs and sidewalks within designated tree protection areas and critical root zones shall be removed by hand. When removing existing sidewalks and curbs, care should be taken to avoid injury to roots located under, over, or adjacent to paved surfaces.
- D. Roots and root-trunk flares growing over curbs should not be injured during breaking of curbs and removal of debris. Wood and bark tissues shall not be injured by striking tissues with equipment.
- E. During the removal of concrete, all root systems and soil areas exposed shall not be disturbed.
- F. Motorized equipment and trailers, including but not limited to tractors, skid steers, bulldozers, rubber tired excavators, tracked excavators, trucks, cars, and carts are to be limited to access on the existing paved street only. Access is not allowed behind the curb within tree protection areas.
- G. Should access be necessary within designated tree protection areas, the existing grade shall be covered with 12-inches of wood mulch and double overlapping sheets of 3/4-inch thick plywood to help distribute the weight of equipment and to minimize soil compaction and rutting.

1. Plywood and/or mulch are not acceptable bridging materials for driving over exposed tree roots. Exposed tree roots shall not be driven over.
2. The City Forester or Project Consulting Arborist shall be notified and shall approve of the access and driving surface prior to its use.

### 3.3 CONSTRUCTION OF SIDEWALKS, CURBS, CONCRETE, ASPHALT PAVING, AND DRAINAGE INLETS

#### A. The following procedures shall be used when constructing sidewalks, curbs, concrete, asphalt paving, and drainage inlets.

1. Keep all materials and equipment within the street bounded by existing curbs.
2. Protect exposed roots from contamination by stabilization materials and concrete.
3. Locate concrete washout areas away from roots and tree protection areas.
4. When excavating for the construction of inlets, excavated soil shall be deposited in trucks and hauled off or deposited temporarily on 3/4-inch thick plywood outside the critical root zone. Excavated and fill soil shall not be deposited, even temporarily, on unprotected natural grade.
5. After proper pruning, by a licensed arborist, cover exposed roots within 30 minutes to minimize desiccation. Roots may be covered with soil, 4" – 6" of wood mulch, or burlap (7 ounce or equivalent), and shall be kept moist during the period until the final grade is established.
6. Where possible, construction should be relocated to prevent damage to existing roots. Where relocation of walks is not possible, walks should be constructed in a manner with the least amount of impact/damage to roots including but not limited to raised, narrowed, curbed, ramped, bridged, cantilevered, use of pylons, root break out zones, root channeling, structural cells to prevent cutting and removing major roots (e.g. roots greater than two inches in diameter).
7. Place a sheet of 6-mil or thicker plastic over the grade within affected portions of tree protection areas prior to pouring concrete sidewalks, curbs, inlets, ramps, and driveway approaches. The plastic will assist in providing a non-leaching barrier between the concrete, soil and roots.
8. Construct new sidewalks on, or above, the existing grade instead of excavating into root zones. The new grade shall not interfere with sheet-flow drainage.
9. Grading within the critical root zone shall consist of the ground encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater. Grading within the critical root zone shall be performed by hand. Any fill material that needs to be placed in the critical root zone shall be limited to a maximum of 1-inch of fill material over the critical root zone area. Fill should consist of sandy loam topsoil. Clay soils shall not be used as fill. When using fill soil, the existing surface to receive fill should be scarified by hand to a maximum depth of 1-inch from the finished grade prior to placing fill material, to ensure proper incorporation of fill material. Any filling operation should not occur during water saturated soil conditions.
10. Existing soil may be used as a form for back of curb and gutter, with or without the use of a form board, although a form board is preferred. This will minimize excavation in the critical root zone and prevent undue injury to the roots. This method is unnecessary in areas outside the critical root zone. Place a layer of "Typar BioBarrier" between the curb and tree roots to help inhibit root growth that may exploit small cracks in the curb. Where appropriate, use curbs with discontinuous footings to maintain natural grade near the base of trees adjacent to the curbing, and to minimize injury to roots and root flares.

11. Provide for easy concrete removal and replacement where an obvious raised root may cause sidewalk cracking in the future. This can be accomplished by installing an expansion joint on either side of the root or by etching the concrete on either side of the root to allow that particular section to be broken out and replaced. Compaction rating for the replacement walkway should not exceed 80% Proctor density. Tree roots will continue to slowly add girth every year; therefore, the base material needs to be malleable (e.g. suitable subgrade aggregates, crushed granite, or compacted sand) to prevent a fulcrum or pressure point which can crack or heave the walkway.
12. Where appropriate, and under the direction of the City Forester or Appointee, root restricting barriers can be installed with a minimal amount of disturbance away from sidewalks, curbs and streets. Materials include:
  - a. 8 Mesh Copper (0.028-inch or greater) wire screen.
  - b. "TYPAR BioBarrier" as manufactured by Fiberweb, Inc. [www.biobarrier.com](http://www.biobarrier.com). Contact Dave Zill, 651-330-2920.
  - c. Or approved equal.
13. In areas where roots have to be removed for construction of drain inlets, roots shall be severed prior to excavation to eliminate unnecessary tearing of roots by equipment, refer to Article 3.5 - Root Pruning.
  - a. Excavate soil by hand at the construction cut limit to a depth of 30-inches or to the depth of the required root cut, whichever is less.
  - b. Prune roots as specified by a licensed arborist if roots are over 2" in diameter.
  - c. Protect exposed roots as specified.
14. Concrete or chemicals spilled within tree protection areas should be completely removed. Contamination soil shall be completely removed at the time of the spill and removed by hand and/or air spade tool without disturbance to root systems. Appropriate soil should be added as necessary to restore the grade. Contact the City Forester immediately in the event of a spill within a tree protection area.

### 3.4 IRRIGATION OR UTILITY INSTALLATION

- A. Protection of Trees and High Value Shrubs: Contractor shall protect all trees and high-value shrubs from injury due to irrigation related work. All injuries to trees and high-value shrubs shall be mitigated to the satisfaction of the Owner, and, if appropriate in accordance with guidelines established in the "Guide for Plant Appraisal". All costs of such mitigating shall be charged to and paid by the Contractor. See Article 3.9 – Injuries to Existing Plants – Damage Penalties of this section for definition of high value trees and shrubs.
  1. All irrigation lines shall be indicated on construction plans and pre-approved by the City Forester or Denver Project Manager. No irrigation lines shall be located within 10- feet of any existing tree trunk, without prior approval of City Forester or Denver Project Manager.
- B. Existing Trees: The City Forester or Project Consulting Arborist shall be notified prior to any trenching or excavation known or suspected to disturb more than 10% of the critical root zone.
- C. Where it is necessary to excavate within the critical root zone of existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots. Where more than 10% of the critical root zone area is to be disturbed the Contractor shall notify the City Forester or Project Consulting Arborist to review the conditions. Final approval must be provided by City Forester

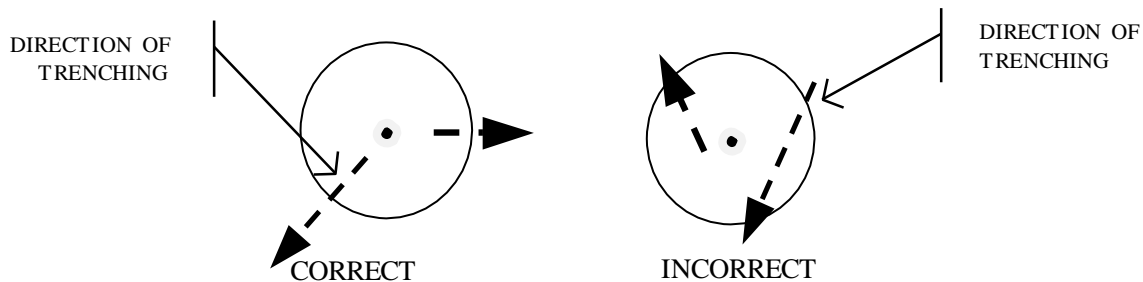
or Project Consulting Arborist prior to excavation work. In areas where tunneling or boring are to occur all exposed roots shall be covered with moistened burlap to prevent drying of roots.

- D. When trenching or excavation within the critical root zone is to occur care shall be taken not to disturb roots contained within the structural root plate of the tree. The structural root plate shall be determined based on the following guidelines:

Tree Diameter (in inches)	Structural Root Plate (in feet)
< 5	3
5	3.75
10	6
15	7.5
20	9
25	10
> 30	12

If trenching or excavation is to occur the following procedures shall apply:

1. If excavation, trenching or utility installation only occurs on one side of the tree or within a 6-inch linear distance from the trunk base for every 1-inch of trunk diameter, horizontal directional boring (auger tunneling), shall be used for irrigation or utility line installations.
  2. If excavation, trenching or utility installation will occur on two or more sides of a tree (e.g. N,S,E, or W) or is within 1-foot linear distance from the trunk base for every 1-inch of trunk diameter, then horizontal directional boring (auger tunneling) shall be used.
- E. All trenching or other work within the drip line of any tree shall be done by hand or other methods approved by the City Forester or Denver Project Manager, which will prevent breakage or other injury to branches and roots.
- F. Wherever a trenching machine exposes roots extending through the trench wall, those roots shall be hand pruned immediately, refer to Article 3.5 - Root Pruning. All trenches within critical root zones shall be closed within 12-hours; if this is not possible, the trench walls shall be covered with burlap and kept moistened. Prior to backfilling, the Contractor shall contact the City Forester, Project Consulting Arborist, or Project Manager to inspect the condition and treatment of roots injured by trenching.
- G. Trenching within critical Root Zone shall be done perpendicular to the radial center of the tree and not through the critical root zone.



### 3.5 ROOT PRUNING

- A. Tree roots shall not be pruned or cut unless their removal is unavoidable or absolutely necessary. The City Forester or Project Manager shall be notified prior to any operation known or suspected to involve cutting of more than:
  - 1. The City Forester or Project Consulting Arborist shall be notified immediately in the event that roots in excess of one-half the diameter of the tree, as measured per Paragraph 1.4.D, are cut, torn, ripped, or otherwise injured.
- B. Upon approval by the City Forester, prior to any excavation, removal of sidewalk, or other activity that will result in removal of soil and tree roots, all tree roots within a designated area will be pruned to a depth of 14-inches. Pruning shall occur with a Dosko Root Pruner, or equivalent, in accessible areas, and by hand in areas inaccessible to the root pruning machine. All other root pruning shall be done by hand with approved tools.
- C. Removal of roots greater than one-half the diameter of the tree, as measured per Paragraph 1.4.D, or parts of roots that are injured or diseased should be performed as follows:
  - 1. Preserve the root bark ridge (similar in structure and function to a branch bark ridge). Directional root pruning technique shall be used during hand excavation around tree roots. Roots are similar to branches in their response to pruning practices. With directional root pruning, objectionable and severely injured roots are properly cut to a lateral root 1/3 the size of the root being cut, if possible, that is growing downward or in a favorable direction.
  - 2. All roots needing to be pruned or removed shall be cut cleanly with sharp hand tools, with oversight by the City Forester or Project Consulting Arborist. No wound dressings shall be used.
  - 3. Recommended root pruning tools:
    - a. Bypass-type lopper.
    - b. Bypass-type pruner.
    - c. Large and small hand saws.
    - d. Wound scriber.
    - e. Reciprocating saw with a sharp blade.
- D. Root Pruning Near Sidewalks:
  - 1. Root pruning should be done carefully, by hand, to achieve the objective of reducing future sidewalk problems as well as preserving the trees. Removing anchoring roots or causing injuries to anchoring roots and root flares will cause future decay and hazards. Indiscriminate cutting of vigorous roots results in their regeneration so that several more new roots may grow from the cut end, back under the sidewalk, thereby reducing the time between sidewalk repairs. Roots can be managed in the ground without significant harm to trees, if care is taken to avoid injuries that lead to root and trunk decay.
  - 2. Directional root pruning is required because it considers the tree's response to root pruning and decay. With directional root pruning, roots are cut to a lateral 1/3 the size of the parent root being cut, if possible, that is growing downward or in a more favorable direction. The pruned root ends will be less likely to regenerate, since a large lateral can assume the new terminal role of the root.
  - 3. Proper removal of selected roots or parts of roots can direct roots away from sidewalks in the future. Procedures for root pruning directly next to sidewalks are as follows:
    - a. Hand-dig a trench 6- to 8-inches in depth at the edge of the planting strip and sidewalk.



- b. Remove all roots less than 2-inches in diameter in this trench back to a desirable lateral root, preserving the root bark ridge. If careful excavation does not reveal a desirable lateral root within 12-inches of the exposed root in question, then the exposed root shall be pruned properly so that a minimal amount of root is removed.
  - c. Small root bundles, the source of future sidewalk problems, should also be removed at this time.
  
- E. All roots one-half the diameter of the tree caliper as measured per Paragraph 1.4.D shall be examined by the City Forester or Project Consulting Arborist in terms of their role in anchoring the tree.
  - 1. All roots that contribute significantly to anchorage should be preserved. Remove all other roots in this size range to sound, downward growing lateral roots that are at least 1/3 the size of the root being removed.
  - 2. All roots larger than one-half the diameter of the tree caliper as measured per Paragraph 1.4.D diameter are to be preserved unless their removal is absolutely necessary and approved by the City Forester. Preservation of large roots may require:
    - a. Reducing the sidewalk width near the root flare and/or
    - b. Curving or relocating walk around root/root flare.
    - c. Ramping or bridging the sidewalk over the roots to allow for root growth.
    - d. Use of cantilever/pylon technology.
    - e. Establish root break out zones.
    - f. Root channeling.
    - g. Structural cells.
  
- F. Tree Guying Subsequent to Root Pruning: Upon review of on-site root pruning and construction grading limits, the City Forester shall determine if existing trees subject to root pruning should be guyed or otherwise stabilized. The Contractor shall retain a qualified tree service company to complete tree guying and stabilization in accordance with Tree Care Industry Association standards. Tree service company shall be licensed by the City and County of Denver, through the City Forester's Office.

### 3.6 TREE PROTECTION FENCING

- A. Tree protection fencing should be installed 1-foot behind the existing curb in areas where the street surface will be removed and replaced. Tree protection areas shall be designated on construction documents, and fencing locations should be staked for approval by the Construction Manager and City Forester or Project Consulting Arborist.
  
- B. Tree protection fences should be constructed of one of the following:
  - 1. Galvanized Chain-link - 6-feet in height. Posts should be installed no less than 10-feet on center, at a depth of 36-inches minimum, or placed in stands with weight to keep the fence in place. Installation of post shall not result in injury to tree surface roots; root flares or branches.
  - 2. Colored (orange), molded plastic construction fencing-four 48-inches in height.
  - 3. Signage in accordance with Section 3.7.A
  
- C. Fencing should be installed to completely surround the limits of tree protection areas, and should extend at least 10-feet beyond the designated construction limits.

- D. Tree protection fencing shall be installed prior to any site activity and shall remain until its removal is authorized by the City Forester or the Denver Project Manager.

### 3.7 TREE PROTECTION SIGNAGE

- A. A standard Denver Forestry Tree Protection sign shall be mounted on tree protection fencing at 50-foot intervals warning construction personnel and the public to keep out of the tree protection areas.
  - 1. Signs may be picked up at the Denver Forestry office in the Webb Building at 201 W. Colfax Ave., Department 605, Denver, CO. 80202

### 3.8 PROJECT SITE MONITORING

- A. As determined by the City Forester for projects of sufficient size to warrant such, a Project Consulting Arborist shall be retained to enforce and monitor the Tree Retention and Protection objectives.
  - 1. The project site should be monitored a minimum of two times weekly (more frequently at the start of the project) until all procedures and specifications are understood and properly executed by all parties.
  - 2. Specific monitoring schedules should be developed at preconstruction meetings and modified as deemed necessary by the appropriate parties.
  - 3. Schedules shall be relayed to the City Forester and the Project Manager along with reports of site visits.

### 3.9 INJURIES TO EXISTING PLANTS - DAMAGE PENALTIES

- A. Tree and High-Value Shrub Appraisal: All trees and high-value shrubs will be evaluated and appraised by the City Forester or Forestry Appointee, and a list of all tree values for the project will be on file in the Construction Manager's office.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain, or to be relocated that are damaged by construction operations in a manner, type and size approved by the City Forester or Project Manager. Repair and replacement shall be independent of an assessed fine for damage to plant materials.
  - 1.
- C. Documentation for appraisals will consist of:
  - 1. Measurement of plant size.
  - 2. Identification by common and botanical names.
  - 3. Current condition (overall health, injuries, overt hazard status, etc.).
  - 4. Location factors as described in the most current addition of "Guide for Plant Appraisal". Photographs may be taken of certain trees and shrubs to document debilitating condition factors.
- D. The threshold level for plants to be appraised shall be one-hundred dollars (\$100.00); only those trees and shrubs estimated to have a monetary value greater than one-hundred dollars (\$100.00) shall be appraised.
- E. Trees and other plants designated as requiring retention or protection shall be identified and located on construction plans. Loss of, or partial injury to, any of these plants due to Contractor neglect or improper construction activities will result in a penalty of up to three times the

damages of the assessed value of the tree as determined by the Denver City Forester or Forestry Appointee as described in Chapter 57 of Denver Revised Municipal Code.

- F. Trees determined as requiring “general protection” or “special protection” in the construction areas and in other key locations should be clearly identified by the City Forester or Forestry Appointee. Loss or partial injury to any of these trees due to Contractor neglect or improper construction activities will result in a penalty of up to treble damages for the assessed value of the trees as determined by the City Forester or Project Consulting Arborist as described in Chapter 57 of Denver Revised Municipal Code. Injury to a portion of these trees will be assessed by the City Forester or Project Consulting Arborist and a corresponding portion of the liquidated damages will be assessed to the Contractor.
- G. A fine of one-thousand dollars (\$1,000.00) will be levied against the Contractor for each incident of construction damage (including construction traffic) within designated tree protection areas. Any fine shall be independent of any applicable damages for the assessed value of the tree or tree part.
- H. Trees or roots visibly and unnecessarily injured, in the opinion of the Denver Project Manager, Denver City Forester and/or Project Consulting Arborist will cause the City to withhold from the Contractor an assessed amount conforming to the requirements stipulated above, for a period of one full year. After that period the impact of the injury to any tree will be assessed by the City Forester or the Forestry Appointee.

### 3.10 SUBMITTALS

- A. Proposed methods and schedule for effectuating tree and other plant protection shall be submitted for approval. Contractor shall submit construction schedule which includes a time frame for work near existing plants. Approval of such shall be obtained from the City Forester prior to commencement of construction near tree protection areas.
- B. Proposed methods, materials, and schedule for root pruning, branch pruning, and other tree maintenance shall be submitted for approval.
  - 1. The Denver City Forester or Forestry Appointee shall mark the location of root pruning lines in the field prior to the operation.
  - 2. If possible, root pruning should occur between autumnal leaf fall and spring foliage.
  - 3. Root pruning during the growing season shall require approval of the Denver City Forester or Forestry Appointee.

### 3.11 TREE AND OTHER PLANT MAINTENANCE DURING AND AFTER COMPLETION OF CONSTRUCTION

- A. Tree Maintenance: Proper maintenance shall include, but be limited to: structural and remedial pruning, watering, mulching, remediating soil compaction, fertilization, insect and disease control, soil and tissue analysis, aeration, and wound treatment.
- B. The timing duration and frequency of necessary maintenance practices should be determined and approved by the City Forester or Forestry Appointee, based on factors associated with the site and affected plants.
- C. Submit maintenance schedule to City Forester for approval prior to work beginning.

- D. Watering of all existing plant material within the affected area shall be the responsibility of the Contractor.

#### PART 4 - MEASUREMENT AND PAYMENT

- 4.1 Measurement: Measurement for Tree Retention and Protection will not be measured, but will be a lump sum item, in accordance with the Drawings and as directed by the Denver Project Manager.
- 4.2 Payment: Payment shall be made at the lump sum price and shall include full compensation for the protection of trees in accordance with the Drawings and Specifications. The lump sum price shall include all material, labor and equipment required to establish tree protection, and remove the tree protection at the end of the project. The lump sum price should also include the maintenance of the tree protection throughout the duration of the project as well as the labor, materials and equipment required to restore the site to its original condition.

**END OF SECTION 01 56 39**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The work of this section consists of installation and maintenance of erosion and sedimentation prevention and protection measures during the construction of the project. The cost of maintaining, repairing, and/or replacement of damaged BMP's will be at the Contractors expense.
- B. Refer to "City and County of Denver Construction Activities Stormwater Manual" by City and County of Denver Wastewater Management Division, Department of Public Works, revised June 2010 at:  
  
<http://www.denvergov.org/Portals/711/documents/StormConsCriteriaFinWCover121610.pdf>
- C. Refer to the Wastewater Management Division, Department of Public Works, specification Section 203:

PART 2 - PRODUCTS

- 2.1 Refer to "City and County of Denver Construction Activities Stormwater Manual".

PART 3 - EXECUTION

- 3.1 Refer to "City and County of Denver Construction Activities Stormwater Manual".

PART 4 - MEASUREMENT AND PAYMENT (Not Used)

**END OF SECTION 01 57 13**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. The Work specified in this Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the project.

## 1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties", "systems", "structure", "finishes", "accessories", and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
  1. Products: Are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "Product" includes the terms "material", "equipment", "system" and terms of similar intent.
  2. Named Products: Are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature that is current as of the date of the Contract Documents.
  3. Materials: Are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
  4. Equipment: Is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

## 1.4 SUBMITTALS

- A. Product List: A list of products is included in each appropriate specification division. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.
  1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.
  2. Form: Prepare product list with information on each item tabulated under the following column headings:
    - a. Related Specification Section number.
    - b. Generic name used in Contract Documents.
    - c. Proprietary name, model number, and similar designations.
    - d. Manufacturer's name and address.
    - e. Supplier's name and address.
    - f. Installer's name and address.
    - g. Projected delivery date or time span of delivery period.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list. Provide a written explanation for omissions of data and for known variation from Contract requirements.
5. Action: The Project Manager will respond in writing to Contractor within 2 weeks or receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Denver Project Manager's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations:
  1. To the fullest extent possible, provide products of the same kind from a single source.
  2. Substitutions to the specified products will only be allowed in accordance with General Contract Conditions Article 406 "Substitution of Materials and Equipment".
- B. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on the exterior.
  1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
  2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
  1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
  4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

## MATERIAL AND EQUIPMENT

6. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## 1.7 GENERAL PRODUCT REQUIREMENTS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
  1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
  2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. It is the responsibility of the Contractor and his installers, as experts, to notify the Project Manager of any specified product that to his knowledge will not meet the requirements or is unsuited to the application indicated or specified.
- C. The use of manufacturer's and trade names is intended only to establish standards of quality and performance and not to limit competition.
- D. Substitution of Materials and Equipment: All bids are to be based on those materials and equipment specified in the Contract Documents. Substitutions after the bid will be made in accordance with the provisions of General Contract Conditions Article 406 "Substitution of Materials and Equipment".

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. The Contract Documents and governing regulations govern product selection. Procedure governing product selection include the following:
  1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
  2. Semi-proprietary Specification Requirements:
    - a. Where Specifications name two or more products or manufacturers, provide 1 of the products indicated. No substitutions will be permitted.
    - b. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
  3. Non-proprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
  4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade



- name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.
  6. Compliance with Standards, Codes and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
  7. Visual Matching:
    - a. Where Specifications require matching an established Sample, the Denver Project Manager's decision will be final on whether a proposed product matches satisfactorily.
    - b. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.
  8. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Project Manager will select the color, pattern, and texture from the product line selected.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

## PART 4 - MEASUREMENT AND PAYMENT (Not Used)

**END OF SECTION 01 60 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section consists of providing storage and protection of the materials, products and supplies which are to be incorporated into the construction and indicating such storage areas on the working drawings with the location and dates when such areas will be available for each purpose.
- B. Reference General Contract Conditions Article 803 "Protection of Property and Work in Progress".

**1.3 SUBMITTALS**

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for submittal procedures. Submit concurrently with submittals required in Division 01 Section "Layout of Work and Surveys".
- B. Storage Site Plan: Submit working drawings showing locations of storage areas not indicated on the Contract Drawings.
- C. Storage and Protection Methods: Submit descriptions of proposed methods and locations for storing and protecting products.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Materials required for the storage and protection of the items specified shall be durable, weatherproof and either factory finished or painted to present an appearance acceptable to the City. Storage facilities shall be uniform in appearance with similar materials used to the maximum extent possible.

**PART 3 - EXECUTION****3.1 GENERAL REQUIREMENTS OF EXECUTION**

- A. Palletize materials, products and supplies which are to be incorporated into the construction and stored off the ground. Store these items in a manner which will prevent damage and which will facilitate inspection. Leave seals, tags and labels intact and legible. Maintain access to products to allow inspection. Protect products that would be affected by adverse environmental conditions.

- B. Periodically inspect stored products to ensure that products are being stored as stipulated and that they are free from damage and deterioration.
- C. Do not remove items from storage until they are to be incorporated into the Work.
- D. The Contractor shall ensure that all protective wrappings and coverings are secure and ballasted to prevent any items from deterioration and/or subsequent dislodgment. All items on the worksite that are subject to becoming windborne shall be ballasted or anchored.

### 3.2 HANDLING AND TRANSPORTATION

- A. Handling:
  - 1. Avoid bending, scraping or overstressing products. Protect projecting parts by blocking with wood, by providing bracing or by other approved methods.
  - 2. Protect products from soiling and moisture by wrapping or by other approved means.
  - 3. Package small parts in containers such as boxes, crates, or barrels to avoid dispersal and loss. Firmly secure an itemized list and description of contents to each container.
  - 4. Refer to Division 32 Sections related to landscape materials for proper handling and storage of plant material.
- B. Transportation: Conduct the loading, transporting, unloading, and storage of products so that they are kept clean and free from damage.
  - 1. Refer to Division 32 Sections related to landscape materials for proper transportation of plant material.

### 3.3 STORAGE

- A. Store items in a manner that shall prevent damage to the City's property. Do not store hydraulic fluids, gasoline, liquid petroleum, gases, explosives, diesel fuel, and other flammables in excavations, except one day's supply of diesel fuel may be stored in open excavations.
- B. Provide sheltered weather-tight or heated weather-tight storage as required for products subject to weather damage.
- C. Provide blocking, platforms or skids for products subject to damage by contact with the ground.
- D. All material shall be stored according to the manufacturer's recommendations. Any material that has to be stored within specified temperature or humidity ranges shall have a 24-hour continuously written recording made of the applicable condition. Should the recording show that the material was not stored within the recommended ranges the material shall be considered defective and in nonconformance. If a certification from the manufacturer's engineering design representative is provided stating that the actual variations are acceptable and will in no way harm the material or affect warranties, then the deficiency will be considered corrected.
- E. Store hazardous material separately, with all material marked with a label showing the hazard and how to treat exposure to the material.

3.4 LABELS

- A. Storage cabinets and sheds that will contain flammable substances and explosive substances shall be labeled FLAMMABLE--KEEP FIRE AWAY and NO SMOKING with conspicuous lettering and conforming to OSHA requirements.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

The cost of the Work described in this Section shall be included in the Contract price.

**END OF SECTION 01 66 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section includes the procedures and accuracy requirements for survey services for layout of work and field measurement of work quantities to be determined by surveys.
- B. Reference Construction General Contract Conditions Article 318 "Construction Surveys" and Article 319 "Preservation of Permanent Land Survey Control Markers".

**1.3 SUBMITTALS**

- A. Refer to Division 01 Sections "Submittals" and "Shop and Working Drawings, Product Data, and Samples" for the submittal process.
- B. Field Notes: Submit Copies of original pages of field notes.
- C. Closeout Submittals:
  - 1. Original field notebooks when filled and at end of contract.
  - 2. As-built measurements.

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION****3.1 CONSTRUCTION LINES AND GRADES**

- A. The Contractor shall make surveys and layouts as necessary to delineate the work. The Contractor shall make the surveys for the proper performance of the Work. As a part of such surveys, the Contractor shall furnish, establish, and maintain in good order survey control points that may be required for the completion of the Work subject to the approval of the Project Manager as to their location, sufficiency, and adequacy. However, such approval by the Project Manager shall not relieve the Contractor of his responsibility for the accuracy of his survey work.
- B. The Contractor shall furnish skilled labor, instrument platforms, ladders, and such other temporary structures as may be necessary for making and maintaining points and lines in connection with the surveys required.

- C. The City may draw the Contractor's attention to errors or omissions in lines or grades, but the failure to point out such errors or omissions shall not give the Contractor any right or claim nor shall in any way relieve the Contractor of his obligations according to the terms of this contract.
- D. The Contractor's instruments and other survey equipment shall be accurate, suitable for the surveys required in accordance with recognized professional standards and in proper condition and adjustment at all times. Surveys shall be performed under the direct supervision of a Colorado licensed surveyor.

3.2 SURVEYING ACCURACY AND TOLERANCES IN SETTING SURVEY, LAYOUT, AND QUANTITY CALCULATION STAKES

- A. The tolerances generally applicable in setting survey stakes shall be as set forth in the CDOT Survey Manual, latest edition. Such tolerances shall not supersede stricter tolerances required by the drawings or specifications, and shall not otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

3.3 AS-BUILT MEASUREMENTS

- A. As-built measurement for items that will be hidden or visible including all civil, mechanical and electrical, control work, and all utilities that are placed in concrete, earth, or behind walls shall be made.
- B. Items located within or five feet beyond a building shall be referenced to building column lines and finish floor elevations.
- C. Special attention shall be paid to items requiring service, sensors, items with moving parts, access points and locations of junctions, elevation changes, and directional changes.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 71 23**

## SECTION 01 74 19

### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements, if applicable:
  - 1. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
  - 2. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

##### 1.03 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

## 1.04 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 15 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:

- a. Asphalt paving.
- b. Concrete.
- c. Concrete reinforcing steel.
- d. Terra cotta/plaster walls.
- e. Structural and miscellaneous steel.
- f. Rough hardware.
- g. Insulation.
- h. Doors and frames.
- i. Door hardware.
- j. Windows.
- k. Glazing.
- l. Gypsum board.
- m. Equipment.
- n. Cabinets.
- o. Piping.
- p. Supports and hangers.
- q. Valves.
- r. Mechanical equipment.
- s. Refrigerants.
- t. Electrical conduit.
- u. Copper wiring.
- v. Lighting fixtures.
- w. Lamps.
- x. Ballasts.
- y. Electrical devices.

2. Construction Waste:

- a. Lumber.
- b. Wood sheet materials.
- c. Metals.
- d. Insulation.
- e. Carpet.
- f. Metal studs.
- g. Gypsum board.
- h. Piping.
- i. Electrical conduit.
- j. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:



- 1) Paper.
- 2) Cardboard.
- 3) Boxes.
- 4) Plastic sheet and film.
- 5) Polystyrene packaging.
- 6) Wood crates.
- 7) Plastic pails.

#### **1.05 ACTION SUBMITTALS**

- A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

#### **1.06 INFORMATIONAL SUBMITTALS**

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
1. Material category.
  2. Generation point of waste.
  3. Total quantity of waste in tons.
  4. Quantity of waste salvaged, both estimated and actual in tons.
  5. Quantity of waste recycled, both estimated and actual in tons.
  6. Total quantity of waste recovered (salvaged plus recycled) in tons.
  7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. LEED Submittal: (Not applicable)
- H. Qualification Data: For refrigerant recovery technician.

- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

## **1.07 QUALITY ASSURANCE**

- A. Waste Management Coordinator Qualifications: General Contractor with a record of successful waste management coordination of projects with similar requirements.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
  1. Disposal Procedures:
    - a. Location: Denver Arapahoe Disposal Site – DADS. All debris must be disposed of at this location.
    - b. Removal and Hauling: All Debris removal and hauling cost shall be part of base bid.
    - c. The Owner will set up an account with DADS that will cover the dump volumes cost only. All other fees to be included in base bid by General Contractor.
- D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Technical Specification Section 012000 "Project Meetings." Meeting shall include contractors affected by the Waste Management Plan. Review methods and procedures related to waste management including, but not limited to, the following:
  1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
  2. Review requirements for documenting quantities of each type of waste and its disposition.
  3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  5. Review waste management requirements for each trade.

## **1.08 WASTE MANAGEMENT PLAN**

- A. General: Develop plan consisting of waste identification. Include separate sections in plan to distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: (Not applicable)

- D. Cost/Revenue Analysis: (Not applicable)

## **PART 2 - PRODUCTS (Not Used)**

## **PART 3 - EXECUTION**

### **3.01 PLAN IMPLEMENTATION**

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. General Contractor's Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on appropriate separation, handling, and recycling to be used by all parties and proper waste management procedures, as appropriate for the Work occurring at Project site.
  - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  - 2. Comply with Technical Specification Section 01500 "Temporary Facilities" for controlling dust and dirt, environmental protection, and noise control.
- E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches or more.

### **3.02 SALVAGING DEMOLITION WASTE**

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  - 3. Store items in a secure area until installation.
  - 4. Protect items from damage during transport and storage.

5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: (Not applicable)
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Lighting Fixtures: Separate lamps by type and protect from breakage.
- F. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

**3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL**

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

C. RECYCLING RECEIVERS AND PROCESSORS				
D. CO Resource E. Management	F. 400 Marriel Avenue G. Carbondale, CO 81623	H. (970) 963-8900	I. George MacDonald	
J. Oxford Recycling	K. 2400 W. Oxford Avenue L. Englewood, CO 80110	M. (303) 762-1160	N. John Kent	
O. Allied Waste	P. 10303 E. Dry Creek Rd #250 Q. Englewood, CO 80112	R. (720) 895-1500	S. Bill Kich	
T. Waste-Not	U. 1065 Poplar Street V. Loveland, CO 80534	W. (970) 669-9912	X. Gary Gettman	
Y. Bunting Disposal	Z. 3315 State Street	BB. (970) 339-	CC. Bryan Bunting	

			AA. Evans, CO 80620	3023	
DD. Phoenix Recycling			EE. 2501 Delwood Avenue FF. Durango, CO 81301	GG. (970) 375- 1300	HH. Mark Thompson
II. Waste Chasers			JJ. 19 Oak Avenue KK. Eaton, CO 80615	LL. (970) 454- 2497	MM. Jason Hawk
NN. Colorado Waste	All		OO. 7247 E. County Rd PP. Longmont, CO 80504	QQ. (303) 702- 9955	RR. Majori McDonald
SS. Patch Construction			TT. 12655 State Hwy 67 UU. Florence, CO 81226	VV. (719) 784- 6236	WW. David Patch Jr.
XX. Pueblo Disposal			YY. 28900 E. Hwy 96 ZZ. Pueblo, CO 81001	AAA. (719) 948- 0047	BBB.
CCC. Construction Endeavors			DDD. 2255 E. Las Vegas Rd EEE. Colorado Springs, CO	FFF. (303) 375- 0785	GGG.

HHH. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

III. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

- a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

### **3.04 RECYCLING DEMOLITION WASTE**

- A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
  1. Pulverize concrete to maximum 4-inch size.
- C. Masonry (Terra Cotta): Remove anchors and ties from masonry and sort with other metals.
  1. Pulverize masonry to maximum 4-inch size.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, panel products, and treated wood materials.
- E. Metals: Separate metals by type.
  1. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- G. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- H. Conduit: Reduce conduit to straight lengths and store by type and size.

### **3.05 RECYCLING CONSTRUCTION WASTE**

- A. Packaging:
  1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  2. Polystyrene Packaging: Separate and bag materials.
  3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

- B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
  - 1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.
- C. Wood Materials:
  - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
    - a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.
- D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
  - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

### **3.06 DISPOSAL OF WASTE**

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them at the Denver Arapahoe Disposal Site (DADS).
  - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.
- D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. The Work specified in this section consists of maintaining a clean, orderly, hazard free worksite during construction, and final cleaning for the City's Final Acceptance. Failure to maintain the worksite will be grounds for withholding monthly payments until corrected to the satisfaction of the Denver Project Manager.
- B. Reference General Contract Conditions as listed:
  - 1. Article 325 "Cleanup during Construction".
  - 2. Article 803 "Protection of Property and Work in Progress".
  - 3. Article 2001 "Cleanup upon Completion".

## 1.3 JOB CONDITIONS

- A. Safety Requirements: Maintain the worksite in a neat, orderly and hazard-free manner in conformance with all federal, state and local rules, codes, regulations and orders, including all OSHA requirements, until Final Acceptance of the Work. Keep catwalks, underground structures, worksite walks, sidewalks, roadways and streets, along with public and private walkways adjacent to the worksite, free from hazards caused by construction activities.
  - 1. Inspect those facilities regularly for hazardous conditions caused by construction activities.
- B. Hazards Control:
  - 1. Store volatile wastes in covered metal containers and remove those wastes from worksite daily.
  - 2. Do not accumulate wastes which create hazardous conditions.
  - 3. If volatile and noxious substances are being used in spaces that are not naturally ventilated, provide artificial ventilation.
  - 4. Hazard controls shall conform to the applicable federal, state, and local rules and regulations.
  - 5. Provide appropriate waste receptacles in all areas in which employees are working. Waste receptacles shall be kept covered at all times. All materials on site shall be anchored and covered to prevent any objects from becoming wind-borne.
- C. Access: Maintain the worksite to permit access by other City contractors as required and to allow access by emergency personnel.



## PART 2 - PRODUCTS

### 2.1 CLEANING MATERIALS

- A. Utilize the type of cleaning materials recommended by the manufacturer for the surfaces to be cleaned.
- B. Maintain current Material Safety Data Sheets (MSDS) on site for all chemicals.
- C. Ensure proper disposal of all wastes generated from the use of these materials. Must ensure compliance with all environmental regulations.

## PART 3 - EXECUTION

### 3.1 INTERIM CLEANING

- A. Clean the worksite every shift/workday for the duration of the construction contract. Maintain structures, grounds, storage areas, and other areas of worksite, including public and private properties immediately adjacent to worksite, free from accumulations of waste materials caused by construction operations. Place waste materials in covered metal containers. All hard concrete, steel, wood, and finished walking surfaces shall be swept clean daily.
- B. Remove or secure loose material on open decks and on other exposed surfaces at the end of each workday or more often in a manner that will maintain the worksite hazard free. Secure material in a manner that will prevent dislodgment by wind and other forces.
- C. Sprinkle waste materials with water or acceptable chemical palliative to prevent blowing of dust.
- D. Promptly empty waste containers when they become full and legally dispose of the contents at dumping areas off the City's property.
- E. Control the handling of waste materials. Do not permit materials to be dropped or thrown from structures.
- F. Immediately remove spillage of construction related materials from haul routes, work site, private property, or public rights of way.
- G. Clean only when dust and other contaminants will not precipitate upon newly painted surfaces.
- H. Cleaning shall be done in accordance with manufacturer's recommendation.
- I. Cleaning shall be done in a manner and using such materials as to not damage the Work.
- J. Clean areas prior to painting or applying adhesive.
- K. Clean all heating and cooling systems prior to operations. If the Contractor was allowed to use the heating and cooling system it shall be cleaned prior to testing.
- L. Clean all areas that will be concealed prior to concealment.

### 3.2 FINAL CLEANING

- A. Inspect interior and exterior surfaces, including concealed spaces, in preparation for completion and acceptance.
- B. Remove dirt, dust, litter, corrosion, solvents, paint, stains, and extraneous markings.
- C. Remove surplus materials, except those materials intended for maintenance.
- D. Remove all tools, appliances, equipment, and temporary facilities used in the construction.
- E. Remove detachable labels and tags. File them with the manufacturer's specifications for that specific material for the City's records.
- F. Repair damaged materials to the specified finish or remove and replace.
- G. Clean all catch basins, manholes, drains, strainers, and filters after all trades have completed their work and just before Final Acceptance
- H. Sweep roadway, driveways, floors, steps, and walks.
- I. Interior areas of buildings shall be vacuumed clean and mopped.
- J. Final cleanup applies to all areas within and adjacent to the site.

### PART 4 - MEASUREMENT AND PAYMENT

#### 4.1 MEASUREMENT

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

#### 4.2 PAYMENT

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

**END OF SECTION 01 74 23**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Work specified in this Section includes procedures required for Substantial Completion under Title 19 and Final Completion and Acceptance of the Work under Title 20 of the General Contract Conditions and Division 01 Section "Contract Record Documents".
- B. Reference General Contract Conditions as listed:
  - 1. Article 906 "Applications for Payment".
  - 2. Article 909 "Additional Withholding of Progress Payments".
  - 3. Article 2003 "Final Settlement".

**1.3 PREPARATION FOR FINAL INSPECTION**

- A. Before requesting inspection for Final Acceptance of the Work by the City, inspect, clean, and repair the Work as required.

**1.4 FINAL INSPECTION**

- A. When the Contractor considers that the Work is complete, he shall submit written certification that:
  - 1. All punch list items have been completed.
  - 2. All clean up at the project site has been accomplished.
  - 3. Work has been inspected by the Contractor for compliance with contract documents.
  - 4. Work has been completed in accordance with contract documents.
  - 5. Work is ready for final inspection by the City.
  - 6. All as-built required documents have been submitted and accepted.
  - 7. All damaged or destroyed real, personal, public or private property has been repaired or replaced.
  - 8. All operation and maintenance manuals have been submitted and accepted and all training has been completed.
- B. The Project Manager will inspect to verify the status of completion with reasonable promptness after receipt of such certifications. The inspection of the work will be done in accordance with the General Conditions.
- C. If the Project Manager finds incomplete or defective work:
  - 1. The Project Manager may, at his sole discretion, either terminate the inspection or prepare a punch list and notify the Contractor in writing, listing incomplete or defective work.
  - 2. The Contractor shall take immediate steps to remedy stated deficiencies and send a second written certification to the Project Manager that Work is complete.
  - 3. The Project Manager will then re-inspect the Work.

CONTRACT CLOSEOUT

#### 1.5 REINSPECTION FEES

- A. Should the Project Manager perform re-inspection due to failure of the Work to comply with the claims of status of completion made by the Contractor:
  - 1. The Contractor shall compensate the City for such additional services at the rate of seventy-five dollars (\$75.00) per man-hour.
  - 2. The City shall deduct the amount of such compensation from the final payment to the Contractor.

#### 1.6 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a Final Statement of Accounting to the Denver Project Manager.
- B. The Final Statement of Accounting shall reflect all adjustments to the contract amount and shall include the following:
  - 1. The original contract amount.
  - 2. Additions and deductions resulting from:
    - a. Previous change orders.
    - b. Allowances.
    - c. Final quantities for unit price items. Along with this statement shall be detailed backup for the quantities.
    - d. Deductions or corrected work.
    - e. Penalties.
    - f. Deductions for liquidated damages.
    - g. Deductions for re-inspection payments.
    - h. City resurveys required due to the Contractor.
    - i. Other adjustments.
  - 3. Total contract amount, as adjusted.
  - 4. Previous payments.
  - 5. Sum remaining due.
- C. If required, the Project Manager will prepare a final change order, reflecting approved adjustments to the Contract sum which were not previously made by change orders.

#### 1.7 FINAL APPLICATION FOR PAYMENT

- A. The Contractor shall submit the final application for payment in accordance with the procedures and requirements stated in the General Conditions Title 20 "Final Completion and Acceptance of the Work".

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 77 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section consists of preparing and submitting operation and maintenance data for mechanical, electrical and other specified equipment.

**1.3 SUBMITTALS**

- A. Refer to Division 01 Sections “Submittals” and “Shop and Working Drawings, Product Data, and Samples” for submittal procedures.
- B. Submit one (1) electronic copy and two (2) bound hard copy of the proposed Operation and Maintenance Data Manual format including a table of contents not less than ninety (90) days prior to acceptance tests and final inspection.
- C. Submit one (1) electronic copy and two (2) bound hard copy of Operation and Maintenance Data Manual within ten days after system startup is complete. These copies shall incorporate any comments made on the previous submittals, along with final readings on all settings and gauges taken while the system is in fully satisfactory operation.

**1.4 CONTINUOUS UPDATING PROGRAM**

- A. Furnish one electronic copy of the Contractor’s letter indicating that suppliers have been notified to provide updated operation and maintenance data, service bulletins, and other information pertinent to the equipment, as it becomes available.

**PART 2 - PRODUCTS**

- A. The following are the requirements of hard copies:
  - 1. Paper Size: 8-1/2-inches x 11-inches.
  - 2. Paper: White bond, at least 20 pound weight.
  - 3. Text: Typewritten.
  - 4. Printed Data: Manufacturer’s catalog cuts, brochures, operation and maintenance data. Clear reproductions thereof will be acceptable. If this data is in color, all final manuals must contain color data.
  - 5. Drawings: 8-1/2-inches x 11-inches, bound with the text. Larger drawings are acceptable provided they are folded to fit into a pocket inside the rear cover of the manual. Reinforce edges of large drawings.
  - 6. Prints of Drawings: Black ink on white paper, sharp in detail, and suitable for making reproductions.

7. Flysheets: Separate each portion of the manual with colored, neatly prepared flysheets briefly describing the contents of the ensuing portion.
8. Covers: Provide 40- to 50-mil, clear plastic, front and plain back covers for each manual. The front covers shall contain the information required in Article 3.2 below.
9. Bindings: Conceal the binding mechanism inside the manual; lockable 3 ring binders shall be provided.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Assemble each operation and maintenance manual using the manufacturer's latest standard commercial data.

### 3.2 COVER

- A. Include the following information on the front cover and on the inside cover sheet:
  1. Title: "Operation and Maintenance Instructions".
  2. Title of structure or facility.
  3. Title and number of contract.
  4. Contractor's name and address.
  5. General subject of the manual.
  6. Leave spaces for signatures of the City representatives and acceptance date.

### 3.3 CONTENTS OF THE MANUAL

- A. An index of all volumes in each volume of multiple volume systems.
- B. An index in front of each volume. List and combine the literature for each system in the sequence of operation.
- C. Names, addresses, and telephone numbers of Contractor, suppliers, and installers along with the manufacturer's order number and description of the order.
- D. Name, address, and telephone numbers of manufacturer's nearest service representatives.
- E. Name, address, and telephone number of nearest parts vendor and service agency.
- F. Copy of guaranties and warranties issued to, and executed in the name of, the City.
- G. Anticipated date City assumes responsibility for maintenance.
- H. Description of system and component parts including theory of operation.
- I. Pre-operation check or inspection list.
- J. Procedures for starting, operating and stopping equipment.
- K. Post operation check or shutdown list.
- L. Inspection and adjustment procedures.

## OPERATION AND MAINTENANCE DATA



- M. Troubleshooting and fault isolation procedures for on-site level of repair.
- N. Emergency operating instructions.
- O. Accepted test data.
- P. Maintenance schedules and procedures.
- Q. Test procedures to verify the adequacy of repairs.
- R. One copy of each wiring diagram.
- S. One copy of each piping diagram.
- T. Location where all measurements are to be made.
- U. One copy of each duct diagram.
- V. One copy of control diagram.
- W. One copy of each accepted shop drawing.
- X. One copy of software programs imputable or changeable on site.
- Y. Manufacturer's parts list with catalog names, numbers and illustrations.
- Z. A list of components which are replaceable by the City.
- AA. An exploded view of each piece of the equipment with part designations.
- BB. List of manufacturer's recommended spare parts, current prices and recommended quantities for two years of operation.
- CC. List of special tools and test equipment required for the operation, maintenance, adjustment, testing and repair of the equipment, instruments and components.
- DD. Scale and corrosion control procedures.
- EE. Disassembly and re-assembly instructions.
- FF. Troubleshooting and repair instructions.
- GG. Calibration procedures.
- HH. Ordering information.
- II. Training course material used to train City staff, including slides and other presentation material.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 78 23**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section consists of preparing and submitting warranties and bonds required by these specifications.
  
- A. Reference the General Contract Conditions as listed:
  - 1. Article 111 "Final Completion".
  - 2. Article 1501 "Surety Bonds".
  - 3. Article 1502 "Performance Bond".
  - 4. Article 1503 "Payment Bond".
  - 5. Article 1801 "Contractor's Warranties, Guarantees, and Correction of Work".
  - 6. Article 1802 "Performance During Warranty Period".

**1.3 SUBMITTALS**

- A. Refer to Division 01 Section "Submittals" for submittal procedures.
  
- B. Submit executed warranties and bonds.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 WARRANTIES AND BONDS**

- A. Execute the warranties and bonds required by the Contract Documents. Prepare and submit a list of all warranties and bonds on the form provided by the City. Reference Division 01 Section "Standard Forms".
  
- B. Provide warranties or bonds for the materials, labor, and time period set forth in the sections of these specifications requiring such documents. All warranties shall be in accordance with the General Contract Conditions. Refer to the individual specifications sections for all specific items requiring longer warranty periods.
  
- C. Provide all warranties and bonds that the manufacturer or supplier furnishes at no additional cost in regular commercial trade. All warranties shall be in accordance with the General Contract Conditions. Refer to the individual specifications sections for all specific items requiring longer warranty periods.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

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

4.2 PAYMENT

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

**END OF SECTION 01 78 35**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work specified in this Section consists of maintaining, marking, recording, and submitting contract record documents which include shop drawings, warranties, contract documents, and Contractor records.
- B. Reference General Contract Conditions Article 324 "Documents and Samples at the Site" and Division 32 Section "Irrigation Systems".

**1.3 SUBMITTALS**

- A. Each submittal of record documents shall contain the following information:
  - 1. Date.
  - 2. Project title and numbers.
  - 3. Contractor's name and address.
  - 4. Title and number of each record document.
  - 5. Certification that each document as submitted is complete and accurate.
  - 6. Signature of the Contractor or his authorized representative.
- B. At the completion of this contract, deliver all record documents including the following:
  - 1. As-built shop drawings, diagrams, illustrations, schedules, charts, brochures and other similar data.
  - 2. Warranties, guarantees, and bonds.
  - 3. Contract documents.
  - 4. Contractor records.

**1.4 QUALITY CONTROL**

- A. Record documents shall be prepared to a high standard of quality, such as that set forth in MIL STD 100, American National Standard Drafting Manual (ANSI Y14), or other relevant lower tier specification defining equal drafting quality for microfilming, except for daily reports.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 MAINTENANCE OF DOCUMENTS

- A. The Contractor shall maintain at the worksite on a current basis one record copy of all drawings, specifications, addenda, change orders, approved shop drawings, working drawings, product data, and samples in good order and marked currently to record all changes made during construction.
  
- B. Maintain at the field office one copy of the following record documents:
  - 1. Contract Documents:
    - a. Contract drawings with all clarifications, requests for information, directives, changes and as-built conditions clearly posted.
    - b. Contract specifications with all clarifications, requests for information, changes, directives and record of manufacturer actually used along with product trade name.
    - c. Reference Standards in accordance with Division 01 Section "Definitions and Conventions".
    - d. One set of drawings to record the following:
      - 1) Horizontal and vertical location of underground utilities affected by the Work.
      - 2) Location of internal utilities; include valves, controls, conduit, duct work, switches, pressure reducers, size reducers, transitions, crosses, tees, filters, motors, heaters, dampers, regulators, safety devices, sensors, access doors, and appurtenances that are concealed in the construction shall be shown with dimensions given from a visible and recognizable reference to the item being located in all three dimensions. The drawing shall also reference the applicable submittal for the item being located.
      - 3) Field changes of dimensions and details including as-built elevations and location (station and offset).
      - 4) Details not on original contract drawings but obtained through requests for information or by other communications with the City.
  - 2. Contractor Records:
    - a. Daily QC Reports.
    - b. Certificates of compliance for materials used in construction.
    - c. Nonconformance Reports (NCRs).
    - d. Remedial Action Requests (RARs).
    - e. Completed inspection list.
    - f. Inspection and test reports.
    - g. Test procedures.
    - h. Qualification of personnel.
    - i. Approved submittals.
    - j. Material and equipment storage records.
    - k. Safety Plan.
    - l. Erosion, sediment, hazardous and quality plans.
    - m. Hazardous material records.
    - n. First report of injuries.

### 3.2 RECORDING

- A. Keep record documents current daily.
- B. Legibly mark copies of the contract drawings to record actual construction.
- C. Legibly mark up each Section of the technical specifications and contract drawings to record:
  - 1. Changes made by change orders, requests for information, substitutions, and variations approved by submittals.

### 3.3 DOCUMENT MAINTENANCE

- A. Maintain Documents in a clean, dry and legible condition, which shall be turned over to the City prior to final acceptance.
- B. Do not use record documents for construction purposes.
- C. Make documents available for inspection by the Project Manager and any others having jurisdiction.

### 3.4 REVIEW

- A. Project Manager or their designated representative will inspect the as-built drawings at each weekly progress meeting to ensure that they are being maintained and contain the most current data.
- B. Prior to any application for payment, the Project Manager or his designated representative will inspect the record documents to ensure that they are being maintained and contain the most current correct data with particular attention to as-built drawings.
- C. If, during the inspection, the Project Manager determines that the documents are not being maintained and kept current as to as-built conditions, an amount may be withheld from the payment request and deducted from the contract value to cover the City's cost of collecting and recording the as-built contract data. This cost will be determined on the basis of seventy-five dollars (\$75.00) per man-hour of effort.

### 3.5 IRRIGATION AS BUILTS

- A. Refer to specification 32 80 00 Irrigation Systems section 1.5.G

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

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

### 4.2 PAYMENT

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

**END OF SECTION 01 78 39**



**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section of the Work includes demolition of existing fence around tennis courts as outlined on plans, removal of pavement in between north and south courts as outlined on plan. The Work also includes incidental filling and grading, and disposal of unsalvageable materials.
- B. Related Sections:
  - 1. Division 01 Section "Temporary Facilities and Controls".
  - 2. Division 01 Section "Erosion and Sedimentation Control".
  - 3. Division 01 Section "Tree Protection and Retention".
  - 4. Division 31 Section "Earth Moving".

**1.3 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Denver Parks.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

**1.4 QUALITY CONTROL**

- A. Comply with safety requirements for demolition, ANSI A10.6-83.

**1.5 PROJECT CONDITIONS**

- A. Keep dust to a minimum at removal areas. Use water trucks as necessary.
- B. Ensure safety of persons in demolition area. Provide temporary barricades as required per Division 01 Section "Temporary Facilities and Controls".

## 1.6 PRE-CONSTRUCTION MEETINGS

- A. Retain subparagraphs below if additional requirements are necessary; revise as required.
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.
- B. Schedule of Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Denver Parks' on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Denver Parks prior to start of demolition.
- D. Predemolition Photographs or Video: Submit before Work begins.

## 1.8 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

## PART 2 - PRODUCTS

### 2.1 FILL MATERIALS

- A. Native soils, free of debris, frozen materials, roots, and other organic matter. See Division 01 Section "Earth Moving".

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, pavement, trails, utilities, and vegetation to remain.
- B. Set up all barriers, including those for tree protection, in accordance with Division 01 Section "Temporary Facilities and Controls" and Division 01 Section "Tree Protection and Retention", prior to proceeding with any demolition.

### 3.2 DEMOLITION

- A. Pavement, Slabs, and Miscellaneous Concrete Items:
  - 1. Remove concrete slabs-on-grade, curbs, and miscellaneous concrete items as directed. Where concrete to be removed abuts concrete to remain, pavement shall be uniformly saw-cut along an existing joint. Jagged or crooked edges will not be acceptable. Concrete shall be broken up, hauled and disposed off site. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Denver Project Manager.
  - 2. Remove asphalt paved roads, parking lots, walks, curbs and miscellaneous asphalt as indicated on Drawings. Cuts between pavement to be removed and pavement to remain shall be saw-cut to full depth, straight, smooth and clean with no jagged edges. Asphalt shall be broken up, hauled and disposed off site. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Denver Project Manager.
  - 3. Remove concrete pipe sections and miscellaneous concrete items as directed.
    - a. Where concrete pipe is to be removed it shall be uniformly saw-cut along an existing joint or disassembled at the joints. Jagged or crooked edges will not be acceptable. Concrete shall be broken up, hauled and disposed off site. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Denver Project Manager.
    - b. When Asbestos Concrete Pipe (ACP) is determined or suspected to be present the Contractor will need to hand dig the pipe sections to be removed. Any ACP sections will need to remain intact. The use of mechanical trenching equipment within 18-inches of any known or suspected ACP will not be permitted. Once the section that is to be removed has been excavated, an abatement contractor will remove the sections of the pipe that are to be replaced or removed and the pipe shall be flush cut. The Contractor is responsible for notifying the Denver Project Manager of any ACP that needs to be removed 48-hours prior to excavation of the area. If ACP is excavated that has not be previously identified the Contractor is responsible to contact the Denver Project Manager either verbally or by email immediately upon discovery. Any ACP that is discovered to be damaged must be immediately reported to the Denver Project Manager. The Denver Project Manager will then notify the Abatement Contractor of the work that needs to be performed. The Abatement Contractor has 24-hours to respond and remove the ACP section(s).

4. Remove road base material that is exposed after removing the pavement. This material shall be hauled and disposed off site unless otherwise directed by the Denver Project Manager. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Denver Project Manager.

B. Abandoned Utilities: Remove aboveground utilities and terminate as approved by the utility company and the Denver Project Manager. Remove necessary portions of underground utilities to a minimum of 24-inches below the elevation of excavation or final grade. Cap off conduits with minimum 24-inch long concrete plugs.

C. Tree Removal: Remove tree and stump as indicated on demolition plans. Do not bury stump or any portion of tree. The removed tree shall be hauled and disposed off site.

### 3.3 RESTORATION

A. Backfilling: Ensure that areas to be filled are free of standing water, frost, frozen material, vegetation, including roots and debris. Place fill materials in accordance with Division 31 Section "Earth Moving".

B. Grading:

1. Restored Areas: Grade surface to blend with original contours and provide free drainage flow. All ruts and depressions where any amount of standing water collects shall be re-graded to a smooth natural appearance to ensure positive drainage.
2. New Construction Areas: Grade as indicated in Division 31 Section "Earth Moving".

### 3.4 DISPOSAL

A. Remove trash, debris and waste materials, haul and legally dispose of it off the property. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS Disposal tickets shall be provided to the Contractor by Denver Project Manager.

B. Salvaged Material: All salvaged material remains the property of the City. Store or deliver as directed by the Denver Project Manager.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. Measurement will be based on the percentage complete for the lump sum contract amount for demolition.

### 4.2 PAYMENT

A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work. It shall include sawing or otherwise effectively cutting the existing paving, curb and gutter or concrete pipe smoothly and squarely in a manner satisfactory to the Denver Project Manager. Will also include the removal and offsite disposal of all materials including

all materials and any base course deemed unsuitable by the Denver Project Manager. All recyclable materials shall be hauled to the nearest recycling center and any non-recyclable materials shall be hauled to DADS. DADS disposal tickets shall be provided to the Contractor by the Denver Project Manager. No payment will be made for the removal and/or replacement of any paving, curb and gutter or pipe sections damaged by the Contractor beyond the authorized limits of removal.

**END OF SECTION 02 41 00**

## SECTION 033000 - CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Slabs-on-grade.
  - 3. Miscellaneous concrete.
- B. Related Sections include the following:
  - 1. Division 03 "Unbonded Post-Tensioned Concrete Slab on Grade"

## 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

## 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

- D. Welding certificates.
- E. Qualification Data: Upon request for Installer manufacturer and testing agency.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- G. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Steel reinforcement and accessories.
  - 4. Curing compounds.
  - 5. Vapor barriers.
  - 6. Joint-filler strips.
- H. Field quality-control test and inspection reports.
- I. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code-- Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete subcontractor.
  - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction isolation joints, vapor-retarder installation, steel reinforcement installation, and concrete protection.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.



- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

- 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

## 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, galvanized.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

## 2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, See Concrete Mix Matrix for type.
    - a. Fly Ash: ASTM C 618, Class F.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
- D. Water: ASTM C 94/C 94M.

## 2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Accelerating Admixture: ASTM C 494/C 494M, Type C
  - 4. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

## 2.6 VAPOR BARRIERS

- A. Plastic Vapor Barriers: meeting ASTM E 1745, Class A, 10 mil. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Vapor barrier shall have a perm rating of less than or equal to 0.01 that also meets or exceeds the flooring system including the adhesive.
- C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

- G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

## 2.8 RELATED MATERIALS

- A. Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

## 2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. See Concrete Mix Matrix for requirements.

- 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

- 1. Fly Ash: 25 percent.
  - 2. Combined Fly Ash and Pozzolan: 25 percent.
  - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
  - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
  - 5. Silica Fume: 10 percent.
  - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
  - 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

- D. Admixtures: Use admixtures according to manufacturer's written instructions.

- 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture.

## 2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Do not chamfer exterior corners and edges of permanently exposed concrete.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

### 3.3 VAPOR BARRIERS

- A. Plastic Vapor Barriers: Place, protect, and repair vapor barriers according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Not allowed
- C. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit and consolidate concrete for slabs in a continuous operation.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to surface drain.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- E. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

### 3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

### 3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped

at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.11 POST-INSTALLED ANCHORS

- A. Post-installed anchors shall be installed in conformance with all manufacturer's instructions.
- B. Manufacturer shall provide on-site training for all personnel who will be installing post-installed adhesive anchors at the beginning of the work.
- C. Post installed anchors are not allowed in the post tensioned slab basketball court.

### 3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.



1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  5. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Structural Engineer's approval.

### 3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before stressing post tensioned tendons.

C. Concrete Formwork Inspection:

1. Inspect formwork for size, shape, profile, condition of surfaces and joints and for attachment of accessories and embedded items before concrete is placed.

D. Steel Reinforcement Inspection:

1. Reinforcing shall be inspected prior to placing of concrete. Inspect all reinforcing for conformance with Contract requirements with regard to bar size, grade, placement, splice lengths, clearance from soil or formwork, supports, and attachment of accessories and embedded items. Inspection shall be according to ACI 318 and IBC, chapter 19. Inspect all reinforcing steel that is welded according to AWS D1.4, IBC chapter 10, and ACI 318.
2. Inspect all bolts and embedded items that will be cast into concrete. Verify size, spacing, embedment length, and location according to IBC chapter 19.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
  - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.
  - a. Cast and laboratory cure four standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M;
  - a. One specimen will be tested at 7 days, 2 specimens will be tested at 28 days, and 1 specimen will be retained in reserve for later testing if required.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from the same composite sample and tested at age indicated.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for cast-in-place concrete.

##### 4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

**END OF SECTION 033000**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:

1. Furnishing post-tensioning reinforcement and accessories including encapsulated prestressing tendons, pocket formers, support bars, bar chairs, and slab bolsters.
2. Installing post-tensioning tendons.
3. Performing post-tensioning operations including stressing and finishing tendons.
4. Finishing tendon ends and patching stressing pockets.

- B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete, steel reinforcement, placement of nonprestressed steel reinforcement, and concrete strength testing of laboratory- and field-cured cylinders.
2. See construction documents for mix design.

**1.3 DEFINITIONS**

- A. Strand Tail: Excess strand length extending past the anchorage device.
- B. Stressing Pocket: Void formed by pocket former at stressing-end anchorage to provide required cover over wedges and strand tail.
- C. Wedge Cavity: Cone-shaped hole in anchorage device designed to hold the wedges that anchor the strand.
- D. Coated Strands: Strands that are shop coated and encased in slippage sheathing to prevent bond, to retard corrosion, and to reduce friction.
- E. Tendon: Any single post-tensioning unit used to apply prestress force to the concrete member, usually composed of a strand, slippage sheathing, and anchorages.
- F. Stressing End Anchorage: At least one end of the tendon assembly shall have access such that stressing equipment can pull on the exposed post-tensioning strand. Any end of the tendon that has stressing access is called a stressing end (also called live end).

- G. Fixed End Anchorage: If the length of the tendon cast within the concrete is less than a specified length, then it is not required for there to be access to both ends of the tendon for stressing. The end that does not have stressing access is the fixed end (also called dead end).
- H. Structural Engineer: Structural engineer of record.
- I. Encapsulated System: The components and procedures for installation of the post-tensioning system are designed to provide a watertight encapsulation of the strand and to prevent intrusion of cement paste or loss of coating throughout the entire length of tendon. Specific differences from a non-encapsulated system include, but are not limited to, epoxy-coated anchors, grease caps over all wedge cavities, longer stressing pockets, and prohibition against any exposed strand.

#### 1.4 SYSTEM DESCRIPTION

- A. Provide a post-tensioning system, which is the product of a manufacturer whose complete system has been previously approved by International Conference of Building Officials. Alternate systems shall be submitted in detail with test data, complete description, calculations, design drawings, and other supporting information necessary for evaluation and approval.
- B. Anchorages shall have cable grippers (also called wedges) to allow the force in the strand to be transferred to the anchorage. Stressing end anchorages shall have removable plastic grommets, which shall leave a void to be grouted after stressing.
- C. Post-tensioning tendons shall be fully encapsulated.

#### 1.5 SUBMITTALS

- A. Product Data: For the following upon request by the Structural Engineer:
  - 1. Post-tensioning coating.
  - 2. Tendon sheathing.
  - 3. Anchorage devices.
  - 4. Tendon couplers.
  - 5. Bar and tendon supports.
  - 6. Pocket formers.
  - 7. Sheathing repair tape.
  - 8. Stressing-pocket patching material.
  - 9. Encapsulation system.
- B. Submittal Schedule: Dates of all structural submittals with sufficient detail indicating content of each package. The submittal schedule shall be detailed enough to show each separate package that is submitted. Submittals will not be reviewed until a valid submittal schedule is supplied.
- C. Shop Drawings: Installation drawings including plans, elevations, sections, details, and notes prepared by or under the supervision of a registered professional engineer detailing tendon layout and installation procedures, including the following:

1. Numbers, arrangement, and designation of post-tensioning tendons.
  2. Tendon profiles and method of tendon support including chair heights and locations. Show tendon profiles at sufficient scale to clearly indicate all support points, with their associated heights.
  3. Stressing procedures and jacking force to result in final effective forces used in determining number of tendons required.
  4. Sealed Calculations prepared showing the predicted elongations and final post-tensioning force supplied by all tendons. Loss calculations shall be in accordance with ACI 318 and shall include the effects of friction, wobble, seating loss, elastic shortening, creep, strand relaxation and concrete shrinkage. Tendon quantities shown on shop drawings shall be based on calculated final post-tensioning force unless otherwise noted on the Contract Drawings. Unless noted, the final post-tensioning force shall be based on the average stress along the length of the tendon.
  5. Details for horizontal curvature around openings and at anchorages.
  6. Details for corners and other locations where tendon layouts may conflict with one another or nonprestressed reinforcing steel.
  7. Diagrams and notes as necessary for positioning of nonprestressed reinforcement required for installing post-tensioning tendons including, but not limited to, the following:
    - a. Support bars.
    - b. Backup bars.
    - c. Hairpins at locations of horizontal curvature.
    - d. Supplemental reinforcement at blockouts.
- D. Field Use Shop Drawings: Deliver one copy of field use PT shop drawings to the Structural Engineer no later than one week prior to any post-tensioned concrete pour. The General Contractor shall use these drawings to verify all review comments have been addressed.
- E. Samples for Verification if requested: For the following products:
1. Each anchorage device assembly with a minimum of 24 inches (610 mm) of coated, sheathed strand.
    - a. Include components of encapsulation system.
- F. Product Certificates:
1. For each type of anchorage device and coupler, signed by product manufacturer.
  2. For each type of encapsulation system, signed by product manufacturer.
- G. Qualification Data: For Installer, manufacturer and testing agency upon request. Include resume of individual supervising installation and stressing of post-tensioning tendons. Onsite Supervision and stressing operations should be provided by personnel certified under either the level 2 or the slab-on-ground installer/stressor programs.
- H. Mill Test Reports: Submit upon request: Certified mill test reports for prestressing strand used on Project indicating that strand is low-relaxation and including the following:
1. Coil numbers or identification.
  2. Breaking load.
  3. Load at 1 percent extension.

4. Elongation at failure.
  5. Modulus of elasticity.
  6. Diameter and net area of strand.
- I. Procedures Statement: Procedures for cutting excess strand tail and patching stressing pocket.
1. Stressing force and required gage pressure.
  2. Maximum temporary stressing force.
  3. Certified ram calibrations and method of ram identification. Non-calibrated ram and pump combination shall not be used on the job.
  4. Furnish method of burning off tendon tails after anchorage.
- J. Stressing Jack Calibration: Calibration certificates for jacks and gages to be used on Project. Calibrate each jack-and-gage set as a pair.
- K. Stressing Records: Filled out by testing agency during stressing operation with the following information recorded:
1. Name of Project.
  2. Date of approved installation drawings used for installation and stressing.
  3. Date of stressing operation.
  4. Weather conditions including temperature and rainfall.
  5. Name and signature of inspector.
  6. Name of individual in charge of stressing operation.
  7. Serial or identification numbers of jack and gage.
  8. Date of jack-and-gage calibration certificates.
  9. Gage pressure to achieve required stressing force per supplied calibration chart.
  10. Tendon identification mark.
  11. Predicted tendon elongation.
  12. Actual tendon elongation.
  13. Actual gage pressure.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer whose full-time Project superintendent has successfully completed PTI's Level 1 - Field Fundamentals course or has equivalent verifiable experience and knowledge acceptable to Structural Engineer.
1. Superintendent must have received training from post-tensioning supplier in the operation of stressing equipment to be used on Project.
- B. Manufacturer Qualifications: Fabricating plant certified by PTI according to procedures set forth in PTI's "Manual for Certification of Plants Producing Unbonded Single Strand Tendons."
- C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Testing Agency Inspector: Personnel performing field inspections and measuring elongations shall have successfully completed PTI's Level 2 – Unbonded PT Inspector Program or shall have equivalent qualifications acceptable to Structural Engineer.
- D. Source Limitations: Obtain post-tensioning materials and equipment from the same supplier.
1. Stressing jacks not provided by post-tensioning supplier must be calibrated and approved for use on Project by post-tensioning supplier.
- E. ACI Publications: Comply with ACI 423.6, "Specification for Unbonded Single Strand Tendons," unless otherwise indicated in the Contract Documents.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19 Project Meetings. Review methods and procedures related to installation and stressing of post-tensioning tendons including, but not limited to, the following:
1. Construction schedule and availability of materials, personnel, and equipment needed to make progress and avoid delays.
  2. Storage of post-tensioning materials on-site.
  3. Structural load limitations.
  4. Coordination of post-tensioning installation drawings and nonprestressed reinforcing steel placing drawings.
  5. Horizontal and vertical tolerances on tendon and non-prestressed reinforcement placement.
  6. Post-tensioning installer's duties during concrete pour.
  7. Marking and measuring of elongations.
  8. Submittal of stressing records and requirements for tendon finishing.
  9. Removal of formwork.
  10. Parties required to attend, but are not limited to:
    - a. Contractor's superintendent
    - b. Post-tensioning installer
    - c. Architect
    - d. Architect's consulting structural engineer
    - e. Denver Project Manager.
  11. Contractor shall distribute written minutes of the pre-installation conference to all parties in attendance.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle post-tensioning materials according to PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."
- B. Inspect tendons and accessory items at time of their delivery to Project site, prior to off-loading. Notify post-tensioning supplier of observed damage prior to off-loading.
- C. Keep accurate and current records of materials delivered and used.
- D. Immediately remove from Project site any tendons with damaged strand.



## 1.8 COORDINATION

### A. Attachments and Penetrations:

1. Attach permanent fixtures to the slab using embedded anchors. Drilled anchors are not allowed unless authorized in writing by Structural Engineer.
2. Power-driven fasteners are not allowed unless authorized in writing by Structural Engineer.
3. Core drilling for sleeves or other penetrations is not allowed unless authorized in writing by Structural Engineer.
4. Protect penetrations within 18 inches of an anchorage with ASTM A 53/A 53M, Schedule 40 steel pipe.

### B. Penetrations:

1. All proposed penetrations through the post-tensioned slab shall be submitted to the Engineer for approval a minimum of 6 weeks prior to the concrete placement. Submittals shall include the actual opening diameter and location.
2. Core drilling for sleeves or other penetrations is not allowed unless authorized in writing by Engineer.

### C. Stressing Access:

1. A minimum access space of 3 feet and 7 inches measured perpendicular to the stressing edge of any member shall be kept clear of construction material, equipment, or other constructions until stressing operations are completed.

## PART 2 - PRODUCTS

### 2.1 PRESTRESSING TENDONS

- A. Prestressing Strand: ASTM A 416/A 416M, Grade 270, uncoated, 7-wire, low-relaxation, 0.5-inch- diameter strand.
- B. Post-Tensioning Coating: Compound with friction-reducing, moisture-displacing, and corrosion-inhibiting properties specified in ACI 423.6; chemically stable and nonreactive with prestressing steel, nonprestressed reinforcement, sheathing material, and concrete.
1. Minimum Coating Weight: 2.5 lb for 0.5-inch- diameter strand per 100 feet of strand.
  2. Completely fill annular space between strand and sheathing over entire tendon length with post-tensioning coating.
- C. Tendon Sheathing: Comply with ACI 423.6.
1. Minimum Thickness: 0.050 inch for polyethylene or polypropylene with a minimum density of 0.034 lb/cu. in. Continuous over the entire length of tendon to provide watertight encapsulation of strand.

- D. Anchorage Device and Coupler Assembly: Assembly of strand, wedges, and anchorage device or coupler complying with static and fatigue testing requirements in ACI 423.6 and capable of developing 95 percent of actual breaking strength of strand.
  - 1. Anchorage Bearing Stresses: Comply with ACI 423.6 for stresses at transfer load and service load.
  - 2. Fixed-End Anchorage Device Assemblies: Plant fabricated with wedges seated at a load of not less than 80 percent and not more than 85 percent of breaking strength of strand.
- E. Encapsulation System: Watertight encapsulation of prestressing strand consisting of the following:
  - 1. Anchorage: Epoxy coated.
  - 2. Wedge-Cavity Caps: Attached to anchorages with a positive mechanical connection and completely filled with post-tensioning coating.
    - a. Caps for Fixed and Stressing-End Anchorages Devices: Designed to provide watertight encapsulation of wedge cavity. Sized to allow required extension of strand past the wedges.
      - 1) Attach cap for fixed-end anchorage device in fabricating plant.
  - 3. Sleeves: Attached to anchorage device with positive mechanical connection; overlapped a minimum of 4 inches with sheathing and completely filled with post-tensioning coating.

## 2.2 NONPRESTRESSED STEEL BARS

- A. Support Bars, Reinforcing Bars, Hairpins: ASTM A 615/A 615M, Grade 60, deformed. Minimum support bar size is 1/2 inch.
- B. Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening tendons and tendon support bars in place. Manufacture bar supports, according to CRSI's "Manual of Standard Practice," from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
  - 1. For uncoated bars, use all-plastic, CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

## 2.3 ACCESSORIES

- A. Pocket Formers: Capable of completely sealing wedge cavity; sized to provide the required cover over the anchorage and allow access for cutting strand tail.
- B. Anchorage Fasteners: Stainless-steel or Galvanized steel nails, wires, and screws used to attach anchorage devices to formwork.
- C. Sheathing Repair Tape: Elastic, self-adhesive, moistureproof tape with minimum width of 2 inches, in contrasting color to tendon sheathing; nonreactive with sheathing, coating, or prestressing steel.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Adhesive Tape Products, Inc.; PWT-20.
  - b. 3M; Tape 226.
  - c. Tyco Adhesives; Polyken 826.

#### 2.4 PATCHING MATERIAL

- A. Patching Material: One component, polymer-modified, premixed patching material containing selected silica aggregates and portland cement, suitable for vertical and overhead application. Do not use material containing chlorides or other chemicals known to be deleterious to prestressing steel or material that is reactive with prestressing steel, anchorage device material, or concrete.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Euclid Chemical Company (The); Verticoat Supreme.
    - b. Fox Industries, Inc.; FX-228.
    - c. Kaufman Products, Inc.; Patchwell Kit HB.
    - d. Master Builders, Inc.; Emaco R350 CI.
    - e. Sika Corporation, Inc.; SikaMonoTop 612.

### PART 3 - EXECUTION

#### 3.1 FORMWORK

- A. Provide formwork for post-tensioned elements as specified in Division 03 Section "Cast-in-Place Concrete." Design formwork to support load redistribution that may occur during stressing operation. Ensure that formwork does not restrain elastic shortening, camber, or deflection resulting from application of prestressing force.

#### 3.2 NONPRESTRESSED STEEL REINFORCEMENT PLACEMENT

- A. Placement of nonprestressed steel reinforcement is specified in Division 03 Section "Cast-in-Place Concrete." Coordinate placement of nonprestressed steel reinforcement with installation of post-tensioning tendons.

#### 3.3 TENDON INSTALLATION

- A. Install tendons according to approved installation drawings and procedures stated in PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."
- B. Tendon Supports: Provide continuous slab bolsters or bars supported on individual high chairs spaced at a maximum of 42 inches o.c. to ensure tendons remain in their designated positions during construction operations and concrete placement

1. Attach tendons to supporting chairs and reinforcement without damaging tendon sheathing.
- C. Maintain tendon profile within maximum allowable deviations from design profile as follows:
1. Uniform Thickness Foundations
    - a. Tendons/ vertical: CGS in middle one-third of the actual foundation thickness, but not to exceed +/- 1 inch
    - b. Tendons/ horizontal: Variance from plan location +/- 12 inches with smooth transition around obstructions with a minimum deviation of 1:12.
- D. If tendon locations conflict with nonprestressed reinforcement or embedded items, tendon placement governs unless changes are authorized in writing by Structural Engineer. Obtain Structural Engineer's approval before relocating tendons or tendon anchorages that interfere with one another.
- E. Deviations in horizontal spacing and location of slab tendons are permitted when required to avoid openings and inserts.
- F. Installation of Anchorage Devices:
1. Place anchorage devices at locations shown on approved installation drawings.
  2. Do not switch fixed and stressing-end anchorage locations unless authorized in writing by Structural Engineer.
  3. Attach pocket formers, intermediate anchorage devices, and stressing-end anchorage devices securely to bulkhead forms. Install stressing-end and intermediate anchorage devices perpendicular to tendon axis.
  4. Install tendons straight, without vertical or horizontal curvature, for a minimum of 12 inches behind stressing-end and intermediate anchorages.
  5. Embed intermediate anchorage devices at construction joints in first concrete placed at joint.
  6. Do not splice reinforcing bars at anchorages. Extend backup bars a minimum of 12 inches past anchorage. Stagger splices a minimum of 60 inches.
  7. Place fixed-end anchorage devices in formwork at locations shown on installation drawings. Support anchorages firmly to avoid movement during concrete placement.
  8. For encapsulated systems, remove loose caps on fixed-end anchorages, refill with post-tensioning coating, and re-attach caps to achieve a watertight enclosure.
- G. Maintain minimum concrete cover as follows:
1. From Exterior Edge of Concrete to Wedge Cavity: 2 inches for encapsulated systems.
  2. From Exterior Edge of Concrete to Strand Tail: 1.5 inches.
  3. From Exterior Edge of Concrete to Wedge-Cavity Cap: 1 inch (25 mm).
  4. Top, Bottom, and Edge Cover for Anchorage Devices: 1-1/2 inches .
- H. Maintain minimum clearance of 3 inches between tendons and openings.
- I. Prior to concrete placement, mark tendon locations on formwork with spray paint.

- J. Do not install sleeves within 36 inches of anchorages after tendon layout has been inspected unless authorized in writing by Structural Engineer.
- K. Do not install conduit, pipe, or embeds requiring movement of tendons after tendon layout has been inspected unless authorized in writing by Structural Engineer.
- L. Do not use couplers unless location has been approved by Structural Engineer.

#### 3.4 SHEATHING INSPECTION AND REPAIR

- A. Inspect sheathing for damage after installing tendons. Repair damaged areas by restoring post-tensioning coating and repairing or replacing tendon sheathing.
  - 1. Ensure that sheathing is watertight and there are no air voids.
  - 2. Follow tape repair procedures in PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."
- B. Immediately remove and replace tendons that have damaged strand.
- C. Exposed strand is not allowed on encapsulated systems.

#### 3.5 CONCRETE PLACEMENT

- A. Do not place concrete until placement of tendons and nonprestressed steel reinforcement has been inspected by engineer or inspector.
- B. Provide Structural Engineer a minimum of 48 hours notice before concrete placement.
- C. Place concrete as specified in Division 03 Section "Cast-in-Place Concrete." Ensure consolidation of concrete around anchorages.
- D. Ensure that method of concrete placement does not damage tendon sheathing. Do not support pump lines, chutes, or other concrete placing equipment on tendons.

#### 3.6 TENDON STRESSING

- A. Calibrate stressing jacks and gages at start of job and at least every six months thereafter and as required by the Structural Engineer. Keep copies of calibration certificates for each jack-and-gage pair on Project site and available for inspection. Exercise care in handling stressing equipment to ensure that proper calibration is maintained.
- B. Stress tendons only under supervision of qualified post-tensioning superintendent.
- C. Do not begin stressing operations until concrete strength has reached 3000 psi as indicated by maturity meter or compression tests of field-cured cylinders.
- D. Complete stressing within 96 hours of concrete placement.

- E. If concrete has not reached required strength, obtain Structural Engineer's approval to partially stress tendons and delay final stressing until concrete has reached required strength.
- F. Stressing Procedure: For each strand proceed as follows:
  - 1. Clean out the stressing cavity and insert the stressing wedges.
  - 2. Place a mark on the strand tail for use in determining the strand elongation. Consistency and accuracy in placing this mark is essential. Contractor and Testing Agency shall coordinate marking method to be used and distance of mark from edge of concrete.
  - 3. Stress the strand using a gauge reading determined by the gauge calibration curve, in accordance with any sequencing requirements described herein and on structural construction plans.
  - 4. Strands that are to be stressed at both ends shall be stressed to the full gauge reading at each end and elongations shall be recorded for each end.
  - 5. Seat the stressing wedges.
  - 6. Record the elongation achieved as soon as possible but no later than the end of the working day.
- G. If detensioning and restressing of tendon is required, discard wedges used in original stressing and provide new wedges.
- H. Mark and measure elongations according to PTI's "Field Procedures Manual for Unbonded Single Strand Tendons." Measure elongations to closest 1/8 inch.
- I. Elongations of strands shall be recorded on an approved form. Any significant deviations from the predicted elongations shall be noted on the elongation records. Actual elongations of individual tendons shall be within 7 percent of the predicted elongations shown on the approved shop drawings.
- J. Structural Engineer will not review elongation records until construction set of post-tensioning shop drawings has been received in accordance with Part 1. Engineer will not review incomplete elongation records. Contractor shall submit elongation records to engineer immediately upon completion of stressing operations for that pour. No tendon tails shall be burnt off or covered by subsequent concrete pours until Structural Engineer has approved elongation records for that pour.

### 3.7 TENDON FINISHING

- A. Do not cut strand tails or cover anchorages until stressing records have been reviewed and approved by Structural Engineer.
- B. Cut strand tail between 1/2 and 3/4 inch from wedges. Do not damage tendon or concrete during removal of strand tail. Acceptable methods of cutting strand tail include the following:
  - 1. Oxyacetylene flame.
  - 2. Abrasive wheel.
  - 3. Hydraulic shears.
  - 4. Plasma cutting.

- C. Cut strand tails and install caps on stressing-end anchorages within one day of Structural Engineer's acceptance of elongations.
- D. Install encapsulation cap immediately not exceeding 8 hours after cutting off tendon tails. The encapsulation cap shall be filled with an approved PT coating material.
- E. Patch stressing pockets within one day of cutting strand tail. Clean inside surface of pocket to remove laitance or post-tensioning coating before installing patch material. Finish patch material flush with adjacent concrete.

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. The individual performing post-tensioning inspections in the field shall be Level 2 certified by the Post-Tensioning Institute. The reinforcing placing foreman and the general contractor's foreman overseeing the post-tensioning work shall also be Level 2 certified by the Post-Tensioning Institute. Cooperate with testing agency to facilitate the execution of its duties.
  - 1. Before concrete placement, special inspector will inspect the following for compliance with post-tensioning installation drawings and the Contract Documents:
    - a. Location and number of tendons and slab reinforcing.
    - b. Tendon profiles and cover.
    - c. Installation of backup bars, hairpins, and other nonprestressed reinforcement shown on post-tensioning installation drawings.
    - d. Installation of pocket formers and anchorage devices.
    - e. Repair of damaged sheathing.
    - f. Connections between sheathing and anchorage devices.
    - g. Observe all placing of concrete.
    - h. Check tendon placement before and during pouring of concrete. Be present during placement and check for tendons being moved out of position.
    - i. Mark tendons prior to stressing.
    - j. Record tendon elongations after stressing and submit copy of original record to the Contractor.
  - 2. Special inspector will immediately report deviations from the Contract Documents to Structural Engineer.

### 3.9 PROTECTION

- A. Do not expose tendons to electric ground currents, welding sparks, or temperatures that would degrade component.
- B. Protect exposed components within one workday of their exposure during installation.
- C. Prevent water from entering tendons during installation and stressing.

- D. Provide weather protection to stressing-end anchorages if strand tails are not cut within 10 days of stressing the tendons.

### 3.10 REPAIRS

- A. Submit repair procedure to Structural Engineer for evaluation and approval.
- B. Do not proceed with repairs requiring removal of concrete unless authorized in writing by Structural Engineer.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for unbonded post tensioned concrete slab.

### 4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

**END OF SECTION 033816**



**1.1 PART 1 - GENERAL****1.2 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and General Requirements by the Architect shall apply.
- B. Provisions of this section shall apply to all of the electrical work.

**1.3 DEFINITIONS**

- A. The "Contractor" as hereinafter referred to shall mean this General Contractor.
- B. "provide" shall mean to supply and make available.
- C. "install" shall mean to put equipment into place and make it ready for use.
- D. "furnish" shall mean to provide and install equipment.

**1.4 MATERIAL STANDARDS**

- A. All material supplied shall be new and shall be equal to or exceed minimum requirements of NEMA, IEEE, and/or UL.
- B. All materials shall bear the Underwriters' Laboratories, Inc., label provided a standard has been established for the material in question.

**1.5 SCOPE OF WORK**

- A. Furnish all materials and equipment and provide all labor and supplies necessary for the installation of the complete electrical system as shown on the drawings and specifications herein. Provide all other work and miscellaneous items not specifically mentioned but reasonably inferred for a complete installation including all accessories and appurtenances required for testing the systems.

**1.6 GENERAL REQUIREMENTS**

- A. The electrical drawings which constitute an integral part of this contract shall serve as working drawings. They indicate the general layout of the complete electrical system including arrangement of feeders, circuits, outlets, switches, controls, panelboards, service equipment, luminaires, and all other work. The drawings are diagrammatic and indicate the general arrangement of electrical work. Locations are approximate and shall be subject to minor modifications as dictated by field conditions and as directed by Architect and/or Engineer

- B. Field verification of any scale dimension is directed since actual locations, distances, and levels will be governed by actual field conditions. Existing conditions shall be verified at the site prior to submitting bids.
- C. The contractor shall review all the drawings – architectural, structural, and electrical– and report any errors or omissions to the Architect or Engineer prior to bidding. Architectural drawings shall govern.
- D. Contractor shall be responsible for exact fitting of all materials and equipment in buildings and on the site. All dimensions shall be verified on job.
- E. The Contractor shall provide devices, light fixtures, conduits per the building standards.

#### 1.7 CODES, REGULATIONS, AND STANDARDS

- A. The electrical installation shall be in compliance with the requirements of the latest editions of International Building Codes (IBC), the National Electrical Code (NEC), the International Energy Conservation Code (IECC), and other applicable National Fire Protection Codes (NFPA) including amendments and regulations adopted by the local jurisdiction.
- B. The equipment and installation shall be in compliance with the latest editions of the standards listed in the other sections of these specifications.
- C. The electrical service installation shall be in compliance with the rules, regulations, and requirements of the local power company serving the project.
- D. The Contractor and electrical installation shall fully comply with all applicable Federal, State, City, and County laws, ordinances, and regulations.
- E. If there is a conflict between codes, local ordinances, or laws and the contract documents (specifications and drawings), the most stringent requirements shall apply.

#### 1.8 LICENSES, FEES, AND PERMITS

- A. All required permits shall be obtained and paid for by the Contractor.
- B. All fees and costs for services of inspection authorities shall be paid by the Contractor.
- C. The Contractor shall cooperate fully with local utility companies with respect to installation of their services to the building.

#### 1.9 OBSERVATION

- A. The work shall be subject to observation by the Owner, Architect, Engineer, or their representatives at all times. In the event of questionable work, their decisions will be final.

#### 1.10 GUARANTEE

- A. All electrical work, items of equipment, and materials provided by the Contractor shall be guaranteed for a minimum period of one (1) year from the date of Substantial Completion of the project. Longer guarantee periods required in other sections of these specifications shall govern over the minimum period specified in this section.

#### 1.11 SAFETY AND INDEMNITY

- A. The Contractor shall be solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours.
- B. No act, service, drawing review, construction observation by the Owner, Architect, Engineer, or their consultants is intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction site.

#### 1.12 OPERATIONS AND MAINTENANCE MANUALS

- A. Provide a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the work. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- C. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds. Include procedures to follow and required notifications for warranty claims.

#### 1.13 RECORD DOCUMENTS

- A. Maintain one set of record prints of the Contract Drawings and Shop Drawings.
  - 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether

individual or entity is installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

2. Upon completion of the work, the Electrical Contractor shall provide the Owner with one set of as-built drawings and marked up specifications, certified accurate by endorsement.

## PART 2 - PRODUCTS

### 2.1 MATERIAL STANDARDS

- A. The design, manufacture, and testing of all electrical equipment and materials shall conform to or exceed the latest applicable standards of NEMA, IEEE, and ANSI.
- B. All materials unless otherwise noted shall be new. All materials shall be UL listed and bear the UL label. Materials that are not covered by UL testing standards shall be tested and approved by an Independent Testing Laboratory or Governmental Agency acceptable to the Owner, Engineer, and Local Code Enforcing Agency.

### 2.2 MANUFACTURERS

- A. The listing of manufacturers in this specification does not imply acceptance of their products that do not meet the specific ratings, features, and functions.
- B. Manufacturers listed are not relieved from meeting the requirements of these specifications in their entirety. Products in compliance with the specification and manufactured by others will only be considered if submitted for review by the Engineer as a substitution for the specified manufacturer(s).

### 2.3 MANUFACTURER'S INSTRUCTIONS

- A. Where the specifications call for an installation to be made in accordance with manufacturer's recommendations, a copy of such recommendations shall be kept in the job superintendent's field office at all times and shall be available for review by the Engineer.
- B. The Contractor shall follow the manufacturer's instruction and recommendations where they cover points not specifically indicated on the drawings, in the specifications, or as required for code compliance. If the manufacturer's instructions and recommendations are in conflict with the drawings or specifications, the Contractor shall obtain clarification from the Engineer before beginning work.

### 2.4 SPECIFIED ITEMS AND BID ALTERNATES

- A. Equipment or materials specified exclusively by trade, name of manufacturer, or by catalog reference shall form basis of work and contract therefore.

- B. Contractor shall be responsible for proper installation, complete in all respects, and operation of all equipment or materials used as result of approval of requests to substitute. No additional payment will be issued due to the incorporation of approved substitutions.

## 2.5 SUBMITTALS

- A. Furnish four copies of submittals, including shop drawings and material lists, as called for, to Architect prior to commencement of work. Submittal via e-mail in pdf format is acceptable in lieu of a hard copy submittal. Material lists shall include catalog cuts, diagrams and other descriptive material, and shall be submitted at the same time in brochure arrangement with one of each requested item in each of the four brochures. Submit for the following:
  - 1. Metering Cabinet
  - 2. Panelboards
  - 3. Disconnect Switches
  - 4. Fuses
  - 5. Luminaires
  - 6. Lamps
  - 7. Lighting Controls, contactors
  - 8. Wiring Devices and Coverplates
  - 9. Identification Materials
- B. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- C. Contractor's Review: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents. The Contractor shall revise and resubmit shop drawings and material lists as required for approval.

## 2.6 IDENTIFICATION

### A. POWER RACEWAY IDENTIFICATION MATERIALS

- 1. If an existing identification scheme exists for this facility, match the existing identification scheme. If an identification scheme does not exist, provide identification as follows:
- 2. Colors for Raceways Carrying Circuits at 600 V or Less:
  - a. Black letters on a white field
  - b. Legend: Indicate voltage, source equipment designation, and circuit numbers and system or service type.
- 3. Colors for Raceways carrying GROUND conductors / cabling:

- a. White letters on a green field
  - b. Legend indicating "GROUND"
4. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

B. EQUIPMENT IDENTIFICATION LABELS

1. Screw on plastic lamicoid Label: Machine printed, in black letters on a white background, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch**.
  - a. Black letters on a white background – normal power
  - b. White letters on a green background – grounding systems

C. CONDUCTOR IDENTIFICATION MATERIALS

1. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.7 BRANCH CIRCUIT PANELS

- A. Circuit breaker type panelboards with main lugs or main circuit breakers where shown, with number and size of full width thermal magnetic bolted branch circuit breakers with minimum AIC rating as indicated. Circuit breakers shall be labeled for use with conductors with minimum of 75° insulation. Panelboards are to be surface or flush mounted with size of bus as indicated. Two and three pole breakers shall have common trip and single operating handle. Provide separate ground bus in each panelboard and a fully rated neutral bus.
- B. Panelboards shall be constructed of code gauge galvanized steel. Fronts are to be complete with door and latch and master-keyed locks, with door-in-door configuration. Fronts shall have adjustable trim clamps and directory frames. Provide a typed circuit directory for each new panel and existing panels affected by this project.
- C. Lighting and miscellaneous power panels:
  1. 208V or 240V, 3 phase, 208/120V, single or 3 phase, or 240/120V, single phase; 10,000 AIC minimum, Eaton/Cutler-Hammer Type PRL1 or equivalent by General Electric, Square D or Siemens.

2.8 DISCONNECT SWITCHES

- A. Provide enclosed, heavy duty, fusible or non-fusible safety switches where required.
- B. Each enclosure shall be NEMA type suitable for the surrounding area and conditions, and shall be labeled for use with conductors having minimum of 75° insulation. Consult mechanical drawings and specifications of mechanical equipment for additional disconnect and starter

requirements. Provide disconnects as appropriate for actual equipment provided on the project. All switches shall be labeled for feeder or motor supplied.

- C. Provide fuse rejection kits for all fusible switches rated 600 amperes and below.

## 2.9 FUSES

- A. Fuses shall be of the time delay type; class "R" with rejection feature up to 600 amperes, bolt-in class "L" above 600 amperes. "Fusetron", "Low Peak", or "Hi-Cap" as manufactured by the Bussmann Manufacturing Company or equivalent by Gould, Inc. (Gould Shawmutt fuses). The Contractor shall furnish and install one complete set of fuses for all fuse holding devices sized in accordance with the associated motor and/or conductors to be protected. Furnish to Owner a minimum of three spares for each size installed.

## 2.10 CONDUIT AND FITTINGS

- A. Provide conduit and fittings as indicated and as required per Part 3 - Execution of this specification.
- B. Galvanized Rigid Steel Conduit (GRC): Zinc coated, threaded type conforming to UL 6. Provide zinc coating fused to inside and outside walls. Provide closed-end thread protectors.
- C. Intermediate Metallic Tubing (IMC): Zinc coated threaded type conforming to UL Provide zinc coating fused to inside and outside walls. Provide closed-end thread protectors.
- D. Electric Metallic Tubing (EMT): Comply with UL 794.
- E. PVC Externally Coated Rigid Steel Conduit (PVC Coated GRC): Provide rigid steel zinc coated with an additional 40 mil thick coating of PVC and internal galvanized surface. PVC coating shall be bonded to the conduit. Extruded exterior coating is not acceptable.
- F. Flexible Steel Conduit: Formed from continuous length of spirally-wound, interlocked zinc-coated strip steel.
- G. Liquid-tight, Flexible Metal Conduit: Formed from a continuous length of flexible, interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).
- H. Rigid Metal Conduit Fittings: Cast-malleable iron, galvanized.
- I. Intermediate Metallic Tubing Fittings.
- J. Electric Metallic Tubing Fittings: Steel or iron, compression (set screw).
- K. Flexible Metallic Conduit Fittings: Steel threadless hinged clamp type.
- L. Flexible Non-metallic Conduit Fittings: Plastic

- M. Conduit Bodies: Galvanized steel conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NEC requirements. Conduit bodies shall have threaded conduit entrance ends, removable covers, either cast or galvanized steel, and corrosion-resistant screws.

## 2.11 CONDUCTORS

- A. Unless otherwise indicated, all conductors shall be copper. The use of aluminum will be accepted only to the extent specifically indicated on the drawings. Conductors sized #10 AWG and smaller shall be solid annealed copper, #8 AWG and larger shall be stranded.
- B. The contractor may substitute aluminum feeders for the specified copper feeders for sizes 1/0 AWG CU and larger only when existing building feeders are aluminum. The contractor is responsible for resizing the feeders and conduits and all other parts of the electrical system that are affected by the conductor change. All changes shall be submitted to the Engineer for review and approval and installed only if written approval by the Engineer is provided.
- C. Minimum conductor sizes shall be #12 AWG for wiring at 120 volts and above, and #18 AWG for signal and control circuits. For 120 volt circuits 75 feet or longer to the first outlet, minimum size shall be increased to #10 AWG (for 277 volt circuits 150 feet).
- D. Color code all conductors. Wire sizes #8 AWG or smaller shall have integral color-coded insulation. Wire sizes #6 AWG and larger shall be color coded insulation or may have black insulation but identified by color-coded electrical tape at all junction, splice, pull, or termination points.
- E. Conductors shall have insulation rated at 600 volts unless otherwise noted. The following insulation standards shall apply:
  - 1. Underground and Wet Locations: Type THW or THWN for #8 AWG and larger; TW or THWN for #10 AWG and smaller.
  - 2. Indoors: Type THW, THWN, or THHN for #8 AWG and larger; TW, THWN, or THHN for #10 AWG and smaller.
  - 3. Ampacities: Conductor ampacities shall be applied per NEC Table 310-16. Ratings for conductors having 75°C insulation shall not be exceeded regardless of which insulation type is used.
- F. Connectors shall be 3-M “Scotchlock”, Buchanan “B-Caps”, Ideal “Wing Nut”, or Buchanan splice caps. All connectors shall be rated at 600 volts for general use, or 1000 volts for use within fluorescent or high intensity discharge (HID) luminaires.

## 2.12 CABINETS AND WIREWAYS

- A. Code gauge galvanized steel. Cabinets to have hinged covers and master keyed locks. Provide cabinet sizes as indicated, and wireway sized for application per NEC Articles 376 & 378 (Wireways). Provide approved NEMA type enclosure suitable for location and conditions encountered. Finish shall be ANSI 61 gray enamel.



## 2.13 OUTLET BOXES

- A. Cast metal boxes for exposed conduit and in equipment rooms. All outlets for exterior application shall be cast, weatherproof type, with gasket and "WP while in-use" type cover plate. Provide galvanized or zinc coated, compressed steel outlet boxes for all other applications. Boxes to be 4 inches square or octagonal unless otherwise required for specific outlet or structural conditions, and of depth as required.

## 2.14 WIRING DEVICES

- A. Provide specification grade receptacles and specification grade switches as manufactured by, Hubbell, Leviton, Cooper, or Pass and Seymour. All devices shall be of the same manufacturer.
- B. Switches shall be rated for the load controlled. Switches shall be heavy-duty specification-grade rated 125 volts, 20A. All other switches shall be of similar premium specification grade quality.
- C. Receptacles shall be rated for the circuit load served. Receptacles shall be rated 125 volts, 20 amperes NEMA 5-20R configuration, unless otherwise noted.
- D. Provide steel coverplates for all devices associated with surface mounted raceways, in areas where raceway is subject to damage or abuse Provide 0.140 inch smooth nylon matching coverplates for all devices in finished areas. Coverplates in existing established buildings shall match the building standard.
- E. Verify device and plate colors and material with Architect before ordering.

## 2.15 LUMINAIRES AND LAMPS

- A. MANUFACTURERS
  - 1. The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer.
- B. All luminaires shall bear the Underwriters Laboratories seal of approval.
- C. Luminaires types are indicated on the drawings by means of letters. Refer to the luminaire schedule for luminaire specifications. When a luminaire type is indicated in a room or area, all other luminaires in the room or area shall be of the same type unless noted otherwise..
- D. Luminaires exposed to wet weather and cold temperature shall be weatherproof and of the low temperature type (below 0 degrees F) suitable for operation at conditions encountered.
- E. All luminaires shall be manufactured so that all metallic parts are continuously grounded. Where acrylic lenses are specified, thickness of such lens shall be nominal 0.125 inch.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Give right of way to piping systems installed at a required slope.

### 3.2 SITE EXAMINATION

- A. The Electrical Contractor shall examine project site and all conditions thereon and shall take into consideration all such conditions as may affect the work hereunder.
- B. Special attention is directed to that portion of the work that is being remodeled. The existing electrical equipment, luminaires, etc., shown on the plans are only as accurate as can be determined from existing electrical plans, site observation, etc., and such existing conditions shall be verified by the Electrical Contractor prior to submitting bid.

### 3.3 SLEEVES, INSERTS, AND EMBEDDED ITEMS

- A. Sleeves, inserts, hangers, etc., furnished under this Division and installed under another Division shall be supplied in such a manner as will permit orderly progress of work by others.

### 3.4 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment with other trades:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right of way for piping and conduit installed at required slope.
  - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Details of equipment furnished by trades other than electrical, but installed as part of the Division 26 work will be found on the drawings and specifications associated with the Division supplying the equipment.
- D. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Coordinate access doors and panels with Architect.
- E. Coordinate sleeve selection and application with selection and application of firestopping. Coordinate firestopping requirements with Architect.
- F. Coordinate work with other trades to avoid conflict and to provide correct rough-in and connections for equipment furnished by others that require electrical connections. Inform contractors of other trades about the required access to and clearances around electrical equipment to comply with code and maintain serviceability.
- G. Verify equipment dimensions and requirements with provisions specified under this section. Check actual job conditions before fabricating work. Changes or additions subject to additional compensation which are made without written authorization by the Owner on an agreed upon price shall be at the Contractor's risk and expense.

### 3.5 TEMPORARY FACILITIES

- A. General: Provision, Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost.
- B. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use. Confirm with owner if payment for power use will be required. Provide connections and extensions of services as required for construction operations.
- C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- D. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- E. Temporary Use of Permanent Facilities: Engage installer of the permanent service to assume responsibility for operation, maintenance, and protection of the permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- F. Locate facilities where they will serve project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required by progress of the work.
- G. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

- H. Construction phase Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions. Provide temporary emergency egress lighting and exit signs as required to clearly illuminate and indicate the path of egress. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion, or as directed by Owner or Contractor. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor.
  - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period.

### 3.6 SELECTIVE DEMOLITION

- A. Existing systems to remain within the scope of work must be tested prior to commencement of work to verify system integrity and proper operation. Systems include, but are not limited to lighting control systems. Test results and any system deficiencies shall be reported to the Owner prior to commencement of work. Contractor shall assume responsibility for system functionality if testing has not been performed. Contractor will be responsible for system functionality until final acceptance by Owner.
- B. All outlets, luminaires, equipment, etc. in existing areas to be remodeled are to be removed except where found to be usable under the new construction. Where devices are removed but conduit is abandoned in place, pull conductors out of conduit back to the source of power and label the conduit as spare.
- C. All outlets and wiring which are to remain shall be reconnected to remain operable. Rework and extend existing circuits, conduit, and relocate outlets as necessary to maintain functionality of all items to remain.
- D. Existing items that conflict with new construction shall be reworked and relocated to avoid conflicts with the new construction.
- E. All wiring, except where indicated to be reused, shall be disconnected from both the power supply and utilization equipment and removed from the conduit.
- F. All exposed conduit, boxes, and outlets, that are indicated to be demolished, shall be removed. Conduit that is not accessible shall be cut, capped, and abandoned in place.
- G. Equipment, luminaries, and devices removed shall be the Owner's property and shall be stored at a location directed by the Owner. Provide a photographic and written inventory of the items removed indicating quantity, description, and condition of the items removed. Failure to provide this inventory may result in the contractor replacing removed equipment.

- H. Items not wanted by the Owner shall become the property of the Contractor and shall be removed from the site.
- I. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- J. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- K. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will direct the Contractor how to proceed with removal of hazardous materials, either under a separate contract or as a change directive to this project.
- L. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to existing condition before selective demolition operations began.

### 3.7 CUTTING AND PATCHING

- A. All cutting and patching work shall be laid out in advance.
- B. Where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of raceways, outlets, or other electrical equipment the work shall be carefully done.
- C. Any damage to woodwork, metalwork, or finished surface shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
- D. Any required openings in concrete walls or floors shall be core drilled.
- E. The Contractor shall not cut or drill any structural member without first obtaining written approval of the Structural Engineer.
- F. The Contractor shall do no cutting, channeling, or drilling of unfinished masonry, tile, etc., unless permission is first obtained from the Owner. If permission is granted, the Contractor shall perform this work in a manner approved by the Owner.
- G. Existing Utility Services and Electrical Systems: Where existing services/systems are required to be removed, or relocated, bypass such services/systems before cutting to minimize interruption to occupied areas.

### 3.8 TRENCHING AND BACKFILL

- A. The Contractor shall be responsible for all trenching and backfilling required in connection with the electrical work.
- B. Earth is to be backfilled in thin layers compacting and tamping each layer prior to placing the next layer. Remove all rocks, stones, etc., from the bottom of the trench and from the backfill material to avoid damage to the cables and/or conduit installed in the trench.
- C. Verify the locations of all existing and/or new underground utilities prior to trenching and, if damaged by the Contractor, replace immediately in an approved manner and at no expense to the Owner.
  - 1. Utility Locator Service: Notify utility locator service for area where project is located before beginning earth moving operations.
- D. When trenching is done through specifically treated areas such as paving, landscaping, etc., the Contractor shall be responsible for restoring the surface to its original condition in a manner approved by the Owner. Repair any trenches where settlement occurs and restore the surface for a period of one (1) year after substantial completion of the project.
- E. Install magnetic warning tape directly above buried electrical conduits or duct banks. Install warning tape 12 inches below finished grade, or 6" below concrete slabs and pavement.

### 3.9 IDENTIFICATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as specified, as approved in submittals, and as required by the NEC.
- B. Install identification devices in accordance with manufacturers written instructions and requirements of the NEC.
- C. Verify identity of each item before installing identification products.
- D. Apply identification devices to surfaces that require finish after completing finish work.
- E. Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners.
  - 1. Equipment to Be Labeled:
    - a. Panelboards.
    - b. Circuit Directories: Typewritten directory of circuits in the location provided by panelboard manufacturer.
    - c. Enclosures and electrical cabinets.
    - d. Access doors and panels for concealed electrical items.

- e. Enclosed switches.
- f. Branch Circuit identification on receptacles.
- g. Enclosed circuit breakers.
- h. Contactors.
- i. Remote-controlled switches, dimmer modules, and control devices.
- j. Lighting control equipment.
- k. Disconnect switches.

### 3.10 INSPECTIONS AND TESTS

- A. Work shall be subject to inspection by Architect and/or Engineer at all times.
- B. After electrical installation is completed and at such time as the Architect or Engineer may direct, the Contractor shall conduct an operating test for approval. Installation shall be demonstrated to be in accordance with requirements of the drawings and this specification. Any defects revealed shall be corrected promptly and the tests reconducted.
- C. The Contractor shall repair and/or replace all defective and/or faulty workmanship, materials, and/or equipment and shall repair and/or replace all other work damaged as a result of such defective and/or faulty installation, materials and/or equipment without charge to Owner during guarantee period.
- D. The following systems shall be tested:
  - 1. Power Distribution.
  - 2. Lighting Control.
- E. Partial occupancy of site by Owner shall not be construed as final acceptance of work.

### 3.11 DEMONSTRATION AND TRAINING

- A. At completion of the project at such time designated by the Owner, the Contractor shall instruct the Owner as to the location and operation of all electrical equipment and systems installed as part of this contract. The Contractor shall also brief the Owner on the routing of feeders to major pieces of mechanical equipment and other large equipment provided by other trades and connected under Division 26.
- B. The Contractor shall also provide demonstration of operation to the Owner of all special systems including items installed by the Contractor or under the Contractor's supervision.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.
- D. Provide demonstration and training as required and as follows:
  - 1. Electrical service and distribution, including panelboards.
  - 2. Luminaires and controls.

### 3.12 DELIVERY AND STORAGE

- A. Electrical Contractor shall make provisions for delivery and safe storage of materials for this contract and shall assume full responsibility for condition and/or safekeeping of materials furnished by others on acceptance of materials.

### 3.13 OUTAGES

- A. Portions of the facility occupied by the Owner must remain operational during the work. One or more outages of the electrical service to the site, electrical distribution system within the site may be required to complete installation and connection of the new service equipment. The number and length of these outages must be kept to a minimum.
- B. The Contractor shall be required to prepare a detailed Method of Procedure (MOP) for each outage. Each MOP shall detail the start and end times for the outage, the steps to be performed during the outage, the approximate time allotted for each step, and a back-out procedure should something unexpected occur or be discovered during the outage.
- C. The MOP shall be prepared sufficiently in advance of the outage to permit review and comment by the Owner. The Contractor shall incorporate all comments into the MOP and submit copies for final review and signoff by all parties. Once approved, the Contractor shall notify the Owner 72 hours in advance of the outage and receive final written permission to proceed.

### 3.14 CONDUIT

- A. All wiring for systems operating over 50 volts shall be installed in conduit. Conduit shall be of size required by NEC or larger as indicated on drawings, and shall be installed according to the NEC. Bends shall be made with an approved hickey or conduit bending machine. Factory bends over 1-1/4 inches are approved.
- B. Exposed conduit shall not be installed in finished areas unless prior approved by Architect. Exposed conduit may be installed in equipment rooms and at surface mounted equipment. All exposed conduit shall be run at right angles and parallel to the building lines.
- C. All underground conduit shall be installed at a minimum of 30 inches below finished grade. Conduits installed below concrete slabs shall be a minimum of 12 inches below slab. All underground conduits shall be installed in select backfill.
- D. Use approved type couplings and connectors in all conduit runs, and make all joints tight. Provide premium quality compression type couplings. Provide insulated bushings for all terminations in pipe sizes 1-1/4 inches and larger. Provide weatherproof fittings for runs exposed to weather and high humidity, and concrete tight fittings for conduits installed in concrete slabs. Provide seal-off fittings where conduits enter or leave hazardous areas or areas of widely different temperature and/or humidity.
- E. Maximum conduit size for installation in concrete slabs or walls shall be 1 inch.
- F. Prior to pulling of conductors, conduits shall be cleaned of all foreign matter. Provide 200 pound test nylon pull-lines in all conduits intended for future use.



- G. Provide conduit with appropriate fittings installed as required per the following criteria:
  - 1. Below Grade in Earth: Use PVC or PVC coated rigid steel conduit. GRC is required where underground or underslab conduits penetrate a concrete slab or foundation wall.
  - 2. Above grade, exterior (except roofs): Use GRC, IMC, or EMT with weatherproof fittings.
- H. Provide sleeves where conduit penetrates a fire rated wall. Sleeve and sleeve seal shall be rated as required to maintain the fire rating of the wall or floor that is being penetrated.
- I. Use PVC coated or bituminous coated galvanized rigid metal elbows for stub ups and 90° bends in underground conduits and for all risers to grade and entry from building exterior.

### 3.15 WIRING

- A. No wire shall be installed prior to completion of work which might cause damage to conductors. All service conductors, feeders, and branch circuits shall be color coded in accordance with Article 210-5 of the NEC. Color coding shall be via colored insulation or tape at all termination locations. Wiring for special systems such as mechanical equipment, etc., shall be in accordance with manufacturers wiring diagrams furnished.
- B. Wiring shall be continuous from outlet to outlet or junction box. Splices shall be held to a minimum, and shall be made only at readily accessible pull box, junction box, or outlet box. The insulation value of the joint shall equal that of the conductor. Splices and connection shall be made by twisting tight and installing insulated pressure or wire nut connectors for #10 AWG and smaller, and with steel crimp-on sleeves and overall nylon insulator for #8 AWG and larger.
- C. Where aluminum conductors are installed, all terminations shall be accomplished with approved compression terminators (Burdny Hyplug or equal). All aluminum terminations shall be treated with deoxidizing solution (Burdny Penetrox or equal).
- D. Color code all conductors. Wire sizes #6 AWG and larger that have black insulation color-coded electrical tape, shall have tape applied at all junction, splice, pull, or termination points. Color tape shall be applied to at least 6 inches of the conductor.
- E. Color code wires as follows:
 

208/120 Volts	480/277 Volts
Phases: A-black, B-red, C-blue,	Phases: A-brown, B-orange, C-yellow,
Neutral-white, Ground-green	Neutral-gray, Ground-green
- F. All branch circuits for 120 volt power systems shall have dedicated neutral wires for each circuit. No shared neutral wires are allowed.
- G. The Contractor shall install a separate neutral conductor for each new branch circuit serving line to neutral loads. Use of multiwire circuits with a common neutral for serving line to neutral loads is not acceptable.

- H. Where existing multiwire branch circuits with a common neutral serving line to neutral loads are being reused, the Contractor shall install breaker handle ties to provide common tripping of the circuits required by code. If the breakers serving the circuits making up the multiwire circuit are not adjacent to each other in the panel, the Contractor shall rearrange the breakers and circuits in the panel as necessary to permit adding the handle ties.

### 3.16 GROUNDING

- A. Provide grounding electrode conductors sized in accordance with the drawings between the service ground bus and the following grounding electrodes for the main service grounding system:
  - 1. The metal frame or structure of the building.
  - 2. A minimum of 20 inches of #2 AWG bare solid copper conductor located near the bottom of the concrete foundation or footing that is in direct contact with earth. Electrode shall be Cadwelded, or equal, to all vertical reinforcing bars, and shall be encased by at least 2 inches of concrete. (UFFER Ground)
- B. The service neutral shall be connected to the ground bus with an unspliced Class B stranded copper conductor sized per NEC Table 250.66. Provide an equipment bonding jumper to the non-current carrying parts of the main service sized per NEC Table 250.122.
- C. All electrical neutrals, raceways, and non-current carrying parts of electrical equipment and associated enclosures shall be grounded in accordance with NEC Article 250. An identified grounding conductor shall be installed in all metallic or PVC conduits. Connect ground wire to the ground terminal of all devices.
- D. For existing conditions, if no equipment grounding conductor exists, provide ground bond jumper from grounding terminal to outlet box and continue the equipment grounding conductor installation throughout entire new portion of circuit.

### 3.17 OUTLET BOXES

- A. Boxes shall be suitable for requirements of each outlet and of such dimensions as will fit structural conditions. Boxes shall be installed in rigid manner.

### 3.18 WIRING DEVICES

- A. Install coverplates for all outlets.

### 3.19 LIGHTING

- A. All luminaires and equipment as indicated on the drawings and as described herein shall be furnished and installed. All luminaires shall bear the UL seal of approval.
- B. All luminaires shall be securely supported and all outlets shall be securely anchored. Furnish all supports necessary for installation including structural members where required.

3.20 BRANCH CIRCUIT PANELS

- A. Update the panel directory at the completion of the project by properly identifying each circuit. Install panels up 6 foot, 7 inches to top of trim or as directed by Architect. Mount panels a minimum of 24" above finished floor.

END OF SECTION 26 00 00

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section of the Work includes stripping sod, and removing and disposing of vegetation and debris.
- B. Related Sections:
  - 1. Division 01 Section "Temporary Facilities and Controls".
  - 2. Division 01 Section "Erosion and Sedimentation Control".
  - 3. Division 01 Section "Tree Retention and Protection".
  - 4. Division 31 Section "Earth Moving"

**1.3 DEFINITIONS**

- A. The term "sod stripping" shall be used when the vegetative material to be removed is mowable and generally less than 12-inches tall.
- B. The term "tree removal" refers to individual woody plants with a caliper over 4-inches. Any removals shall be performed by a tree Contractor licensed through Denver Forestry.
- C. The term "clearing and grubbing" refers to all other plant removals.
- D. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- E. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow, and ; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches ( ) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- F. Plant-Protection Area: Area surrounding shrub beds or massings, or other vegetation or sensitive areas to be protected during construction, and indicated on Drawings.
- G. Tree-Protection Area: Area surrounding individual trees or groups of trees to be protected during construction, see Division 01 Section "Tree Retention and Protection".
- H. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

#### 1.4 MATERIAL OWNERSHIP

- A. All materials including stripped topsoil, those materials indicated to remain or to be stockpiled, shall remain the property of City and County of Denver, all other materials shall be removed at the Contractor's expense.

#### 1.5 SUBMITTALS

- A. Existing Conditions: Documentation of existing conditions, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or videotape.
  - 2. Include plans and notations to indicate specific damaged conditions of existing construction, site elements, and landscape.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions. Submit to Owner's Representative prior to start of construction.

#### 1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Project Manager and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Project Manager or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Not allowed without prior approval from Project Manager. Work only within Work Limit Line as defined on drawings.
- C. Salvable Items: Carefully remove items indicated to be salvaged and store on Denver Parks' premises as directed by the Project Manager.
- D. Protection and Repair of Underground lines:
  - 1. Request utility locates 72 – hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor.
  - 2. The contractor is required to contact all private utility companies including Denver City departments to locate all private utilities. The request for locates shall be a minimum of 72 – hours prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the contractor these shall be repaired at no cost to the city. If the contractor damages staked or located private utilities they shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor.

- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree and or plant protection measures are in place.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Protect existing site improvements to remain from damage during construction.
  - 1. Restore existing improvements damaged by Contractor during the work of this Contract to their original condition, as acceptable by Project Manager.

### 3.2 CLEARING

- A. Remove brush and vegetation from areas designated to be cleared. As directed by Project Manager, trim low hanging, unsound, or unsightly branches on existing trees and shrubs designated to remain. All tree work must be performed by a licensed Tree Contractor. All cuts shall be in accordance with current arboricultural standards ANSI A300 Part 1.

### 3.3 GRUBBING

- A. Remove all stumps, roots, and debris a minimum of 12-inches below finish grade in all areas as required. Use hand methods for grubbing inside drip line of trees to remain. Backfill and compact stump and root holes to a maximum of 85% in landscape areas and 95% under hardscape or as directed by the City Forester and Project Manager.

### 3.4 TOPSOIL STRIPPING

- A. See Division 31 Section "Earth Moving".

### 3.5 SOD STRIPPING

- A. Strip sod in all areas to be re-graded to a depth of 1", so that a relatively clean dirt surface remains.

### 3.6 DISPOSAL

- A. Haul and dispose of all removed materials, trash, debris and waste materials legally outside of the Owner's property. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Project Manager.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Clearing and Grubbing of miscellaneous debris or as defined in Article 1.3 including brush, and vegetation will not be measured, but will be a lump sum item.

4.2 PAYMENT

- A. The lump sum price shall include all clearing and grubbing of miscellaneous debris or items defined in Article 1.3, including all other work necessary such that a relatively clear dirt surface remains on the site. Price shall include the removal and offsite disposal of all materials. No payment will be made for the removal of any brush and vegetation damaged by the Contractor beyond the authorized limits of removal.

**END OF SECTION 31 11 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the requirements for excavation, re-grading, stripping and stockpiling of topsoil, filling, backfilling, compaction, hauling, and legal off-site disposal of spoil materials to meet the required lines and grade as specified to complete the work.
- B. Related Sections:
  - 1. Division 01 Section "Erosion and Sedimentation Control".
  - 2. Division 01 Section "Tree Retention and Protection".
  - 3. Division 01 Section "Clearing and Grubbing".
  - 4. Division 02 Section "Demolition".
  - 5. Division 32 Section "Topsoil".

**1.3 DEFINITIONS**

- A. Excavation: The removal of material encountered to subgrade or over-excavation and subsequent disposal or placement of materials removed.
- B. Unclassified Excavation: The term "unclassified excavation", as used herein, includes the excavation of all materials required for the work obtained within construction limits of project, including bedrock, surface boulders, wasted sections of concrete, asphalt or other debris including historic landfills that may be encountered. All excavation will be considered unclassified regardless of the nature of material encountered.
- C. Classified Excavation: The term "classified excavation", as used herein, defines the soil conditions that are expected to be encountered and makes provisions for measurement and payment of any rock encountered at an agreed upon unit price.
- D. Unauthorized Excavation: Inadvertent or purposely removing materials beyond indicated subgrade elevations or dimensions without specific direction of the Project Manager. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation shall be at Contractor's expense.
- E. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.
- F. Subgrade: The undisturbed earth or the compacted soil layer immediately below proposed pavement topping materials.
- G. Structure: Walls, foundations, slabs, pavement or other man-made stationary features occurring above or below ground surface.



- H. Structural Fill: The term “structural fill”, as used herein, includes soil materials used for general site filling under pavements or structures.

#### 1.4 QUALITY CONTROL

- A. Coordinated and paid for by Contractor.
- B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- C. Comply with requirements within project Geotechnical Report.
- D. Codes and Standards: Comply with all applicable local, state and Federal rules, regulations and ordinances concerning sloping of excavation, trenching and safety of workers, including the latest version of OSHA requirement.
- E. Testing Agency: All testing required to determine compliance for the work of this section will be completed as specified in Division 01 Section “Contractor Quality Control”. Testing Agency to test the following, and as stated throughout this Section:
  - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  - 2. Determine that fill material and maximum lift thickness comply with requirements.
  - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- F. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- G. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Project Manager.
- H. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every two thousand (2,000) sq. ft. or less of paved area or building slab, but in no case fewer than three (3) tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 50 feet (50’) or less of wall length, but no fewer than two tests.
  - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every one hundred fifty feet (150’) or less of trench length, but no fewer than two tests.
  - 4. Landscaped areas: At least one test every twenty thousand (20,000) sq. ft or less of disturbed landscaped area, but in no case fewer than two tests.
- I. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

- J. Submit testing report documentation to Project Manager per Division 01 Section “Quality Assurance”.

#### 1.5 SUBMITTALS

- A. Samples for Verification: For the following products, in sizes indicated below:
  - 1. Warning Tape: Twelve-inches (12”) long; of each color.
- B. Qualification Data: For qualified testing agency.
- C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Location of soil source.
  - 2. Classification according to ASTM D 2487.
  - 3. Laboratory compaction curve according to ASTM D 698.
- D. Provide one (1) cubic foot sample of imported backfill material for approval by Project Manager.
- E. For imported backfill materials, general or structural, the Contractor shall provide, at a minimum, a soils report indicating gradation tests, liquid limit, plasticity index and standard proctor density test and free of environmental contaminants. Depending on the use of the imported backfill materials the Project Manager may request that a soils analysis be performed to determine percent organic content of the soils, and salt levels.
- F. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

#### 1.6 PROJECT CONDITIONS

- A. Protection and Repair of Underground lines:
  - 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. The Contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
  - 2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. The Contractor is required to contact all private utility companies including Denver City departments to locate all private utilities. The Contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy two (72) hours prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the Contractor these shall be repaired at no cost to the city. If the

Contractor damages staked or located private utilities they shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.

- B. Use of Explosives: Use of explosives is not permitted.
- C. Protection of Persons and Property: The Contractor is responsible for installing barricades and posting with warning lights all open excavations occurring as part of this work.
  - 1. Protect structures, utilities, walkways, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- D. Environmental Requirements: Blasting is not permitted. Employ jack hammering and other loud noises and methods sparingly; comply with all applicable noise abatement ordinances or regulations. Onsite burning is not allowed.
- E. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the City.
- F. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 01 Sections "Temporary Facilities and Controls" and "Tree Retention and Protection", and Division 31 Section "Clearing and Grubbing," are in place.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: All fill material, regardless of intended use category, must be clean and free from organic matter, roots, brush or other vegetation, trash, debris or other detrimental substances, and rocks or unbroken lumps larger than three-inches (3"). Project Manager to approve material prior to placement.
- B. Structural Fill: Existing soils obtained from on-site excavations, including granular or aggregate base course from removed pavements shall be free of organic matter or any other deleterious substances, including overly wet soils, bedrock, or high swell content soils. If sufficient materials meeting the above requirements are not available from on-site sources, provide additional material obtained from off-site sources and approved by the testing and inspections agency, at no additional cost to the City. The soil must be compactable and pass, at minimum, a proof roll prior to being accepted for supporting paving materials.
- C. On-Site Topsoil: The top four-inches (4") minimum of organic material in the excavation zone shall be stripped stockpiled prior to other earthwork operations. All stockpiled topsoil shall be reused on site.

### 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to thirty-inches (30") deep; colored as follows:
1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
  2. Verify that final grades are completed in accordance with the drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

#### 3.2 GENERAL PROCEDURES

- A. Comply with Division 01 Section "Erosion and Sedimentation Control" and all local, state and national erosion control requirements.
- B. Erosion Control shall be maintained during all phases of site excavation and site development and maintained throughout the construction period in order to protect adjacent properties, streets, and storm sewers from erosion and sediment runoff during the construction process. Do not commence excavation and grading work until erosion control measures are in place and have been inspected and approved by the Wastewater Management Inspector. Contractor shall be responsible for maintaining erosion control measures throughout construction. Frequent monitoring, cleaning and other work required for proper operation shall be Contractor's responsibility. Contractor shall modify/replace all erosion control measures to fit field conditions after continual monitoring by Project Manager and or Wastewater Management Inspector.

### 3.3 DEWATERING

- A. Wherever possible, prevent surface water and subsurface or groundwater from flowing into excavations and from flooding the project site and surrounding area.
- B. Contractor shall be required to dewater excavated areas by pumping, or otherwise control the water so that the project can be constructed in accordance with the plans. Any controlling of the water must be performed in such a manner that recently constructed portions of the project are not damaged. Repairs shall be at the Contractor's expense.
- C. Damage to adjacent property that results from the Contractor's alteration of any surface drainage, ground water flows or pumped water shall be repaired by the Contractor at no additional cost to the City.

### 3.4 GROUND SURFACE PREPARATION

- A. Complete clearing and grubbing operations in accordance with Division 31 Section "Clearing and Grubbing". Where new material is to be placed on compacted subgrade, scarify ground surface until surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction and bond between old and new material.
- B. Prior to placing any new sections of asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of six-inches (6"). In areas where existing pavement is to be removed and replaced the existing compacted subgrade may be reused if the subgrade meets specified compaction. In areas of existing subgrade that do not meet the specified compaction, materials shall be removed, replaced and compacted to meet the specified proctor density. Adjust moisture content and compact as hereinafter specified.

### 3.5 STRIPPING AND STOCKPILING TOPSOIL

- A. Strip all topsoil from the excavation zone for new facilities (four-inches (4") in depth for all disturbed areas). Stockpile topsoil in locations indicated on the Drawings or as directed by the Project Manager.
- B. Placing topsoil, refer to Division 32 Section "Topsoil".

### 3.6 EXCAVATION

- A. Stability of excavations: Comply with local codes, ordinances, and requirements of agencies having jurisdiction to include the latest revision to OSHA standards.
- B. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of +/- one tenth foot (0.1'), and extending a sufficient distance to permit installation of services and other construction, and for inspection.
- C. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as indicated within a tolerance of +/- one tenth foot (0.1').
- D. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil

materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
  - a. Twenty four-inches (24") outside of concrete forms other than at footings.
  - b. Twelve-inches (12") outside of concrete forms at footings.
  - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
  - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
  - e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
  - f. Six-inches (6") beneath pipe in trenches, and the greater of twenty four-inches (24") wider than pipe or forty two-inches (42") wide.

E. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Project Manager and approved by Project Manager. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
  - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
  - a. Twenty four-inches (24") outside of concrete forms other than at footings.
  - b. Twelve-inches (12") outside of concrete forms at footings.
  - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
  - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
  - e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
  - f. Six-inches (6") beneath pipe in trenches, and the greater of twenty four-inches (24") wider than pipe or forty two-inches (42") wide.

### 3.7 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions shown on Contract Drawings within a tolerance of plus or minus one tenth foot (0.1'). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

2. Pile Foundations: Stop excavations six to twelve-inches (6" – 12") above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

### 3.8 EXCAVATION FOR WALKS AND PAVEMENTS

- A. See project Geotechnical Report.
- B. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 foot.
- C. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
  1. Prior to placing the pavement section, the entire subgrade should be scarified to a depth of six-inches (6"), adjusted to a moisture content near optimum and compacted as indicated in the Geotechnical Report.

### 3.9 SUBGRADE INSPECTION

- A. Notify Project Manager when excavations have reached required subgrade.
- B. If Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade in twenty (20) locations identified by the Project Manager with a pneumatic-tired and loaded ten (10-wheel), tandem-axle dump truck weighing not less than fifteen (15) tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  1. Completely proof-roll subgrade in one direction. Limit vehicle speed to three (3) mph.
  2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Project Manager, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Project Manager, without additional compensation.

### 3.10 SPECIAL CONDITIONS

- A. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than thirty five degrees (35°) F.
- B. Dust Control: Provide dust control to alleviate dust nuisance to the public, to adjacent properties and other work underway at the project site.
- C. Unanticipated Conditions: Notify the Project Manager immediately upon finding subsurface or other conditions which are not shown or which cannot be reasonably assumed from existing surveys. Secure Project Manager's instructions before proceeding with further work in such areas.

- D. Unsatisfactory Soils: Remove or otherwise correct unsanitary, sour, or otherwise unsatisfactory soil. Remove contaminated or unsuitable material from under paved areas.
- E. Additional Excavation: When excavation has reached required subgrade elevations, the Contractor shall contact the testing agency, which will make an observation of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the testing agency.

### 3.11 FILL AND BACKFILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in this Section.
  - 1. Under grassed areas, use satisfactory, excavated or borrow material.
  - 2. Under walks and pavements, use satisfactory, excavated or borrow materials, or a combination to meet structural fill requirements.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
  - 1. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
  - 2. Removal of all trash and debris from excavation.

### 3.12 PLACEMENT AND COMPACTION

- A. Abide by requirements of project Geotechnical Report unless otherwise directed by Project Manager.
- B. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Ground surfaces that are steeper than four-to-one (4:1) (horizontal to vertical) shall be stripped of vegetation, scarified to a depth of six-inches (6") and create excavated benches to ensure that fill material will bond with the existing surface.
  - 1. Present remediation options to Project Manager for any soils that do not meet the specified standard proctor density to bring those soils into compliance with the specifications.
- C. Place backfill and fill materials in layers not more than eight-inches (8") in loose depth for material compacted by heavy compaction equipment, and not more than four-inches (4") in loose depth for material compacted by hand-operated tampers, each layer to be compacted to meet requirements herein.
- D. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- E. Compaction of Fill for Hardscape Areas:
  - 1. Select fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").



2. Compaction shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment required to meet specifications. Granular fill shall be compacted using vibratory equipment or other equipment required to meet specifications. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained. Refer to Paragraph 3.12.I herein for criteria.
  3. Prior to placement of any base or surfacing materials, one hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.
- F. Compaction of Landscape Slope Areas:
1. Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, compact to a density as specified in Paragraph 3.12.I. Permanent fill slopes shall not exceed four-to-one (4:1) (horizontal to vertical).
  2. Where natural slopes are steeper than twenty percent (20%) in grade and the placement of fill is required, cut benches shall be provided at the rate of one bench for each five feet (5') in height (minimum of two benches). Benches shall be at least ten feet (10') in width. Fill shall be placed on completed benches as outlined within this specification.
- G. Control soil and fill compaction, providing minimum percentage of density specified. Correct improperly compacted areas or lifts as directed if soil density tests indicate inadequate compaction.
- H. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
1. Moisture Content: The Contractor may be required to add moisture to the excavation materials in the stockpile area if it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rip or disc the fill soils to provide uniform moisture content through the soils.
  2. The application of water to the embankment materials shall be made with any type of watering equipment which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.
  3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
  4. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
- I. Density Tests: Field density tests shall be made by the Contractor per Division 01 Section "Contractor Quality Control" locations and depths selected by the Project Manager. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several-inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved. Criteria for acceptance are as follows:
1. Under pavements and structures: Intervals and quantities of tests required shall be established by the Project Manager. On-site or imported clay materials shall be compacted to at least ninety five percent (95%) of maximum standard Proctor dry density (ASTM D 698) at moisture content within two percent (2%) of optimum. Granular

material, whether imported or developed on-site, shall be moisture conditioned to within two percent (2%) of optimum and compacted to at least 95% of maximum modified Proctor dry density (ASTM D 1557).

2. Under landscape areas (top 12-inches): Eighty five percent (85%) of maximum standard Proctor dry density at moisture content within two percent (2%) of optimum (ASTM D 698).

### 3.13 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  1. Stockpile soil materials away from edge of excavations. Do not store within drip line of existing trees or within Tree Protection Fencing. Refer to Division 01 Section "Tree Retention and Protection".

### 3.14 GRADING

- A. General: Uniformly grade areas within project limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations or contours are indicated or between such points and existing grades.
- B. Subgrade tolerances are as follows:
  1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than one tenth foot (0.10') above or below required subgrade elevations.
  2. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than two one-hundredths foot (0.02') above or below required subgrade elevation.
- C. Under no circumstances shall variations from specified grade elevations create any ponding or retention of water on intermediate pavement levels, or finished surfaces.

### 3.15 PLACING STOCKPILED TOPSOIL

- A. Refer to Division 32 Section "Topsoil".

### 3.16 FIELD QUALITY CONTROL

- A. Special Inspections: Project Manager may engage a qualified special inspector to perform the inspections in addition to the Contractor's requirements for testing for the purposes of verifying results of Contractor's Testing Agency.

### 3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Project Manager; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work.

### 3.18 MAINTENANCE

A. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.19 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from City's Property: Remove waste materials, including materials not allowed for fill, backfill or site grading as specified within, trash, contaminated materials, and debris, and legally dispose of it off City's property at Contractor's expense. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Project Manager.

B. Remove any excess fill material from the site, unless otherwise directed by the Project Manager.

C. Remove any materials determined to be hazardous or contaminated to DADS. DADS Disposal tickets or hazardous waste manifest tickets shall be provided to the Contractor by Project Manager.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. Measurement will be based on the percentage complete for the lump sum contract amount for earth moving.

### 4.2 PAYMENT

A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

**END OF SECTION 31 20 00**

## **SECTION 32 13 13      CONCRETE WALKS, CURBS, AND MISCELLANEOUS FLATWORK**

### **PART 1 - GENERAL**

#### **1.1      RELATED DOCUMENTS**

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

#### **1.2      SUMMARY**

- A. This Section includes requirements for furnishing, placing, shoring, bracing, and anchorage of formwork, concrete reinforcement, accessories, and placing concrete flatwork, including walks, curbs and gutters, ramps, and pans, including installation of control and expansion joints, concrete curing and concrete finishing.
- B. Related Sections:
  - 1. Division 01 Section "Layout of Work and Surveys".
  - 2. Division 01 Section "Submittals".
  - 3. Division 01 Section "Contractor Quality Control".
  - 4. Division 01 Section "Erosion and Sedimentation Control".
  - 5. Division 03 Section "Cast-In-Place Concrete".
  - 6. Division 31 Section "Earth Moving".

#### **1.3      REFERENCES**

- A. Note: All references below shall be from the most current edition.
- B. American Concrete Institute (ACI):
  - 1. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
  - 2. ACI 301 - Specifications of Structural Concrete for Buildings.
  - 3. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
  - 4. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
  - 5. ACI 315 - Details and Detailing of Concrete Reinforcement.
  - 6. ACI 318 - Building Code Requirements for Reinforced Concrete.
  - 7. ACI 347 - Recommended Practice for Concrete Formwork.
- C. American Society for Testing and Materials (ASTM):
  - 1. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
  - 2. ASTM C33 - Concrete Aggregates.
  - 3. ASTM C94 - Ready-Mixed Concrete.
  - 4. ASTM C150 - Portland Cement.
  - 5. ASTM C260 - Air Entraining Admixtures for Concrete.
  - 6. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
  - 7. ASTM C494 - Water Reducing Admixtures for Concrete.
  - 8. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
  - 9. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
  - 10. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.

- D. CRSI - Manual of Standard Practice.
- E. Colorado Department of Transportation (CDOT) – Standard Specifications for Road and Bridge Construction, latest edition
- F. National Ready Mixed Concrete Association

#### 1.4 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. Definitions: Refer to ACI 301 11.7 for definition of slab surface finishes.

#### 1.5 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product indicated.
- C. Material Certificates: For the following, from manufacturer:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Fiber reinforcement.
  - 4. Admixtures.
  - 5. Curing compounds.
  - 6. Applied finish materials.
  - 7. Bonding agent or epoxy adhesive.
  - 8. Joint fillers.
- D. Field quality control reports.
- E. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- F. Mix Designs:
  - 1. Submit substantiating data for each concrete mix design specified for use to the Project Manager not less than four (4) weeks prior to first concrete placement. Data for each mix shall, as a minimum, include the following per section 2.7.B:
    - a. Mix identification designation (unique for each mix submitted).
    - b. Statement of intended use for mix.
    - c. Mix proportions.
    - d. Aggregates.
    - e. Admixtures (must be approved by the Project Manager)
    - f. Wet and dry unit weight.
    - g. Entrained air content.
    - h. Design slump.
    - i. Strength qualification data.

## 1.6 QUALITY CONTROL

- A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.
- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- E. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- F. Pre-installation Conference: Conduct conference at Project site.
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete Subcontractor.
    - e. Special concrete finish Subcontractor.
  - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.
- G. Sample Panel(s): If requested by the Project Manager, prior to starting any concrete paving, provide a sample panel using materials indicated for project work. For each type, color and finish of concrete specified, build panel at the site of full thickness and approximately ten feet (10') by 10 feet (10'), including expansion joints, control joint, scales, fillers, and one radial edge. Provide the workmanship proposed for the work. Correct and replace sample panel until Project Manager's acceptance of the work. Retain panel(s) during construction as a standard for completed paving work.
  - 1. The approved sample panel may be a portion of the work and remain in place. Locations as directed by the Project Manager.

- H. Record of Work: A record shall be kept by the Contractor listing the time and date of placement of all concrete for paving. Such record shall be kept until the completion of the project and shall be available to the Project Manager for examination at any time.
- I. All testing shall be completed by the Contractor at their expense unless otherwise specified by the contract.
  - 1. Testing Frequency: Obtain at least one composite sample for each one hundred (100) cu. yd. or five thousand (5,000) sq. ft. or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five (5) compressive-strength tests for each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
  - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four (4) standard cylinder specimens for each composite sample.
  - 5. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at twenty eight (28) days, and keep one for backup in the event a sample should break.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at twenty eight (28) days.
- J. Strength of each concrete mixture will be satisfactory if average of any three (3) consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than two-hundred (200) psi.
- K. Test results shall be reported in writing to Project Manager, concrete manufacturer, and Contractor within forty eight (48) hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at twenty eight (28) days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both seven (7) and twenty eight (28) day tests.
- L. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Project Manager.
- M. Concrete paving will be considered defective if it does not pass tests and inspections.
- N. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- O. Prepare test and inspection reports.

## 1.7 DELIVERY, STORAGE AND HANDLING

- A. General: Materials handling and batching shall conform to applicable provisions of ASTM C94.
- B. Reinforcing: Unload and store reinforcing bars so they are kept free of mud and damage.
- C. Hauling Time for Concrete: Deliver and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours, or three hundred (300) revolutions of the drum after the mixing water has been added, whichever is earliest.
- D. Extra Water:
  - 1. Deliver concrete to site in exact quantities required by design mix.
  - 2. Should extra water be required for workability before depositing concrete, and the water/cement ratio of accepted mix design will not be exceeded, the General Contractor's superintendent shall have the sole authority to authorize addition of water. Additional water shall not exceed one (1) gallon/cu. yd. Any additional water added to mix after leaving batch plant shall be indicated on truck ticket and signed by person responsible.
  - 3. Where extra water is added to concrete it shall be mixed thoroughly for thirty (30) revolutions of drum before depositing.
  - 4. Water may be added at the site only once for each batch.
  - 5. A full set of tests shall be performed after addition of water. Excessive slump or other out of range tests will be cause for rejection.

## 1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
  - 1. Cold Weather Placement:
    - a. When for three successive days prior to concrete placement the average daily outdoor temperature drops below forty degrees (40°) F or when the average outdoor temperature is expected to drop below forty degrees (40°) F on the day of concrete placement, preparation, protection and curing of concrete shall comply with ACI 306R. Concrete temperature shall maintained above fifty degrees (50°) F using concrete blankets or heating.
    - b. Minimum temperature of concrete upon delivery shall conform to ACI 301 Table 7.6.1.1. Concrete at time of placement shall conform to minimum values of ACI 306R Table 1.4.1, and shall not be below minimum temperature of fifty degrees (50°) F.
    - c. Subject to acceptance of the Project Manager an accelerating admixture may be used. Admixtures shall meet requirements of Part 2. Calcium Chloride and other chloride-type accelerating admixtures are not allowed.
    - d. Comply with concrete protection temperature requirements of ACI 306R. Record concrete temperatures during specified protection period at intervals not to exceed sixteen (16) hours and no less than twice during any twenty four (24) hour period.
  - 2. Hot Weather Placement:
    - a. When depositing concrete in hot weather, follow recommendations of ACI 305R.
    - b. Temperature of concrete at time of placement shall not exceed eighty five (85°) F.
    - c. When air temperatures on day of placement are expected to exceed ninety degrees (90°) F, mix ingredients shall be cooled before mixing. Flake ice or well-crushed



ice of a size that will melt completely during mixing may be substituted for all or part of mix water.

- d. Retarding admixture may be used subject to acceptance of the Project Manager. Admixtures shall meet requirements of Part 2.
  - e. Protect to prevent rapid drying. Start finishing and curing as soon as possible.
- B. Protection: Protect newly finished slabs from vandalism and all weather related damage. Protect finished slabs from mortar leakage from pouring of concrete above. Cover masonry walls, glazing, and other finish materials with polyethylene or otherwise protect from damage due to pouring of concrete.
- C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- D. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of forty degrees (40°) F for oil-based materials, fifty five degrees (55°) F for water-based materials, and not exceeding ninety five degrees (95°) F.

#### 1.9 RIGHT OF WAY WORK

- A. Contractor shall obtain all necessary permits when working with in the Right of Way.
- B. Contractor shall preserve and protect all permanent land survey control markers. Per the General Contract Conditions Article 319 "Preservation of Permanent land Survey Control Markers".

### PART 2 - PRODUCTS

#### 2.1 SUBGRADE MATERIAL

- B. Dense, readily compactible material, free from organic matter, clay, and loose rock in excess of one and one half-inches (1-1/2"). Material excavated from on-site that meets this requirement may be used if approved by Project Manager. Material properties to be in conformance with project Geotechnical Report.

#### 2.2 FORM MATERIALS

- A. Hand Placed Steel Forms: Hand placed steel forms are only to be used for sections that are straight and have no bend, radii or curvature in the sections to be used.
- B. Plywood Forms: Are to be used on any section of concrete that have bends, radii or curvature. Forms shall be made of Douglas Fir or Spruce species; solid one side grade; sound, undamaged sheets with straight edges. Staking shall be adequate to hold wet concrete while maintaining the desired radii.
- C. Lumber: Douglas Fir or Spruce species; construction grade; with grade stamp clearly visible.
- D. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

## 2.3 CONCRETE MATERIALS

- A. Provide materials in accordance with ACI 301, unless amended or superseded by requirements of this section or general notes on structural drawings.
  - 1. General: Ready-mixed Concrete: ASTM C94. On-site mixed concrete not allowed.
  - 2. Cement: ASTM C150. Type II minimum of five hundred sixty four (564) pounds per cubic yard.
  - 3. Fly Ash: ASTM C618 Class C or F. Fly ash shall not exceed fifteen percent (15%) of total cementitious material by weight.
  - 4. Aggregate: ASTM C33. Obtain from same source throughout project.
    - a. Fine Aggregate: Natural sand.
    - b. Coarse Aggregate: Gravel or crushed stone containing no deleterious substances which cause surface spalling.
  - 5. Water: ASTM C 94/C 94M, Clean and not detrimental to concrete.

## 2.4 STEEL REINFORCEMENT

- A. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than twenty five percent (25%).
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars.
- D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.
- E. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars.
- F. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- G. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

- I. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

## 2.5 SLIP “SPEED” DOWELS

- A. Slip Joints:
  - 1. Speed Dowel Model PSD09/#4TX, 9” long sleeve to accommodate 18” smooth steel round bar. Manufactured by Sika/Greenstreak, (800)325-9504, or equal.
  - 2. Dowel, 18” long smooth round steel bar, 5/8” diameter. De-bur cut ends.

## 2.6 ADMIXTURES

- A. General: Unless specified, no admixtures may be used without specific approval of the Project Manager.
- B. Prohibited Products: Calcium chloride or admixtures containing more than 0.05% chloride ions or thiocyanates are not permitted.
- C. Air-Entraining Admixture: ASTM C260. Subject to compliance with requirements, provide one of the following:
  - 1. “Air Mix” by Euclid Chemical Co.
  - 2. “Darex ARA” by W. R. Grace.
  - 3. “Micro-Air” by Master Builders.
  - 4. Or equal.
- D. Water Reducing Admixture: ASTM C494, Type A. Subject to compliance with requirements, provide one of the following:
  - 1. “Eucon WR-75” by Euclid Chemical Co.
  - 2. “Rheobuild 1000” by Master Builders.
  - 3. “Plastocrete 106” by Sika Chemical Co.
  - 4. Or equal.
- E. High Range Water Reducing Admixture (Superplasticizer): ASTM C494, Type F or G. Subject to compliance with requirements, provide one of the following:
  - 1. “Eucon 37” by Euclid Chemical Co.
  - 2. “Pozzolith 400N” by Master Builders.
  - 3. “Sikament” by Sika Chemical Co.
  - 4. Or equal.
- F. Warm weather admixtures: ASTM C494. Use of admixtures will not relax warm weather placement requirements.
- G. Cold Weather Admixtures: ASTM C494. Use of admixtures will not relax cold weather placement requirements.
- H. Color Admixtures
  - 1. Davis Colors chart or approved equal.

## 2.7 CONCRETE MIX

- A. Refer to the Denver Right of Way Services approved materials list of pre-approved concrete mixes at the following website:

<http://denvergov.org/rightofwayservices/RightofWayServices/ConstructionInspection/RightofWayConstructionInspection/ApprovedMaterials/tabid/442460/Default.aspx>

- B. All Concrete mixes from the approved list or submitted for approval shall meet the following criteria.

1. All concrete for flatwork shall be Class P (four thousand two hundred (4,200) PSI) unless otherwise requested by the Project Manager.
2. Mix concrete in accordance with ASTM C94 and ACI 301 Chapter 3.
3. Cement Content: Type II cement, minimum of five hundred sixty four pounds (564#) per cubic yard.
4. Maximum water-cement ratio: 0.44.
5. Slump: 4-inches maximum when hand placed.
6. Air Entrainment: five percent (5%) to eight percent (8%).
7. Aggregate Size: three quarter-inch (3/4") maximum.
8. Deliver concrete and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours, or three hundred (300) revolutions of the drum after the mixing water has been added, whichever is earliest.
9. During cold weather (below forty five degrees (45°) F), use heated water and aggregates if necessary to maintain concrete temperature between sixty degrees (60°) F. and ninety degrees (90°) F.
10. Concrete for Footings, Walls, and Interior Slabs-on-Grade shall be Class B, as approved by the Project Manager.
11. Concrete for Exterior Flatwork, including Pavement, Curb and Gutter, and Drainage Pans shall be Class P, as approved by the Project Manager.
12. Fly Ash: Per CDOT Standard Specifications for Road and Bridge Construction Section 701.02.

## 2.8 FIBROUS CONCRETE REINFORCEMENT

- A. Shall be one hundred percent (100%) virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation utilizing twenty five (25) individual fiber designs for use as concrete secondary reinforcement. Volume per cubic yard shall be one and one-half (1.5) pounds, or in accordance with manufacturer's recommendations. Fiber manufacturer must document evidence of five (5) year satisfactory performance history, compliance with applicable building codes and ASTM C1116 Type III 4.1.3 and ASTM C1116 Performance Level I.
1. Fibrous concrete reinforcement shall be utilized in all flatwork applications.

## 2.9 EXPANSION JOINT MATERIAL

- A. Interior Use or Exterior Use where sealants are specified: Bituminous saturated fiber conforming to ASTM D1751, one half-inch (1/2") thick. Provide manufacturer's certification of compatibility with specified sealants where required.

- B. Pre-molded closed cell polyethylene foam: Backer rod if required, equal to “Sonoflex F” by BASF, Provide half-inch (1/2”) thick by depth of the slab material, allow half-inch (1/2”) thickness for joint sealer.
- C. Joint Sealant: Sonolastic Sealant as manufactured by BASF or a silicone material that is on CDOT’s approved silicone sealant list. Where color additive is used, color to match.

#### 2.10 CONTROL JOINTS

- A. Shall be in conformance with current Denver Department of Public Works Traffic Engineering Standards and Details and as shown on Contract Drawings

<http://www.denvergov.org/Portals/487/documents/CCD%202010%20Trans%20Standards%20and%20Details%20-%20Complete.pdf>

#### 2.11 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately nine (9) oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
  - 1. Products: Subject to compliance with requirements:
    - a. BASF Construction Chemicals, LLC; Confilm.
    - b. Or approved equal.
- E. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type two (2), Class B, dissipating.
  - 1. Products: Subject to compliance with requirements:
    - a. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
    - b. Or approved equal.

#### 2.12 RELATED MATERIALS

- A. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of one eighth-inch (1/8”) to one quarter-inch (1/4”) to match Project Manager’s sample.
  - 1. Products: Subject to compliance with requirements:
    - a. Conspec by Dayton Superior; Delay S.
    - b. Or approved equal.

#### 2.13 TRUNCATED DOME INSERTS FOR RAMPS

- A. Shall be in conformance with current Denver Department of Public Works standards.

## PART 3 - EXECUTION

### 3.1 PREPARATION OF SUBGRADE

- A. Excavate to required depth in accordance with geotechnical report. Remove soft, yielding material and replace with select fill. Compact to minimum ninety five percent (95%) Standard Proctor within two percent (2%) of optimum moisture.

### 3.2 MAINTENANCE OF SUBGRADE

- A. Maintain subgrade in a compacted condition until concrete is placed.

### 3.3 FORMS

- A. Metal or uniform warp free lumber, coated with form release agent. Slope forms to give slabs positive drainage and stake securely. Obtain approval of Project Manager for alignment and grade of forms a minimum of forty eight (48) hours prior to placing concrete. Any concrete work installed without obtaining approval from the Project Manager shall be subject to removal and replacement at the discretion of the Project Manager, at no cost to the City.
- B. Radii shall be continuous and flowing to avoid angular intersections in the horizontal alignment, radial forming shall use bender board or approved equal as directed by Project Manager.

### 3.4 STEEL REINFORCEMENT

- A. Install steel reinforcement only in locations shown on Contract Drawings.
- B. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- C. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- D. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

### 3.5 CONCRETE PLACEMENT

- A. Prior to placing any new sections of asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of 6-inches. In areas where existing pavement is to be removed and replaced the existing compacted subgrade may be reused if the subgrade meets specified compaction. In areas of existing subgrade that do not meet the specified compaction, materials shall be removed, replaced and compacted to meet the specified proctor density. Adjust moisture content and compact as hereinafter specified.
- B. Before placing concrete, inspect and complete formwork installation, steel reinforcement (if present), and items to be embedded or cast-in.
- C. Do not place concrete on frozen surfaces.

- D. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- E. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- F. Do not add water to concrete during delivery.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not use vibratory equipment to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Screed paving surface with a straightedge and strike off.
- J. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- K. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- L. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
  - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- M. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - 1. When air temperature has fallen to or is expected to fall below forty degrees (40°) F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than fifty degrees (50°) F and not more than eighty degrees (80°) F at point of placement.
  - 2. If subgrade is frozen, as determined by Geotechnical Engineer and/or Project Manager, thaw subgrade to depth of eight (8") prior to placing concrete.
  - 3. Do not use frozen materials or materials containing ice or snow.
  - 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- N. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below ninety degrees (90°) F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.6 CONCRETE FINISHING

- A. After darbying or bullfloating, stop finishing until bleeding has ceased and until concrete can support foot pressure with only about one eighth-inch (1/8") indentation. During or after the first floating, check planeness of surface with a ten foot (10') straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within one eighth-inch (1/8") in ten feet (10').
- B. Finishes:
  1. Medium Broom Finish: Provide a medium broom finish for all exterior concrete unless otherwise noted. Immediately after float finishing and tooling control joints, roughen surface with fiber-bristle broom to match the approved mockup panel. Confirm direction or pattern of broom finish with the Project Manager prior to commencing slab placement.
- C. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a three eighths-inch (3/8") radius. Final concrete finish to completed following jointing. Surface/edging tool marks are not acceptable.
- D. Handicap Ramps:
  1. Provide score joints in handicap ramps, tooled in a pattern in accordance with standard Denver Public Works standards.
  2. Install truncated dome inserts flush with the adjacent ramp surface in accordance with standard Denver Public Works standards, taking care to achieve a tight bond with the concrete, free of air pockets.

### 3.7 CONCRETE CURING, PROTECTION AND SURFACE TREATMENTS

- A. Refer to the list of curing materials in section 2.11. Apply curing materials as specified by the manufacturer.
- B. General:
  1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.
  2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete unless test cylinders, made and kept adjacent to the structure and cured by the same methods, are tested with the average compressive strength equal to seventy percent (70%) of the specified twenty eight (28) day strength.
  3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period. During hot and cold weather, cure concrete in accordance with ACI 305R and ACI 306R.
- C. Curing Methods: Perform curing of concrete by moisture curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified. Coordinate with



and choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Provide moisture curing by one of the following methods:
    - a. Keep concrete surface continuously wet by covering with water.
    - b. Continuous water-fog spray.
    - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping it continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
  2. Provide moisture retaining cover curing as follows: Cover concrete surfaces with a moisture-retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least 3-inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  3. Provide curing and sealing compound to exterior slabs, walks, curbs, etcetera as follows:
    - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within thirty (30) minutes). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to rainfall within three hours after initial application.
    - b. Maintain continuity of coating and repair damage during period.
- D. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above for specified curing time.

### 3.8 JOINTS

- A. Construct joints true to line with faces perpendicular to surface.
- B. Expansion Joints: Expansion joint material shall be provided at the following locations and shall be in place prior to the placing of concrete:
  1. As shown on the Contract Drawings; or
  2. At each end of curb return.
  3. Between sidewalk and driveway slabs or service walks.
  4. Between new concrete and existing concrete.
  5. Between new concrete and fixed vertical objects.
  6. At maximum one hundred twenty foot (120') spacing.
  7. As directed by Project Manager.
  8. Thoroughly clean all surfaces prior to installation of sealant material.
- C. Speed Dowels:
  1. Attach bases to the face of concrete forms using a double-headed nail or self-tapping screw.
  2. Center of base shall be centered on form.
  3. Prior to pouring concrete, Speed Dowel sleeve shall be slipped over base.
  4. Pour concrete minimum eighteen-inches (18") from Speed Dowel system and work concrete around the Speed Dowel System.
  5. Concrete forms shall be removed with bases still attached. Bases may be reused.

6. Install slip dowels to the full depth of the embedded Speed Dowel sleeve and proceed with next concrete pour.
7. Greasing of dowels is not required. Embedded Speed Dowel Sleeve accommodates expansion and shrinkage movements that may occur.
8. Bent or badly sheared slip dowels shall not be used. Saw cut dowels recommended.
9. Concrete shall not be poured directly over the Speed Dowel System.
10. Place edge forms plumb. Out of plumb forms may result in misaligned dowels.

D. Contraction (Control) Joints in Walks: Contraction joints shall be formed with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut one eighth-inch (1/8") wide joints into concrete that has hardened sufficiently that cutting action will not tear, abrade, or otherwise damage surface, but before development of random contraction cracks. Sawed cut joints shall be spaced at a distance equal to the width of the walk, but not over ten feet (10') unless approved by the Project Manager. Depth of joints shall be one-fourth (1/4) the slab thickness.

1. Tooled joints will not be allowed on concrete trails, unless directed by the Project Manager.

E. Curb and Gutter Contraction (Control) Joints: Space curb and gutter joints not more than twelve foot six-inches (12'-6") on center, and align them with sidewalk joints. Contraction joints shall be tooled. Form plane of weakness by inserting and later removing a metal divider, finish with an edger or groover, or by saw cutting a previously tooled joint.

### 3.9 FORM REMOVAL

- A. Remove forms after concrete surface is hard enough so as not to be damaged in any way. Reasonable care is to be used in removing forms. Repair minor defects with high strength grout as per Project Managers direction. Plastering will not be permitted on exposed faces.

### 3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Project Manager.
- B. Drill test cores, where directed by Project Manager, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

### 3.11 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117, the drawings, and as follows:
  1. Elevation: In conformance with grading plans.
  2. Thickness: Plus three eighths-inch (3/8"), minus one quarter-inch (1/4").

3. Surface: Gap below ten foot (10') long, unlevelled straightedge not to exceed one eighth - inch (1/8").
4. Lateral Alignment and Spacing of Dowels: one-inch (1").
5. Vertical Alignment of Dowels: one quarter-inch (1/4").
6. Joint Spacing: three-inches (3").
7. Contraction Joint Depth: Plus one quarter-inch (1/4"), no minus.
8. Joint Width: Plus one eighth-inch (1/8"), no minus.

#### PART 4 - MEASUREMENT AND PAYMENT

- 4.1 Measurement: Measurement will be based on the percentage complete for the lump sum contract amount for concrete walks, curbs and miscellaneous flatwork.
- 4.2 Payment: Payment will be made at the lump sum contract price, and shall include all equipment, excavation, loading, transporting, stockpiling, disposing, hauling off, watering, compaction, sub-grade preparation, formwork, placing of concrete, reinforcing, joints, curing, finishing and all other items required to complete the work.

**END OF SECTION 32 13 13**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. The Work of this Section includes furnishing and installing entire fence system, including fence framework, fabric and accessories, manual gates and all related hardware.
- B. Related Sections:
  - 1. Division 01 Section "Layout of Work and Surveys".
  - 2. Division 01 Section "Submittals".
  - 3. Division 01 Section "Contractor Quality Control".
  - 4. Division 01 Section "Erosion and Sedimentation Control".
  - 5. Division 01 Section "Material and Equipment".
  - 6. Division 01 Section "Tree Retention and Protection".
  - 7. Division 03 Section "Cast-In-Place Concrete".
  - 8. Division 31 Section "Earth Moving".
  - 9. Division 31 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
  - 10. Division 32 Section "Sodding".

## 1.3 REFERENCES

- A. Comply with the following standards unless noted otherwise.
  - 1. ASTM A116 – Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
  - 2. ASTM A53/A53M – Pipe, steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Use.
  - 3. ASTM A123 – Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
  - 4. ASTM A153 – Zinc-Coated (Hot-Dip) on Iron and Steel Hardware.
  - 5. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.
  - 6. ASTM A392-11a – Top and Bottom Knuckled Selvage Chain Link Fabric.
  - 7. ASTM F668 – PVC Coated Steel Chain Link Fence Fabric.
  - 8. ASTM F934 – Colors for PVC Fence Coatings.

## 1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Minimum Post Size: Determine according to ASTM F 1043 for framework up to 12 feet (3.66 m) high, and post spacing not to exceed 10 feet (3 m).
2. Minimum Post Size and Maximum Spacing: Determine according to Chain Link Fence Manufactures Institute (CLFMI WLG 2445), based on mesh size and pattern specified and on the following:
  - a. Wind Loads: Per City and County of Denver Standards.
  - b. Exposure Category: Per City and County of Denver Standards.
  - c. Fence Height: Per plans and details.
  - d. Material Group: Schedule 40 steel pipe

## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
  1. Fence and gate posts, rails, and fittings.
  2. Chain-link fabric, reinforcements, and attachments.
  3. Accessories.
  4. Gates and hardware.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, and operational clearances.
- C. Samples for Initial Selection: Color and finish samples for components with factory-applied color finishes.
- D. Samples for Verification: Prepared on Samples of size indicated below:
  1. Polymer-Coated Components: In 6-inch (150-mm) lengths for components and on full-sized units for accessories.
- E. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:
  1. Polymer finishes.
  2. Gate hardware.

## 1.6 QUALITY CONTROL

- A. Testing Agency Qualifications: For testing fence grounding. Member company of NETA or an NRTL.
  1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

## 1.7 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling.
- B. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

## 1.8 WARRANTY

- A. See Division 1.
- B. Special Warranty: Manufacturer's standard form in which installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: (1) year from date of Substantial Completion.

## 1.9 SITE CONDITIONS

- A. Protection of Monuments: Locate, protect and maintain benchmarks, monuments, control points and project engineering reference points. Re-establish disturbed or destroyed items at the Contractor's expense.
- B. Site Drainage and Dust: The Contractor shall maintain positive drainage into all existing drainage ways. The project area shall be graded to smooth all uneven areas prior to installation of fencing materials and at the completion of fence installation. Control dust caused by the work. Dampen surfaces as required.
- C. Site Access: The Contractor shall access each project site at locations designated by the Project Manager. No heavy trucks are allowed on turf areas. Should the work be for the installation of a ball field fence access for fence installation will only be allowed from outside the ball field area.
- D. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. All fence materials shall meet the minimum requirements established by the Chain Link Fence Manufacturers Institute (CLFMI).

### 2.2 FENCE FABRIC

- A. Galvanized Fabric: hot dip galvanized after weaving in accordance with ASTM A116.
  - 1. Fabric Height: As indicated on Drawings.

2. Steel Wire Fabric: Wire with a diameter of 9 gauge (0.1144").
  - a. Mesh Size: 1.75 inches (44.45 mm).
  - b. Zinc-Coated Fabric: ASTM A 392, Type II, [Class 1, 1.2 oz./sq. ft. (366 g/sq. m)] [Class 2, 2.0 oz./sq. ft. (610 g/sq. m)] with zinc coating applied after weaving.

B. Selvage: Knuckled at both selvages, top and bottom.

C. Vinyl Coated Fabric: Galvanized fabric as specified above, with Polyvinyl Chloride (PVC) coating. PVC coating to be Class 2B (thermally fused and bonded to metallic coated steel wire). Color in accordance with ASTM F934, to be selected by the Project Manager.

## 2.3 FENCE FRAMEWORK

A. Galvanized Posts and Rails: Hot dip galvanized HT-25 Fence Pipe, conforming to ASTM F1043, of sizes noted on the drawings and details.

B. Polyester Powder Coated Posts and Rails: For use in conjunction with vinyl coated fabric. Min. thickness of finish polyester powder coat shall be 2- to 3-mils over 2-mil zinc epoxy. Color of fabric and framework to match approved sample.

## 2.4 TENSION WIRE

A. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824, with the following metallic coating:

1. Type II, zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:

- a. Class 3: Not less than 0.8 oz./sq. ft. (244 g/sq. m) of uncoated wire surface.

2. Type III, Zn-5-Al-MM alloy with the following minimum coating weight:[Choose one]

- a. Class 60: Not less than 0.6 oz./sq. ft. (183 g/sq. m) of uncoated wire surface.

B. Polymer-Coated Steel Wire: [0.177-inch- (4.5-mm-)] [0.148-inch- (3.8-mm-)] diameter, tension wire complying with ASTM F 1664, over zinc coated steel wire.

1. Color: Match framing members, chain-link fabric, and approved sample, complying with ASTM F 934.

## 2.5 TIE WIRES

A. Steel Wire: 6 gauge, wire complying with ASTM A 817 and ASTM A 824. Coating to match fence fabric and structure. Aluminum tie wires are not acceptable.

## 2.6 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and both single and double swing gate types.

B. Materials for gates shall match fence materials relative to finish and color.

## CHAIN LINK FENCING

- C. Dimensions and member sizes as indicated on drawings.
- D. Pipe and Tubing:
  - 1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; [protective coating and finish to match fence framing and approved sample.
  - 2. Gate Posts: Round tubular steel.
  - 3. Gate Frames and Bracing: Round tubular steel.
- E. Frame Corner Construction: Per Denver Parks and Recreation Standards
- F. Hardware:
  - 1. Per Denver Parks and Recreation Standards

## 2.7 FENCE FITTINGS

- A. The material for fence fittings shall be manufactured to meet the requirements of ASTM F626. The coating for all fittings shall be the same as that required for the framework and matching the approved sample.
- B. Post Caps: Provide for each post.
  - 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches (152 mm) long.
  - 2. Rail Clamps: Line and corner boulevard clamps for connecting [intermediate] [and] [bottom] rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: [Steel, hot-dip galvanized after threading] [Mill-finished aluminum] rod and turnbuckle or other means of adjustment.

## 2.8 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.



## PART 3 - EXECUTION

### 3.1 SITE CONDITIONS

#### A. Existing Conditions:

1. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
2. Soil Conditions: Investigate the type of soil and conditions in which lines are to be installed and allow for same in proposal. No extra payment will be allowed due to difficulty in excavating, unless approved by the Project Manager.
3. Contractor is responsible for understanding the scope of related operations as specified and indicated in the Drawings and Specifications before beginning Work under this Section.
4. Report unsatisfactory conditions in writing to the Project Manager. Commencement of installation means acceptance of existing conditions by the Contractor.
5. Do not begin installation before final grading is completed unless otherwise permitted by Project Manager.

#### B. Protection of Property:

1. Preserve and protect all trees, plants, monuments, structures, and paved areas from damage due to Work of this Section. In the event damage does occur, all damage to inanimate items shall be completely repaired or replaced to satisfaction of the Project Manager, and all injury to living plants shall be repaired or replaced by the City. All costs of such repairs shall be charged to and paid by Contractor.
2. Protect buildings, walks, walls, and other property from damage. Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site. Damage caused to asphalt, concrete, or other building material surfaces shall be repaired or replaced at no cost to the City. Restore disturbed areas to original condition.

#### C. Protection of Existing Trees:

1. Consult with Denver City Forester as requested by Project Manager prior to digging within critical root zones. All digging or work within critical root zones of any tree shall be dug by hand or by other methods as directed by the City Forester or Project Manager so as to prevent damage to limbs or branches and root system. See Division 01 Section "Tree Retention and Protection".

#### D. Protection and Repair of Underground Lines:

1. Request utility locates 72-hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. Take whatever precautions are necessary, including pot holing to verify location and depth to protect these underground lines from damage. If damage does occur, all damage shall be repaired by the Utility Owner. All costs of such repairs shall be paid by Contractor.
2. Contractor is required to contact all private utility companies including City departments to locate all private utilities. A minimum of 72-hours prior to proceeding with any excavation. If, after such requests private utilities are encountered and damaged by the contractor these shall be repaired by the City at no cost to the contractor. If Contractor damages staked or located private utilities, they shall be repaired by Utility Owner at Contractor's expense.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, irrigation system, underground structures, benchmarks, and property monuments.

### 3.3 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with recommendations of the Chain Link Fence Manufacturers Institute and in compliance with ASTM F 567
  - 1. Install fencing on established boundary lines inside property line.
- B. Workmanship: The complete fence shall be plumb, both in line and transverse to the fence, straight and rigid with fabric tightly stretched and held firmly in place. Install fencing with bottom of fabric flush with grade. Details of construction, not specified shall be performed in keeping with good standard fencing practice.
- C. Concrete: Set all posts in concrete, designed to have a minimum compressive strength of 3000 PSI at 28-days. Allow all posts to set at least 48-hours before top rails, center rails, wire fabric, and fittings are installed.
- D. Posts:
  - 1. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more or as indicated on drawings. Set posts plumb.
  - 2. Line Posts: Space line posts uniformly as indicated on drawings. Set posts plumb.
  - 3. Set posts in concrete as shown on drawings or per manufactures specifications. Install mow strip per Division 03 Section "Cast in Place Concrete" (when applicable) where required and as indicated on drawings, with control joints centered on posts.
- E. Rails:
  - 1. Set rails as nearly parallel to finish grade as possible and at the specified height shown on the Drawings.
  - 2. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
  - 3. Intermediate and Bottom Rails: Install and secure to posts with fittings.
- F. Fabric:
  - 1. Fabric shall be full height as shown on details.
  - 2. Where applicable, all fabric shall be attached to the ball field side of the fence with the ties spaced at 1-foot intervals (maximum) on all posts and 2-foot intervals (maximum) on all rails, with no sharp ends projecting.
  - 3. Selvages shall be knuckled top and bottom throughout, as detailed.
  - 4. Fabric shall be tightly stretched and securely fastened with fittings and accessories provided by the manufacturer.
  - 5. Minimum width of fabric on fences shall be no less than the distance between two panels or posts.

6. Fabric on high fences shall lap or splice only at intermediate rails.
7. Bottom knuckled selvage of fabric shall be in contact with top of mowing strips – no gaps allowed.
8. Fasten fabric to top rail, line post, braces and bottom tension wire/bottom rail with tie wire at maximum 12-inches on center.
9. Attach fabric to end, corner and gate posts with tension bars and tension bar clips. The tension bars shall be of lengths 2-inches less than the full height of the fabric with which they are to be used. Bars shall be attached to the fabric by threading through the fabric, by bands or other mechanical means, and installed at all terminal or corner posts and gate posts.

G. Install gates with fabric, structure and ties to match fence.

### 3.4 FIELD QUALITY CONTROL

- A. The Contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

### 3.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

### 3.6 TOLERANCES

- A. Variation from plumb: 1/4-inch in 6-feet; 1/2-inch maximum overall.
- B. Variation in line of posts: 1/4-inch in 20-feet horizontal; 1/2-inch maximum overall.

### 3.7 CLEAN UP

- A. Maintain a neat and orderly work site at all times.
- B. Upon completion of site work, clean up area, remove tools, equipment, materials and debris.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for chain link fencing.

4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

END OF SECTION 32 31 13

**PART 1: GENERAL****1.1 SUMMARY**

- A. Furnish all labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to complete installation of site work and site furnishings, bench, trash receptacles. Install per manufacturer's specifications.

**1.2 SUBMITTALS**

- A. Submit samples under provisions of Section 01330 - Submittal Procedures.
- B. Manufacturer's Technical Literature: Submit manufacturer's specifications, cut sheets, shop drawings, and color samples for:
  - 1. Trash Receptacles.
  - 2. Grill
  - 3. Benches
  - 4. Bike Rack

**1.3 HANDLING AND STORAGE**

- A. Protect all materials from damage, deterioration, or loss of any kind while in storage and during construction.
- B. Ensure that materials have not been damaged during shipping. No damaged materials shall be accepted. If materials have been damaged beyond repair, they must be replaced with new materials of the same type and kind at no additional cost to the Owner. Damaged materials that have been repaired will be accepted only if the damaged part or parts can be replaced with a completely new manufacturer-supplied part or parts of the same type and kind.

**PART 2: MATERIALS****2.1 TRASH RECEPTACLE**

- A. Wausau Tile Inc., Model# MF 3202, Side Door, Ribbon Style, Surface Mount,  
Color: RAL 6012 Black Green  
Quantity: 2

**2.2 GRILL**

- A. Little Tikes, Model # 200 Rotating Pedestal Grill,  
Color: Black  
Quantity: 1

**2.3 BENCHES**

- A. Backed Bench, Wausau Tile, Model# 2200 Ribbon Slats  
Color: RAL 6012 Black Green  
Quantity: 2
- B. Backless Bench, Wausau Tile, Model# 2202 Ribbon Slats Backless  
Color: RAL 6012 Black Green  
Quantity: 4

#### 2.4 BIKE RACK

- A. Wausau Tile, Model# MF 9006 Inverted 'U', Surface Mount  
Color: RAL 6012 Black Green  
Quantity: 4

### PART 3: EXECUTION

#### 3.1 PICNIC TABLES, TRASH RECEPTACLE, GRILL, BENCHES AND BIKE RACKS

- A. Locate all furniture on site for review by Owner's Representative. All Trash receptacles, shall be set plumb and level. Install per manufacturer's recommendations.
- B. Prior to completion of project, clean all furniture, as needed, to remove any dust and dirt. Provide a clean factory finish at time of final review.

### PART 4: MEASUREMENT AND PAYMENT

#### 4.1 MEASUREMENT

- A. Measurement for site furnishings will not be measured, but will be a lump sum item, in accordance with the Drawings and as directed by the Project Manager.

#### 4.2 PAYMENT

- A. Payment: Payment shall include furnishing and installation of Site Furnishings in accordance with the Drawings and Specifications and manufacturers recommendations.

**END OF SECTION 32 33 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the requirements for the installation of an underground irrigation system including the following:
  - 1. Trenching, stockpiling excavation materials, refilling and compacting trenches.
  - 2. Complete irrigation system including but not limited to piping, valves, fittings, heads and wiring, sensors, backflow preventer(s), Automatic Irrigation Controller(s) and final adjustments to insure complete coverage.
  - 3. Water connections.
  - 4. Replacement of unsatisfactory materials.
  - 5. Cleanup, inspections, and approval.
  - 6. Testing.
- B. Related Sections:
  - 1. Division 01 Section "Contractor Quality Control".
  - 2. Division 01 Section "Erosion and Sedimentation Control".
  - 3. Division 01 Section "Tree Retention and Protection".
  - 4. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
  - 5. Division 32 Section "Soil Preparation".
  - 6. Division 32 Section "Topsoil".
  - 7. Division 32 Section "Sodding".
  - 8. Division 32 Section "Plants".

**1.3 REFERENCES**

- A. Conform to requirements of reference information listed below except where more stringent requirements are shown or specified in Contract Documents.
  - 1. American Society for Testing and Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section.
  - 2. Underwriters Laboratories (UL) - UL Wires and Cables.
  - 3. National Sanitation Foundation (NSF) – Piping and backflow prevention.
  - 4. American Water Works Association – Piping and backflow prevention.

**1.4 QUALITY CONTROL**

- A. Special Requirements.
  - 1. Tolerances: Specified depths of mains and laterals and pitch of pipes shall be installed per the Contract Drawings and specifications.
  - 2. Compaction: Settlement of trenches is cause for removal of finish grade treatment, refilling, compaction, and repair of finish grade treatment.

3. Coordination with Other Contractors: Protect, maintain, and coordinate work with work under other Sections.
4. Damage to other Improvements: Contractor shall replace or repair damage to grading, soil preparation, seeding, sodding, planting and/or new site features done under other Sections during Work associated with installation of irrigation system at no additional cost to the City.
5. Damage or Disturbance to the Existing Irrigation Components: Damage to existing components as a result of work being performed by the Contractor will require the Contractor to replace the damaged components to the City's current standards, at no additional cost to the City. This includes boxes, manifolds, valves, angle valves, risers, wire, heads, pipe, and autom.
6. Water Delivery Interruption: When working on an existing irrigation system, the Irrigation Contractor shall contact the Project Manager and inform him seventy two (72) hours in advance of any water interruption that is required. The maximum irrigation system interruption is to be no more than seventy two (72) hours during the growing season. The contractor shall make all necessary provisions including material, equipment, labor, delivery and scheduling as required to complete all points of connection, upgrades, and improvements within seventy two (72) hours.
7. Watering: The Contractor is responsible for following all Denver Water rules and regulations for sod and seed establishment, available at <http://www.denverwater.org>. The Contractor shall post signage per Denver Water in a visible location(s) on site indicating "IRRIGATION TESTING AND MAINTENANCE IN PROGRESS" when Work (establishment, construction or warranty) requires irrigation system operation between the hours of 10 AM to 6 PM. The signs are to be used are available from Denver Water.
8. Permits: Work involving plumbing for installation of copper piping, ductile iron piping, backflow preventer(s), and related Work shall be executed by licensed and bonded plumber(s). Secure a permit at least forty eight (48) hours prior to start of installation. Work involving high voltage electrical wiring, grounding and related Work shall be executed by licensed and bonded electrician(s). Secure a permit at least forty eight (48) hours prior to start of installation
9. Refer to maintenance requirements for water during construction, 1.9.B.1.

B. Pre-Construction Conferences and Site Meetings:

1. Contractor shall schedule and conduct a pre-construction conference to review in detail quality control and construction requirements for equipment and materials used to perform the Work. Conference shall be scheduled not less than ten (10)-days prior to commencement of Work. All parties required to be in attendance shall be notified no later than seven (7) days prior to date of conference. Contractor shall notify qualified representatives of each party concerned with that portion of Work to attend conference, including but not limited to the Project Manager, Denver Parks Superintendent, Operations Supervisor, Water Conservation, Contractor's Superintendent, and Installer.
2. Prior to commencement of Work, Contractor shall schedule an on-site conference with Project Manager, Denver Forestry and any other parties designated by Project Manager to discuss tree protection requirements, marshalling locations, traffic control, and equipment access. Provide a minimum of seven (7) days notice prior to date of conference.
3. Contractor shall schedule on-site conferences the frequency of which is to be determined by the Project Manager and any other parties designated by the Project Manager to review project progress.
4. Contractor shall record Minutes of each conference and distribute to all parties in attendance within three (3) days of conference.



## 1.5 FIELD QUALITY CONTROL

- A. Flushing: After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupler assemblies, and hose valves, thoroughly flush piping system under full head of water pressure from dead end fittings. Maintain flushing for five (5) minutes through furthest valves. Cap risers after flushing.
- B. Testing Pressurized Mainline: Prior to installing any plant materials (sod, seed, trees, shrubs, perennials) arrange and conduct pressure test(s) in the presence of the Project Manager. Arrange for testing a minimum of forty eight (48) hours in advance. The contractor is responsible to supply the hydrostatic test pump and all other equipment required to complete the test.
1. Set in place, cap and pressure test all piping under paving, in presence of the Project Manager prior to backfilling and paving operations.
  2. After backfilling and installation of all control valves, fill pressure supply line with water, and pressurize to forty (40)-PSI over the designated static pressure or one hundred twenty (120)-PSI, whichever is greater, for a test period of two (2)-hours.
  3. All isolation valves, angle valves, ball valves and zone valve flow controls are to remain open during testing.
  4. Leakage, Pressure Loss:
    - a. Solvent welded PVC Pipe: Test is acceptable if zero pounds of pressure is evident during the test period.
    - b. Ring Tight Pipe: Test is acceptable if two (2) pounds of pressure or less is evident during the test period.
  5. Leaks: Detect and repair leaks. Replace defective PVC pipe with new full length pipe section. No pipe splices will be accepted within pipe sleeve. No PVC pressure couplings or slip-fix repair couplings will be allowed.
  6. Retest system until test pressure can be maintained for duration of test.
- C. Walk-Through for Substantial Completion:
1. Arrange for the Project Manager to be present. Provide minimum of forty eight (48) hours notice in advance of walk-through.
  2. Entire system shall be completely installed and operational and trenches shall be finish graded and sod and seed in place prior to scheduling of walk-through.
  3. Electrically operate each zone in its entirety for the Project Manager the time of walk-through.
  4. A project inspection walk through shall include but is not limited to the following:
    - a. Contractor shall adjust, straighten and nozzle all heads prior to walk through. Review operation, coverage, head/nozzle adjustment, and system adjustment per specifications.
    - b. Contractor shall have all valves boxes unlocked prior to walk through. Open valve boxes to confirm materials, filter fabric, gravel bedding, wire splices, compaction, elevation, workspace access within boxes, clearance from lid and bedding, locking mechanisms, and zone branding. Interior of boxes should be free of foreign material, only filter fabric shall be visible in the bottom of boxes. All valves must be tagged with zone identification, Christy's valve marker tags or equal and valve box lids must be branded with zone valve identification. Verify connections in all valve and wire splice boxes.

- c. Contractor shall provide documentation that resistance tests for all spare common and hot wires has been performed and the results for each OHMS reading on each wire tested.
- d. Confirm irrigation heads are at specified elevation and distance(s) from paved surfaces and curbs, plumb and soil compacted.
- e. Inspect concrete size and elevation of pads for backflow assemblies, master valves, and enclosure pads. Confirm quality of concrete, finishes, access to the Automatic Irrigation Controller and spare conduit/sleeving as required for wiring.
- f. Review trench and related excavation repair including backfill, compaction, fine grade, seed and sod installation.
- g. Review appropriate use of purple valve lids and other product as required for reuse water applications.
- h. Generate a punch list of items to be corrected prior to Final Completion.
- i. Furnish all materials and perform all work required to correct all inadequacies of coverage due to deviations from Contract Documents.

D. Walk-Through for Final Completion:

- 1. Arrange for Park Operations Supervisor, the Project Manager and Consultant to be present a minimum of seventy two (72) hours in advance of walk-through.
- 2. Show evidence to the Project Manager that the City has received all maintenance items and accessories, charts, record Contract Drawings, equipment, backflow certification reports and Automatic Irrigation Controller grounding assembly certificates as required before Final Completion walk-through is scheduled.
- 3. Operate each zone, in its entirety for the Project Manager at time of walk-through to insure correction of all incomplete items.
- 4. Items deemed not acceptable by the Project Manager shall be reworked to complete satisfaction of the Project Manager.
- 5. If after the walk-through for Final Completion of irrigation system the Project Manager finds items which have not been properly adjusted, reworked, or replaced per the previous punch list, the Contractor shall be charged for all subsequent walk-throughs. Funds will be withheld from final payment and/or retainage to Contractor, in amount equal to additional time and expenses required to conduct and document additional walk throughs by Project Manager to ensure compliance with Contract Documents.

1.6 SUBMITTALS

- A. Prepare and make submittals in accordance with conditions of the Contract prior to installation of any irrigation equipment:
- B. Material List: Submit a PDF file of complete list of materials, and cut sheets indicating manufacturer, model number and description of all materials and equipment to be used. Show appropriate dimensions and adequate detail to accurately portray intent of construction.
- C. Shop Contract Drawings: If applicable, submit shop Contract Drawings for pumps, backflows and assemblies. Include plumbing and foundation/support systems if the installation differs from the manufacturer's recommended installation.
- D. Mock Ups:
  - 1. Valve clusters: Provide a completely built electrical valve cluster. This mockup, to include three electric valves, angle valve, manifold, unions and riser, the mock up may be incorporated into the work toward the end of the project.

2. Swing joints: Provide a pre-manufactured or constructed swing joint assembly for each detail shown (eg. - quick coupler, rotors) or as directed by the Project Manager
  3. Drain valves: Provide a mock up including the service tee, and required fittings, and drain valve.
  4. Other: Mock ups that may be requested by the Project Manager.
- E. Operation and Maintenance Manual: Coordinate scheduling/precipitation instructions with the City's operations staff. Submit three (3) bound manuals and one (1) digital copy to the Project Manager including:
1. Winterization and spring start-up procedures.
  2. Cut sheets of products.
  3. Manufacturer's maintenance and checking instruction for backflow preventer (if applicable).
  4. Manufacturer's maintenance and operation instruction for pump station (if applicable).
- F. Warranty: Submit two year written warranty, in accordance with Paragraph 1.8 below-  
CONTRACT RECORD DRAWINGS.
- G. Prior to the installation of irrigation system, the Contractor will provide on-site copies of original irrigation design Contract Drawings "Record Contract Drawings". Contractor to revise Record Contract Drawings in red ink as Work progresses to show any changes to the plan and include field dimensions.. Record Contract Drawings shall be brought up-to-date prior to any Pay Application Submittals that contain irrigation installation. Should the Contractor choose to utilize GPS for the purposes of documenting Work in progress, a hard copy print will need to be provided prior to Pay Application Submittal. A print of Record Contract Drawings shall be available at Project Site for review by the Project Manager at any time during the project.
- H. Record Contract Drawings shall encompass entire scope of work including any altered existing equipment and altered zones, and notate the Automatic Irrigation Controller zone number, type of irrigation, GPM, operating PSI for any altered or added zone.
- I. Preparation of Contract Record Drawings: Dimension from two permanent points of reference (building corners, sidewalk, road intersections or permanent structures) the location of the following items:
1. Point of connection.
    - a. Meters and vault dimensions
    - b. Curb Stops
    - c. Isolation Valves
    - d. Drain Valves
    - e. Pumps
    - f. Backflows
    - g. Bypass lines
    - h. Service lines
  2. Routing of irrigation mainline. Provide dimensions for each one-hundred linear feet (100 L.F.) maximum along each routing and for each change of direction.
  3. Routing of non-pressure lateral lines, layout and size.
  4. Sprinkler control valves.
  5. Quick coupling valves.
  6. Drain valves
  7. Master valves

8. Flow sensors
  9. Rain sensors/weather station
  10. Wire splice boxes
  11. Control wire routing if not with pressure mainline.
  12. Gate valves.
  13. Air relief valves.
  14. Sleeves.
  15. Flush valves.
  16. Power service drop.
  17. Other related equipment as directed.
  18. Two-wire grounding rods
- J. Make dimensions accurately at the same scale used in the original Contract Drawings, or larger. Notes and dimension lettering must be legible.
- K. 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.
- L. The Project Manager will not certify any pay request submitted by the Contractor if the Contract Record Drawings are not current, and processing of pay request will not occur until Contract Record Drawings are updated.
- M. Final Submittal: Upon completion of Project, prior to final acceptance, secure digital copy of irrigation design from the Project Manager and record installation information that reflects all changes made over the course of the construction project, prepared by a qualified draftsman. Contract Record Drawings shall include details, including any revisions as per actual installation. Deliver and submit to the Project Manager for review the following items:
1. Digital Contract Record Drawings in both PDF and AutoCAD release 2007 bound format (include any related X-ref files, plot files and pen settings.) Make any additional changes to the file as directed by the Project Manager prior to final submittal and approval.
- N. Request for final payment will not be certified or processed until all Contract Record Drawing prints and digital files have been received and approved.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Packing and Shipping: Deliver all components to job site in original unopened packaging containers prominently displaying manufacturer's name, volume, quantity, contents, instructions, and conformance to local, state, and federal law. Remove and replace cracked, broken, or contaminated items or elements prematurely exposed to moisture, inclement weather, snow, ice, temperature extremes, fire, or jobsite damage.
- B. Handling, Storage, and Delivery of PVC Pipe:
1. Exercise care in handling, loading and storage of PVC pipe.
  2. Provide forty eight (48) hours advance notice of delivery to the Project Manager for observation of unloading and handling of PVC materials during delivery.
  3. All PVC pipe shall be transported in a vehicle which allows length of pipe to lie flat so as not to subject it to undue bending or concentrated external loads. All sections of pipe that have been dented or damaged shall be discarded, and shall be replaced with new piping.

- C. Storage and Protection: Deliver, unload, store, and handle materials, packaging and bundling products in dry, weatherproof condition in manner to prevent damage, breakage, deterioration, intrusion, ignition, and vandalism.
- D. Only materials and equipment meeting project specifications and to be used as part of Project shall be stored on site. Project Manager to may verify at any time during construction period.

## 1.8 JOBSITE CONDITIONS

- A. Existing Conditions:
  - 1. Soil Conditions: The Contractor is responsible for investigating the type of soil and conditions in which lines are to be installed. No extra payment will be allowed due to difficulty in trenching, unless approved by the Project Manager.
  - 2. Contractor is responsible for understanding the scope of related operations as specified and indicated in the Contract Drawings and Specifications before beginning Work under this Section.
  - 3. Report unsatisfactory conditions in writing to the Project Manager within twenty four (24) hours of discovery. Commencement of installation means acceptance of existing conditions by the Contractor.
- B. Protection of Property:
  - 1. Protect buildings, walks, walls, and other property from damage. Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site. Damage caused to asphalt, concrete, monuments, structures or other building material surfaces shall be repaired or replaced at no cost to the City. Restore disturbed areas to original condition.
  - 2. The Contractor is responsible for potholing of all existing utilities, irrigation lines or any other underground improvements that may be damaged due to the installation of Irrigation Systems.
- C. Protection of Existing Trees:
  - 1. Refer to Division 01 Section "Tree Retention and Protection".
  - 2. Consult with the Denver City Forester as requested by the Project Manager prior to trenching or boring within tree drip-lines. All trenching or work under drip line of any tree shall be dug by hand or by other methods as directed by the Forester or the Project Manager so as to prevent damage to limbs or branches and root system.
  - 3. Directional boring that is permitted within tree protection area must occur at thirty six inches (36") below grade and may not take place anywhere within four feet (4') of the drip line. Any exception must be agreed upon by the Denver City Forester or the Project Manager.
- D. Protection and Repair of Underground Lines:
  - 1. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. Take whatever precautions are necessary, including pot holing to verify location and depth to protect these underground lines from damage. If damage does occur, all damage shall be repaired by the Utility Owner. All costs of such repairs shall be paid by Contractor.
  - 2. The Contractor is required to contact all private utility companies including Denver City Departments to locate all private utilities. The request for locates shall be a minimum of seventy two (72) hours prior to proceeding with any excavation. If, after such requests private utilities are encountered and damaged by the Contractor these shall be repaired at

no cost to the City. If the Contractor damages staked or located private utilities, they shall be repaired by the Utility Owner at the Contractor's expense.

- E. Replacement of Paving and Curbs: Any damage do to work that occurs adjacent to or crosses existing roadways, paths, trails, curbing, sidewalks, etc. shall be restored to original condition at the contractors expense, and the satisfaction of the Project Manager.

#### 1.9 WARRANTY/GUARANTY

- A. Provide a two year written warranty for material and installation from date of Substantial Completion.
- B. Expenses due to vandalism before Substantial Completion shall be the Contractor's responsibility.
- C. Any settling of backfilled trenches that occurs during warranty period shall be repaired at no expense to the City, including complete restoration of damaged property.
- D. Once substantial completion is granted, the City will maintain turf and planting areas during warranty period, unless maintenance by Contractor is specified in the contract. Contractor is responsible to monitor and coordinate Automatic Irrigation Controller scheduling and maintenance with Project Manager for any seeding, sodding or planting areas under Contractor's warranty.
- E. Project Manager reserves the right for his staff to make temporary repairs during the warranty period as necessary to keep systems in operating condition without voiding the Contractor's warranty, nor relieving the Contractor of his responsibilities.
- F. Contractor shall make repairs and replacements within three days of notification. If Contractor fails to make repairs within three days, the City will make such repairs at Contractor's expense.

#### 1.10 TURN OVER ITEMS

- A. Where applicable, furnish the following maintenance items to City prior to Final Acceptance:
  1. Two (2) sprinkler heads for each size and type specified.
  2. Two (2) nozzles for each type of head.
  3. Two (2) head adjustment tools for each type of head installed.
  4. Two (2) valve keys for operating each type of manual valve. (Manual drain valves, isolation valves).
  5. Two (2) valve keys and hose swivels for each type of quick coupling valve.

#### 1.11 MAINTENANCE DURING PROJECT CONSTRUCTION

- A. Within Limits of Construction: Contractor shall fence, water, and keep weed free any turf, trees and any plantings within the limits of construction. Contractor is responsible for maintenance which includes picking up trash, weed control and mowing of turf and native areas within the limits of construction. Contractor is responsible for watering existing landscape within limits of construction. Turf and plants affected by mainline work or irrigation water service shutdown during irrigation season shall receive watering per Parks' schedule, with no interruption of watering greater than seventy two (72)-hours. Contractor is responsible for maintenance until substantial completion is granted.

- B. Outside Limits of Construction: Coordinate Automatic Irrigation Controller scheduling and maintenance operations with Project Manager for portions of City property unaffected by construction.
- C. Additional Maintenance During Warranty Period:
  - 1. Make repairs and replacements needed due to defective workmanship and materials.
  - 2. Winterization: Include cost in bid for winterizing complete system at conclusion of irrigation season (during which system received final acceptance) within three (3)-days of notification by the City. System shall be voided of water using compressed air or similar method accepted by the Project Manager. Coordinate with the Denver Parks Operations Supervisor and the Project Manager to be present during the winterization procedures. The Contractor shall notify all persons that are to be present at the winterization a minimum of forty eight (48) hours prior to the winterization of the system.
  - 3. Spring Start Up: Reopen, operate, adjust system malfunctions and make any necessary system repairs, the following season within three (3) days of notification by the City. Coordinate with the Denver Parks Operations Supervisor and the Project Manager to be present during the spring start up procedures. The Contractor shall notify all persons that are to be present at the spring start up a minimum of 48-hours prior to starting of the system.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Equipment must have performance characteristics to operate per the design conditions indicated. If any discrepancy or conflict exists between the quantities of equipment listed in the schedule and quantities shown on the Contract Drawings, the greater quantity shall govern.
- B. All material shall be of the highest grade possible and where applicable, shall be marked accordingly and shall be new.

### 2.2 PIPE AND PIPE FITTINGS

- A. Ductile Iron Pipe and Fittings:
  - 1. Ductile Iron Pipe: Centrifugal cast ductile iron in metal molds for water pipe In accordance with ANSI C151 and AWWA A21.51 with asphaltic exterior coating and interior lining and coating in accordance with ANSI C151 and AWWA A21.51. Rubber-Gasket joints shall conform to ANSI/AWWA C111/A2.11. Fittings - Fittings shall be available in three inches (3") through twelve inches (12") sizes and shall be cast from ductile iron in accordance with ANSI/AWWA C153/A21.53 with mechanical joint bells. Glands, bolts, nuts and gaskets shall be in accordance with requirements of ANSI/AWWA C153/A21.53. The working pressure rating shall be 350 PSI. Fittings shall have an asphaltic outside coating in accordance with ANSI/AWWA C153/A21.53. Secure mechanical joint fittings to piping via installation of Meg mechanical joint restraints as manufactured by EBBA or approved equal.
- B. Copper Pipe and Fittings:
  - 1. Pipe: Type K, rigid, hard tempered.

2. Fittings - Wrought copper, solder joint type. Joints - Soldered with solder, forty five percent (45%) silver, fifteen percent (15%) copper, sixteen percent (16%) zinc, and twenty four percent (24%) cadmium and solidus at 1125° F and liquids at 1145° F.
- C. Main and Lateral Lines:
1. Main Lines (pressurized, downstream of backflow prevention units):
  2. Class 200 PVC BE, size one inch (1") to two and one half inch (2-1/2").
  3. Class 200 PVC RT/Gasketed, size three inches (3") and greater).
  4. Velocities in PVC mainline shall not exceed five feet (5') per second.
  5. All PVC pipe shall conform to the requirements of the United States Department of Commerce commercial standard Type 1-ASTM-D-2241.
  6. 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.
- D. 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: HDPE.
- E. Brass Pipe and Fittings:
1. Brass Pipe: Eighty five percent (85%) red brass, ANSI Schedule 40 screwed pipe.
  2. Fittings: Medium brass, screwed one hundred twenty five (125) pound class.
- F. Plastic Pipe and Fittings:
1. Identification Markings: Identify all pipe with following indelible markings:
    - a. Manufacturer's name.
    - b. Nominal pipe size.
    - c. Schedule of class.
    - d. Pressure rating.
    - e. NSF (National Sanitation Foundation) seal of approval.
    - f. Date of extrusion.
  2. Class 200 PVC Pipe (pressurized main line two and one-half inches (2-1/2") and under):
    - a. Pipe will be assembled with Schedule 80 PVC fittings using ASTM-F-656 purple primer followed with heavy bodied ASTM-D-2564 glue.
    - b. Fittings shall be installed with concrete thrust blocks as per Details.
  3. Gasketed End Pipe (pressurized main line 3-inches and larger): Manufactured from virgin Polyvinyl Chloride compound in accordance with ASTM D2241 and ASTM D1784; cell classification 1254-B, Type 1, Grade 1.
    - a. All fittings and service tees, three inches (3") and larger: Harco or Leemco ductile iron, grade 70-55-05 in accordance with ASTM A-536. Fittings shall have deep bell push-on joints with factory installed gaskets meeting ASTM F-477.
    - b. Lubricant: As recommended by manufacturer of pipe fittings.



- c. Pipe Restraints on all fittings and service tees and pipe to pipe restraints: Harco or Leemco, installation as recommended by the manufacturer. Each fitting bell shall be restrained to the pipe inserted in it per manufacturer's recommendations. See Manufacturer catalog for appropriate selection or chart supplied on plans.
4. Flexible Plastic Pipe (non-pressure lateral lines):
    - a. Manufactured from virgin polyethylene in accordance with ASTM D2239, designated as PE 3408. Maximum size two inches (2"); minimum size one inch (1").
    - b. Fittings: Manufactured in accordance with ASTM D2609; PVC Type 1 cell classification 12454-B.
    - c. Clamps: All stainless steel worm gear screw clamps. Use two (2) clamps per joint on all insert fittings.
    - d. 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.
    - e. Risers for Pop-up Heads: Shall be swing pipe, 0.49 ID, operating pressure of eighty (80) PSI, manufactured by Rainbird or approved equal.

## 2.3 VALVES

- A. Gate Valve or Isolation Valve:
  1. Valve for two and one-half inch (2-1/2") and smaller mainline (solvent-weld): Shall be cast iron body, threaded ends, left-hand opening, square nut operated, rubber resilient seated, FIPT joint AWWA gate valve with clear waterway equal to full diameter of pipe. Able to withstand continuous working pressure of one hundred fifty (150) PSI. Wheel type handle is unacceptable. Matco Norca 10RS series.
  2. Valve for three inch (3") and larger mainline: Shall be cast iron body, push-on, left-hand opening, square nut operated, rubber resilient seated, mechanical joint AWWA gate valve with clear waterway equal to full diameter of pipe. Able to withstand continuous working pressure of one hundred fifty (150) PSI. Wheel type handle is unacceptable. Martco-Norca 10RT series
- B. Automatic Control Valve:
  1. Automatic Valve for Potable Water System: Rain Bird PEB Series Valve having manual flow adjustment and manual bleed nut. PRS-D shall be used if pressure at the heads is greater than ten pounds over the optimal pressure as stated on the plans or measured in the field.
  2. Automatic Valve for Non-Potable Water System: Rain Bird PESB Series Valve. PRS-D shall be used if pressure at the heads is greater than ten (10) pounds over the optimal pressure as stated per the manufactures catalog, plans or measured in the field.
  3. Manifold: Manifold to be constructed out of Schedule 80 PVC pipe, fittings, and nipples. Use ductile iron riser nipple and Champion angle valve brass body 200RS angle valve with brass unions as per details and plans.
  4. Install one flexible marker tag on each valve. Mark each tag with inedible ink indicating zone number. Tags shall be: Potable water systems (yellow Christy's ID-MAX-Y1-PW014), Non-potable systems (purple Christy's ID-MAX-P1-NP011)
- C. Manual Drain Valve:
  1. Drain Valve: Mueller Oriseal #H-10283 or MacDonald AY, one inch (1") 3061 with brass swing joint assembly, or approved equal.

- D. Quick Coupling Valves:
1. Buckner "Wing Thing" Q44LCAR10 brass two-piece body with winged stabilizer, designed for working pressure of one hundred fifty (150) PSI; one inch (1") FIP.. Size as shown on drawing.
  2. Quick Coupling Valves immediately after the backflow shall be used for winterization and shall be constructed of all brass swing joint and fittings. All other Quick Coupling Valve swing joints shall be constructed as shown on the details.
- E. Master Valve:
1. Mainline smaller than two inch (2"), Master Valve shall be Superior 3100 normally open valve.
  2. Mainline two inch (2"), and larger, Master Valve shall be Bermad 410 normally open valve.
- F. Flow Sensor Assembly:
1. Mainline one inch (1"), flow sensor shall be Data Industrial IR-250B .
  2. Mainline one and one-half inch (1-1/2") through four inch (4"), flow sensor shall be Data Industrial - IR-220P, sized according to mainline size.
  3. Mainline larger than four inch (4"), flow sensor shall be Data Industrial 220-B mounted with Harco tapping saddle sized according to mainline size.
- G. Valve Boxes:
1. All valve boxes will have a stainless steel hex bolt locking system.
  2. Isolation Valves, Quick Coupling Valves, Drain Valves, Wire Splices and Ground Rods: Carson Brooks, Model #910-4, ten inch (10") round box.
    - a. Brand Lids as follows:
      - 1) Isolation/Gate Valve "GV"
      - 2) Quick Coupler Valve "QC"
      - 3) Manual Drain Valve "DV"
      - 4) Air Relief Valve "AR"
      - 5) Master Valve "MV"
      - 6) Flow Sensor "FS"
      - 7) Wire Splice Box "SB"
      - 8) Grounding Rod "GR"
      - 9) Filter "FIL"
  3. Electric Control Valve Box: Shall have locking cover branded with the zone numbers.
    - a. Single valve location only, three-quarter inch (3/4") through two inch (2"): Carson Brooks, Model #1220 jumbo box with bolt down T-cover.
    - b. Multiple valve clusters, maximum three (3) control valves per box: Carson Brooks, Model #1730-18 box with bolt down T-cover.
  4. Box color for valves:
    - a. Green for potable systems.
    - b. Purple for non-potable systems.
  5. Gravel Leveling Bed and Drainage Sump in Valve Boxes: three quarters inch (3/4") crushed gravel lined in geo-textile, as indicated on Contract Drawings.
- H. 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".
- I. Air Relief Valve: On mainlines three inches (3") or larger, as per plan: Bermad 4415 (all cast iron) 2-inch double purpose vacuum air release valve or approved equal.
- J. Pressure Reducing Valve: Watts #223 Hi-Capacity commercial grade or equal required where system pressures exceed one-hundred (100) PSI.

#### 2.4 SPRINKLER HEADS

- A. Heads: Provide fabricated riser units of the type and size as indicated on the Contract Drawings. Heads of a specific type or function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification in such a position that they can be identified without being removed from the system.
1. Pop-Up Sprinkler Heads in turf areas: 1806 SAM-PRS.
  2. Pop-Up Sprinkler Heads in native grass areas and flower bed areas: Rain Bird 1812 SAM-PRS.
  3. Pop-Up Sprinkler Nozzles shall be Rain Bird MPR Series nozzle. Strip series, rotary, and VAN nozzles may be used for specific approved applications at the direction of the Project Manager.
  4. Gear Driven Heads: Hunter I-20, I-25, I-40 or Rain Bird 5000 Plus, 5500, or 8005 series with stainless steel risers, internal check valve, PRS and MPR as specified per Contract Drawings. Riser height shall be six inches (6") in turf areas, and twelve inches (12") stainless steel in native seed areas.
- B. Flexible Connectors to Lateral Pipe:
1. Pop-up Heads: Shall be one-half inch (1/2") swing pipe, connected to lateral pipe with male x insert spiral barbed ell PVC insert fittings.
  2. Gear Driven Heads: Shall be field constructed PVC swing joints as per detail, connected to lateral pipe with PVC insert fittings.

#### 2.5 LOW VOLUME IRRIGATION

- A. Valve: Rain Bird X CZ-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.
1. All low volume irrigation shall be zoned independently from turf, and product applications may not be mixed within zone.
- B. 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.

- C. 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.
  - 1. Requires Netafim 120 mesh disc filter, Rain Bird PEB valve and bronze angle valve in Carson 1324-12 valve box with corner hex bolt down cover. Brand lid with "FIL".
  - 2. Flush valve in Carson round ten inch (10") valve box with bolt down T-cover as per Contract Drawings. Brand lid with "FV".
  - 3. 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.
- D. 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.
- E. 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.
  - 1. Install two heads on opposite sides of the trees dripline.
  - 2. Precipitation rate of the nozzles must not exceed soil infiltration rate.

## 2.6 AUTOMATIC CONTROL SYSTEM

- A. See Division 32 Section "Automatic Irrigation Controllers".
- B. Electrical Control Wiring:
  - 1. Low Voltage:
    - 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. Data Wires: Paige 7171D-A direct burial shielded and armored signal cable with polyethylene jacket (NO SUBSTITUTIONS).
    - d. 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).
      - 1) Two-wire decoder cable shall have surge arrestors (Toro ESB-BLA) 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.
      - 2) 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.
      - 3) 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.

- a) Two-Wire Splice Box: Carson #1419-12 box with bolt-down lid, branded "SB."
- e. 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.
- f. Data Wires: Paige 7171D-A direct burial shielded and armored signal cable with polyethylene jacket (NO SUBSTITUTIONS)
  - 1) 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.
- g. Data Wire connections and splices shall be made with Ranger Servi-Seal.
- h. 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.
- 2. Splice Box: Carson Brooks 10-inch round box, branded "SB."
- 3. 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.
- 4. High Voltage: Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

## 2.7 MISCELLANEOUS MATERIALS

- A. Rain Sensor: Hunter wireless Rain Klik with by-pass approved equal. Rain sensor shall be installed per manufacturer's recommendations.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Utility Locates: Contact Utility Notification Center of Colorado at or 8-1-1 or 1-800-922-1987 prior to any excavation, for the marking of underground member utilities. The indication of utilities on the Contract Drawings does not relieve the Contractor of the responsibility for utility location. Contractor is responsible for potholing all utility locations to verify the depth and locations. Potholing related to irrigation installation shall be considered incidental to irrigation installation and will not be paid for separately. Route trenches to avoid existing utilities. Verify with the Project Manager any required relocation prior to installation.
- B. Landscape Plan Review and Coordination: Contractor will be held responsible for coordination between landscape and irrigation system installation. Landscape material locations shown on the Landscape Plan shall take precedence over the irrigation system equipment locations. If irrigation equipment is installed in conflict with the landscape material locations shown on the

landscape plan, the Contractor will be required to relocate the irrigation equipment, as necessary, at Contractor's expense.

- C. Pressure Verification: Contractor shall field verify the tap size, static pressure and verify Gallons Per Minute flow at the project site, prior to commencing Work or ordering irrigation materials, and submit findings in writing to the Project Manager. If Contractor fails to verify tap size, static water pressure and flow prior to commencing Work or ordering irrigation materials, Contractor shall assume responsibility for all costs required to make system operational and the costs required to replace any damaged landscape material. Damage shall include all required material costs, design costs, labor costs and plant replacement costs.
- D. Inspection: Examine areas and conditions under which Work of this Section is to be performed. Do not proceed with Work until unsatisfactory conditions have been corrected.
  - 1. Grading operations, with the exception of fine grading, shall be completed and approved by Project Manager before staking or installation of any irrigation system begins.
- E. Layout: Layout and stake system before beginning installation. Staking shall occur as follows:
  - 1. Mark, with paint, routing of pressure supply line and flag heads for all new zones. Contact the Project Manager forty eight (48) hours in advance and request review of staking. The Project Manager will review staking and direct changes if required. Review does not relieve installer from coverage problems due to improper placement of heads after staking.
  - 2. Valve boxes and mainline will not be located in ball fields, and multi-use sport fields, recovery zones, or below playground equipment.
  - 3. If project has significant topography, free form planting beds, or other amenities which could require alteration of irrigation equipment layout as deemed necessary by the Project Manager, do not install irrigation equipment in these areas until the Project Manager has reviewed equipment staking.
  - 4. The Project Manager may request the City Foresters approval of proposed trenching prior to start of trenching.
  - 5. Review backflow prevention device location and operation with the Project Manager prior to mainline installation.

### 3.2 EXCAVATION AND BACKFILL

- A. Install mainline pipe and wire sleeving under existing asphalt paving, concrete walks and critical root zones by directional boring. Pot-hole existing utilities for location and depth in advance of boring operations. When pot-holing in cross streets: include all permits, traffic control, backfill, compaction and surface restoration as required by the City and County of Denver Transportation Engineering Standards and Specifications. Compact backfill at bore pits around the end of sleeves to ninety five percent (95%) compaction in landscape areas.
- B. Excavation:
  - 1. Trenching:
    - a. Trench excavation shall follow, as much as possible, the layout shown on Drawing. Dig trenches straight and support pipe continuously on bottom of trench. Trench bottom shall be clean and smooth with all rock and organic debris removed. Comply with OSHA standards for all trenching and excavation.
    - b. Trenching under limb spread of existing trees: Accomplish by hand or other method that will not damage limbs or branches. Refer to Division 01 "Tree Retention and Protection" for additional precautions.

2. Clearances and Depths:
  - a. Main pressure line: Make trenches of sufficient width to properly assemble and position pipe in trench. Clearances:
    - 1) Piping three inches (3") and larger: Minimum clearance of piping three inches (3") or larger shall be five inches (5") horizontally on both sides of the trench.
    - 2) Piping two and one-half (2-1/2") and smaller: Trenches shall have a minimum width of four inches (4").
    - 3) Line Clearance: Provide minimum six inches (6") of clearance between each line, and minimum twelve inches (12") of clearance between lines of other trades.
    - 4) Lateral Pipe: Trenches shall have a minimum width of four inches (4").
    - 5) Line Clearance: Provide not less than six inches (6") of horizontal clearance between each line, and not less than twelve inches (12") of clearance between lines of other trades.
    - 6) Installation of multiple runs of piping in common trench is prohibited.
  - b. Pipe and Wire Depth to finish grade:
    - 1) Pressure Supply Piping within Parks: thirty inches (30") from the top of pipe, maximum variation two inches (2").
    - 2) Pressure Supply Piping within Right-of-Way: twenty four inches (24") from the top of pipe, maximum variation two inches (2").
    - 3) PVC Sleeving: At specified pipe or wire depth.
    - 4) Non-pressure Piping (gear driven heads): eighteen inches (18") from top of pipe, maximum variation two inches (2").
    - 5) Non-pressure Piping (pop-up heads): turf zones: eighteen inches (18") from top of pipe, native seed zones: twenty four inches (24") from top of pipe, maximum variation two inches (2")
    - 6) Control Wiring and Two-Wire Decoder Cable: Side of pressure main when installed in the same trench; twenty-four (24) inches from the top of wire bundle where installed separately from mainline trench.
3. Vibratory Plow: Not permitted without written authorization of the Project Manager.

### 3.3 INSTALLATION OF IRRIGATION EQUIPMENT

- A. Locate all equipment as near as possible to locations designated. Deviations shall be reviewed and approved by the Project Manager prior to installation.
- B. Service Line Piping (copper or ductile iron piping from water meter to connection to backflow prevention device) - When pipe installation is not in progress, or at the end of each day, close pipe ends with tight plug or cap.
  1. Ductile Iron Pipe – Provide and install full pipe length protective polyethylene factory-formed sleeves around all piping to be buried. Pipe shall be bedded per Denver Water current standards and specifications.
  2. Copper piping – Installation shall match specifications for copper service line as required by Denver Water and in accordance with City and County of Denver Building Codes.
- C. Sleeving:
  1. Install sleeving under any hard surface prior to surface being installed to accommodate piping and wiring.

2. Minimum depth to top of pipe shall be determined by depth of mainline and lateral lines.
3. Provide for a minimum cover of twenty four (24) inches between the top of the sleeve and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete or concrete paving.
4. Sleeving located under areas where asphalt or concrete paving will be installed shall be bedded with a sand layer six inches (6") below the pipe and six inches (6") above the pipe.
5. Sleeving under existing walks or concrete pavement shall be done by jacking, boring or hydraulic driving. Where cutting of asphalt and/or concrete is necessary, it shall be done per the Contract Drawings and Details and or per the City and County of Denver Right of Way Standards. Where cutting of concrete is necessary remove the entire concrete section or "stone". Obtain permission to cut walks from the Project Manager.
6. Compact backfill material in three uniform lifts at ninety five percent (95%) determined in accordance with ASTM D698 using mechanical tamping devices under pavement.
7. Do not allow sleeves to become filled with soil or other undesirable material. Tape ends of sleeves until commencement of pipe installation.
8. Mark sleeves on hard surfaces with a three inch (3") by three inch (3") "X" as per plans in a manner to ensure easy location in the future.
9. Sleeve size requirements for wire and pipe, control wire shall be placed in sleeving separate from pipe sleeving:
  - a. 1" to 1-1/4" Pipe: 2" PVC (1)
  - b. 1-1/2" to 2" Pipe: 4" PVC (1)
  - c. 2-1/2" to 3" Pipe: 6" PVC (1)
  - d. 4" Pipe: 8" PVC (1)
  - e. 1 to 25 Control Wires: 2" PVC (1)
  - f. 26 to 50 Control Wires: 3" PVC (1)
  - g. Two-Wire Decoder Cable: 2" PVC (1)
10. 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.



- D. Installation of Piping:
1. PVC Mainlines:
    - a. Ensure that pipe is placed at a consistent depth and on a level base free of rocks and stones. Place manual drain valves at low points and dead ends of pressure supply piping to insure complete drainage of system. When pipe laying is not in progress, or at end of each day, close pipe ends with tight plug or cap. Perform Work in accordance with good practices prevailing in piping trades.
    - b. Install Drain Valves at all low points of the system.
    - c. Install mainlines a minimum of twenty four inches (24") off of any hard surface.
    - d. Solvent Weld PVC Pipe (required on all pipes two and one-half inches (2-1/2") or less): Lay pipe and make all plastic to plastic joints in accordance with manufacturer's recommendations. Do not install pipe when air temperature is below forty degreeS (40°) F.
    - e. Gasketed End Pipes (required on all pipes three inches (3") or larger): Lay pipe and make pipe-to-fitting or pipe-to-pipe joint, following the manufactures installation recommendations. Install joint restraint fittings and pipe restraints on all fittings and adjacent pipe runs per manufacturer's recommendations and per approved plan.

- E. Thrust Blocks on all PVC mainline two and one-half-inches (2-1/2") and smaller: Construct thrust blocks per Contract Drawings and Details.
1. Concrete thrust blocks shall be a minimum of one (1) cubic foot of cast in place concrete in compliance with Division 03 Section "Cast-in-place Concrete". Contact the Project Manager prior to placing thrust blocks for observation of thrust block excavation and initial placement. Install a bond breaker made of a minimum six (6)-mil plastic between the thrust block and fittings being restrained. Size thrust blocks per soil type table below:

Soil Type	lbs./SF
Mulch, Peat, etc.	0
Soft Clay	500
Sand	1,000
Sand and Gravel	1,500
Sand and Gravel with Clay	2,000
Sand and Gravel Cemented with Clay	4,000
Hard Pan	5,000

- F. Joint restraints on all gasketed PVC mainline pipe three inches (3") and larger: Install joint restraints per the plans and or manufactures recommendations.
1. Joint restraints shall be installed as shown on the plans or per the manufacturer's recommendations. Prior to backfilling any joint restraints the Project Manager shall be present to verify that the restraints were installed in the proper locations and that all bolts have been tightened to the manufactures specifications. Any restraints that are buried prior to inspection shall be excavated to allow for review and inspection at no additional cost to the City.
- G. Flexible Plastic (Polyethylene) Pipe: Lay pipe and assemble fittings according to manufacturer's recommendations and per Contract Drawings and details.
- H. Control Wiring - Low Voltage Wiring:

1. Bury control wiring between Automatic Irrigation Controller and electric valves in pressure supply line trenches, strung as close as possible to main pipe lines with such wires to be consistently located below and to one side of pipe, or in separate trenches.
    - a. Bundle all 24-volt wires at ten foot (10') intervals and lay with pressure supply line pipe to one side of the trench.
  2. Install tracer wire per Details.
  3. Provide an expansion loop at every mainline change of direction, every electric control valve location (in valve box), and every five hundred feet (500'). Form expansion loop by wrapping twenty four inches (24") of wire around a three quarters inch (3/4") pipe and withdrawing pipe.
  4. Make all splices and electric control valve connections using 3M DBR/Y-6 connectors
  5. Install all control wire splices not occurring at control valve in a separate Carson Industries Model #910-10 body with 910-4 bolt down T-cover wire splice valve box with branded with WS in 1-inch high letters minimum.
  6. Install one control wire for each control valve.
  7. Install a total of five spare #14 AWG UFUL control wires and one spare common wire from Automatic Irrigation Controller pedestal to the end of each and every leg of mainline. Label spare wires at Automatic Irrigation Controller and wire stub box.
  8. Two-wire control wiring:
    - a. Bury two-wire decoder cable between Automatic Irrigation Controller and electric valves in pressure supply line trenches, strung as close as possible to main pipe lines with such cable to be consistently located below and to one side of pipe, or in separate trenches. Lay with pressure supply line pipe to one side of the trench.
      - 1) Lay with pressure supply line pipe to one side of trench.
    - b. Provide an expansion loop at every pressure pipe angle fitting, every electric control valve location (in valve box), and every five-hundred feet (500'). Form expansion loop by coiling thirty-six inches (36") of cable.
    - c. Make wire/cable splices at electric control valve connections as follows:
      - 1) Two-wire cable to two-wire cable - 3M Co. DBR/Y-6 watertight connectors.
      - 2) Two-wire cable to electric valve solenoid wires - 3M Co. DBR/Y-6 watertight connectors.
    - d. Install all two-wire decoder cable splices not occurring at control valve in a separate Carson Industries Model #1419-12 body with bolt down T-cover wire splice valve box with branded with "SB" in one inch (1") high letters minimum.
- I. Installation of Valves:
1. Electric Control Valves: Install electric control valves as detailed on the Contract Drawings.
    - a. Electric Control Valves for two-wire system: Install electric control valves as detailed on the Drawings. Install one valve decoder module (Toro ESB-BDC series) per valve box, sized to operate all valves located within same box.
  2. Quick Coupling Valves: Install quick coupling valves as detailed on the Contract Drawings.
  3. Drain Valves: Install manual drain valves as detailed on the Contract Drawings.
    - a. Install manual drain valves at all low points in pressure supply line, whether indicated on the drawing or necessitated by actual conditions, to ensure proper drainage of the mainline.

4. Isolation/Gate Valves: Install as detailed in locations shown on Contract Drawings.
5. Valve Boxes: Install one valve box for each type of valve or manifold as detailed. Install compacted gravel leveling bed after compaction of subgrade and prior to setting of valve box.
  - a. Install filter fabric over gravel prior to setting valves boxes. Ensure that filter fabric extends a minimum of six inches (6") from the bottom and no more than 6" from the top of box. Secure the filter fabric to the side of box with grey tape.
  - b. Install valve boxes flush with finish grade and square to adjacent surface features and one another
  - c. When valve boxes are grouped together, allow at least twenty four inches (24") between valve box sides.
  - d. Install valve boxes a minimum of eighteen inches (18") off of any hard surface.
  - e. Cutting of valve box to give clearance for piping or valves is not allowed.

### 3.4 BACKFLOW PREVENTION

- A. 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.

### 3.5 INSTALLATION OF SPRINKLER HEADS

- A. Install sprinkler heads where designated after the Project Manager has approved staking. Set to finish grade as detailed.
  1. Spacing of heads shall not exceed the maximum indicated on Drawing(s) unless re-staked or as directed by the Project Manager. In no case shall the spacing exceed maximum recommended by manufacturer.
  2. Install gear driven heads on swing-joint risers as detailed. Swing joints to non-pressure lines shall be set at no more than forty five degrees (45°) or less than ten degrees (10°).
  3. Install pop-up heads on swing pipe as detailed.
  4. Adjust part circle heads for proper coverage. Adjust heads to correct height after sod is installed. Plant placement shall not interfere with intended sprinkler head coverage, piping, or other equipment. The Project Manager may request nozzle changes or adjustments without additional cost to the City.

### 3.6 BACKFILLING

- A. Do not begin backfilling operations unless authorized by the Project Manager and all required systems tests have been completed. Backfilling shall not be done in freezing weather unless authorized by the Project Manager. Leave trenches slightly mounded to allow for settlement

after backfilling is completed. Trenches shall be finish graded and sodded or seeded prior to walk-through of system by the Project Manager.

1. Materials - Excavated material is generally considered satisfactory for backfill purposes. Backfill material shall be free of trash, organic matter, frozen materials, and stones larger than 2-inches in maximum dimension. Material not suitable for backfill shall be hauled away. Contractor shall be responsible for providing suitable backfill if excavated material is unacceptable or not sufficient to meet backfill, compaction, and final grade requirements.
2. Do not leave trenches open for a period of more than forty eight (48) hours. Open excavations shall be protected in accordance with OSHA regulations.
3. Compact backfill to ninety five percent (95%), determined in accordance with ASTM D698 utilizing the following methods in landscape areas:
  - a. Mainline Pipe: Backfill and mechanically compact in three uniform lifts to a ninety five percent (95%) compaction, utilizing optimum moisture content for the soil type. Hydraulic settling of mainline trenches will not be allowed.
  - b. Secondary Pipe: Backfill in two uniform lifts and hydraulically or mechanically compact each.
  - c. Puddling or ponding and/or jetting is prohibited within twenty feet (20') of building or foundation walls.

### 3.7 RAIN SENSOR

- A. Rain Sensor: Install in accordance with manufacturer's instructions, and as shown on the Contract Drawings.
  1. Install rain sensor(s) prior to starting any irrigation schedules for new sod or seed programs.
  2. Install rain sensor(s) a minimum of fifteen (15) feet above grade, mount to a light pole, building or approved structure that is not shielded by tree canopies or structures and not effected by irrigation overspray.
  3. All rain sensor(s) to be set at one eighth inch (1/8") inch prior to being installed or irrigation begins.

### 3.8 ADJUSTING

- A. Upon completion of installation, "fine-tune" entire system by regulating valves, adjusting arcs and radius, and setting pressure reducing valves at proper and similar pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible. Heads of same type shall be operating at same pressure within plus or minus ten percent (10%).
- B. If it is determined by the Project Manager or Consultant that irrigation adjustments will provide improved coverage and water distribution, the Contractor shall make such adjustments prior to Final Acceptance. Adjustments may include but not limited to changes in nozzle sizes, degrees of arc, and control valve flow control regulations. Adjustments shall be completed at no additional costs to the City.
- C. All sprinkler heads shall be set perpendicular to finish grade or within allowable limits shown on Contract Drawings.
- D. Areas that do not conform to designated operation requirements, due to unauthorized changes or poor installation practices, shall be immediately corrected at no additional cost to the City.

### 3.9 CLEANING

- A. Maintain continuous cleaning operation throughout duration of Work. Dispose of, all trash, waste materials, debris and excess soil generated by installation of irrigation system off-site at no additional cost to the City. Contractor shall clear all debris, including, soil, from all paths, walks, roads, and other hard surface areas.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

- A. Measurement for Irrigation will not be measured, but will be a lump sum item, in accordance with the Contract Drawings and Specifications and as directed by the Project Manager.

### 4.2 PAYMENT

- A. Payment shall be made at the lump sum bid price and shall include full compensation all of the Contractor's costs of whatever nature required to complete the irrigation in accordance with the Contract Drawings and Specifications. Payment shall include materials, labor and equipment required, including excavation, loading, transporting, stockpiling, disposing, hauling off, watering, dust control, erosion and sediment control, installation of pipes, wires, heads, valves, boxes, soil amendments and fertilizers, disking, raking, spreading, fine grading, furnishing and installation of seeds and mulches installation and maintenance of temporary protection by fencing or other means, watering, all maintenance required, and Contract Record Drawings until Final Acceptance of the work in accordance with the Contract Drawings and Specifications.

**END OF SECTION 32 80 00**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes requirements for the preparation of soil for the purpose of seeding, sodding, or planting operations.
  - 1. Soil preparation consists of ripping, fertilizing, soil conditioning and fine grading the topsoil. Soil preparation as specified herein **MUST** precede all seeding, sodding, and planting.
- B. Related Sections:
  - 1. Division 01 Section "Erosion and Sedimentation Control".
  - 2. Division 31 Section "Clearing and Grubbing".
  - 3. Division 32 Section "Topsoil".
  - 4. Division 32 Section "Sodding".
  - 5. Division 32 Section "Plants".

**1.3 DEFINITIONS**

- A. Fertilizer: A substance that is added to soil to help the growth of plants.
- B. Soil Amendment: Any substance which is intended to improve the physical, chemical, or other characteristics of the soil
- C. Soil Conditioner: Combination of slow-release fertilizer, hummate, and Mycorrhiza

**1.4 SUBMITTALS**

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Soils Test Data: See Sections 1.6 through 1.9 of this specification.
- C. Product Data: For each type of product.
  - 1. Include recommendations for application and use.
  - 2. Include test data substantiating that products comply with requirements.
  - 3. Material Certificates: For each type of soil conditioner, soil amendment and fertilizer before delivery to the site, according to the following:
    - a. Manufacturer's qualified testing agency's certified analysis of standard products.
- D. Samples: For each bulk-supplied material, one (1) quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

- E. Quality Control Submittals:
  - 1. Certificates: State, Federal and other inspection certificates shall accompany invoice for materials showing source or origin. Submit to Project Manager prior to acceptance of material.
  - 2. Material Analysis: Provide soil conditioner analysis performed no more than three months prior to delivery to site.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, chemical name, trade name, trademark and conformance to state law, bearing name and warranty of producer.
- B. Notify Project Manager of delivery schedule in advance so material can be inspected upon arrival at project site. Immediately remove unacceptable material from project site.

#### 1.6 PROJECT/SITE CONDITIONS

- A. General: Do not perform work when climate and existing site conditions will not provide satisfactory results.
- B. Vehicular site access shall be limited to the area(s) indicated on the Contract Drawings or as defined by the Project Manager.
- C. Damage to turf, natural areas, pavements, irrigation systems, underground utilities, and other improvements shall be repaired by the contractor at no additional cost to the City.

#### 1.7 QUALITY CONTROL

- A. Testing Agency Qualifications: Retain an independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
  - 1. Laboratories: Subject to compliance with requirements, provide testing of materials in the Section by a qualified testing laboratory approved by the Project Manager. Submit Testing Agency qualifications to Project Manager for approval prior to construction.
  - 2. Multiple Laboratories: Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing. Submit Testing Agency qualifications to Project Manager for approval prior to construction.

#### 1.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Contractor is responsible for specified tests.
- C. Fertility Testing: Soil-fertility analysis shall, include the following:
  - 1. Percentage of organic matter.
  - 2. CEC, calcium percent of CEC, and magnesium percent of CEC.

3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Lime estimate.
6. Soil texture estimate.
7. Nitrogen ppm.
8. Phosphorous ppm.
9. Potassium ppm.
10. Manganese ppm.
11. Zinc ppm.
12. Iron ppm.
13. Boron ppm.
14. Copper ppm.
15. Sodium ppm, and sodium absorption ratio.
16. Soluble-salts ppm.
17. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
18. Other deleterious materials, including their characteristics and content of each.

- D. Soil will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.
- G. Inspection: Provide notice to the Project Manager requesting inspection at least seventy-two (72) hours prior to anticipated date of completion.
- H. Contractor shall be responsible for coordinating soil preparation inspections with Denver Water, call (303) 628-6682 at least seventy-two (72) hours prior to installing sod, seed or plantings.
- I. Deficiencies: The Project Manager will specify deficiencies to Contractor who shall make satisfactory adjustments and shall again notify Project Manager for final inspection.

#### 1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency, approved by the Project Manager, to perform preconstruction soil analyses on existing, on-site soil, imported topsoil and pre-amended imported soil.
  1. Notify Project Manager seventy-two (72) hours in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment, soil-conditioner and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
  1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.



## 1.10 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Project Manager and under the direction of the testing agency.
  - 1. Number and Location of Samples: Minimum of five (5) samples per acre collected randomly throughout the areas to receive similar soil preparation, including seed/sod, native seeding, planting beds, and gardens. Provide a map to the Project Manager of sampling locations prior to sampling for approval.
  - 2. Procedures and Depth of Samples: Collect samples to a depth of six inches (6") and combine in a clean plastic container.
  - 3. Mixing of Samples: Mix samples together thoroughly, removing plant debris and breaking up clods.
  - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

## 1.11 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
  - 1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
    - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
    - b. Hydrometer Method: Report percentages of sand, silt, and clay.
- C. Fertility Testing: Soil-fertility analysis shall include the following:
  - 1. Percentage of organic matter.
  - 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
  - 3. Soil reaction (acidity/alkalinity pH value).
  - 4. Buffered acidity or alkalinity.
  - 5. Lime estimate.
  - 6. Soil texture estimate.
  - 7. Nitrogen ppm.
  - 8. Phosphorous ppm.
  - 9. Potassium ppm.
  - 10. Manganese ppm.
  - 11. Zinc ppm.
  - 12. Iron ppm.
  - 13. Boron ppm.
  - 14. Copper ppm.
  - 15. Sodium ppm, and sodium absorption ratio.
  - 16. Soluble-salts ppm.
  - 17. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
  - 18. Other deleterious materials, including their characteristics and content of each.

- D. Recommendations: Based on the test results, state recommendations for soil treatments, soil amendments, and soil conditioners to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.
  2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.

#### 1.12 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Do not move or handle materials when they are wet or frozen.
  4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Topsoil: Shall be as specified under Division 32 Section "Topsoil".
- B. Soil Amendments:
1. For the purpose of bidding the Contractor shall assume all areas to receive soil amendments will be at four (4) cubic yards per one thousand (1,000) square feet. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Amendment.
  2. Composted material shall consist of aged organic matter, free of weed or other noxious plant seeds, lumps, stones, or other foreign contaminants harmful to plant life, and having the following characteristics based on a nutrient test performed no longer than 3 months prior to its incorporation into the project:
    - a. Organic matter: twenty five percent (25%) maximum.
    - b. Salt content: Five (5.0) mmhos/cm maximum.
    - c. pH: 7.5, maximum.
    - d. Carbon to nitrogen ratio shall be less than 20:1.
  3. Mountain peat, aspen humus, gypsum and sand will not be accepted.
  4. Acceptable product: Class I compost, such as Ecogro or Bio-comp, as produced by AI Organics, Eaton, CO, or approved equal.

C. Soil Conditioners:

1. For the purpose of bidding the Contractor shall assume all areas to receive Soil Conditioners will be applied at the rate specified by the manufacturer for each specific planting type. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Conditioner.
  - a. Organic slow release fertilizer (6-1-1), acceptable product: "Biosol" or approved equal.
  - b. Granular Humic Acid soil conditioner, acceptable product: "Menefee Humate Soil Conditioner".
  - c. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, thirty three percent (33%) hydrogel, and a maximum of five and one half percent (5.5%) inert material.
  - d. Mycorrhizal Inoculant: AM-120, as manufactured by Reforestation Technologies International, locally available from Pawnee Buttes Seed, Greeley, CO, (970)356-7002.
  - e. Acceptable substitution.

2.2 FERTILIZER

A. General:

1. Fertilizer shall conform to applicable State fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Fertilizer that has become caked or damaged will not be accepted.

B. Turf Grass Lawns:

1. Diamonium phosphate (18-46-0). Nitrogen shall be composed of sulphur-coated Urea only. Provide in sufficient quantity to apply at the rate of one hundred (100) pounds nitrogen per acre, unless otherwise indicated by the soils tests.

C. Native Grass Areas:

1. Fertilizer shall not be applied to areas to receive native grass seeding.

2.3 PESTICIDE

- A. Post Emergent Pesticide: Roundup (Glyphosate) or approved equal as manufactured by Monsanto Company or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Verify that existing site conditions are as specified and indicated on Contract Drawings before beginning work under this Section.

1. Grades: Inspect to verify rough grading is within +/-one tenth of one foot (0.1') of grades indicated and specified.
2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel,

SOIL PREPARATION

paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.

3. Damaged Earth: If, upon inspection, the soil is found to be unfit to support planting as described in article 2. above, it is to be removed and replaced with clean soil from a source approved by the Project Manager.

B. Unsatisfactory Conditions: Report in writing to General Contractor with copy to Project Manager.

C. Acceptance: Beginning of installation means acceptance of existing conditions by installer.

### 3.2 PREPARATION

A. Areas of Newly Placed or Existing Topsoil:

1. Protection:

- a. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment prior to commencing work.
- b. Contractor shall be responsible for proper repair to landscape, utilities, walls, pavements and other site improvements damaged by operations under this section.

B. Weed Control: Perform pesticide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire pesticide treatment process before proceeding with planting. Repeat procedure as needed as weed growth becomes evident throughout the duration of construction.

1. Pesticide treatment must be completed during the growing season.
2. Water surface one half inch (1/2") per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
3. Treat site with pesticide in accordance with manufacturer's recommendations.
  - a. Two days after application water surface one half inch (1/2") per week if natural precipitation does not supply this amount to encourage weed seed germination.
  - b. Ten (10) days after the first Pesticide application, review surface for evidence of plant growth.
  - c. Repeat steps 2, 3, 4, and 5, up to three (3) applications, until there is no evidence of plant growth after a ten (10) day period.
  - d. Obtain Project Manager approval of surface conditions fourteen (14) days after last pesticide application.
  - e. Pesticide treatments beyond the three (3) applications shall be considered additional to the contract and will be performed at the directed of Project Manager after the City has approved the cost. Additional pesticide treatments required for imported topsoil shall be borne solely by the Contractor.
  - f. Remove plant debris from treated area.
  - g. Contact Project Manager forty eight (48) hours in advance to review the site after each pesticide treatment. Do not proceed with additional planting until the results are approved and accepted by the Project Manager.
4. Surface Grade: Establish grades as indicated on Contract Drawings, and as required in Division 31 Section "Earth Moving".
5. Remove weeds, debris, clods and rocks larger than one inch (1"). Remove and dispose of accumulated materials at direction of Project Manager.

6. Erosion Control: Take measures and furnish equipment and labor necessary to control the flow, drainage and accumulation of water, and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site throughout duration of work. Insure that all excess water will run off the grades or will percolate within twelve (12) hours.
7. Soil Testing: Soil Amendments, Soil Conditioners and Fertilizers shall meet the minimum amounts as specified in Article 3.3, "Installation", below. Unless determined by the Project Manager the Contractor shall be responsible for performing horticultural soil tests on a minimum of four (4) current soil samples for each source of topsoil to be used in the project. Reference Division 32 Section "Topsoil", Article 1.4, "Quality Control" for soil analysis report information. Soil test will be used to determine the type and amount of Soil Amendment, Soil Conditioner, and Fertilizer to be applied prior to seeding, sodding and planting. Locations for testing shall be approved by the Project Manager.
8. Timing: Perform soil preparation just prior to planting operations and in accordance with final planting schedule. Coordinate with irrigation system installation to avoid damage.

- C. Areas of Compacted Topsoil: Areas within the work limits or as defined on Contract Drawings or by the Project Manager that have vegetation that is sparse, stunted, anemic, weedy or was used as a construction staging, parking area and/or subjected to heavy use will require ripping to prepare the soil for revegetation. Scarify compacted soil to a 8-inch depth minimum to loosen topsoil.
- D. Areas of Disturbed Topsoil: Areas disturbed but not severely compacted as determined by the Project Manager, shall be deep tine aerated or shattered to prepare the soil for revegetation.
- E. Areas of Undisturbed Natural Topsoil: Undisturbed sites that are or were supporting healthy plant growth need only surface seedbed preparation prior to sowing seed.

### 3.3 INSTALLATION

- A. Install topsoil as required in Division 31 section "Earth Moving" and Division 32 Section "Topsoil".
- B. Soil Preparation in Turf Grass and Planting Bed Areas:
  1. Apply Soil Amendments at the following rates:
    - a. Soil Amendments: Bid quantity to be four (4) cubic yards per one thousand (1,000) square feet, or per soil test recommendations.
    - b. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
    - c. Fertilizer: Diamonium phosphate, Bid quantity to be two (2) pounds of nitrogen per one thousand (1,000) square feet. Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
    - d. Mycorrhizal inoculants: Apply per manufacturer's instructions and quantities appropriate to the planting type.
  2. After applying Soil Amendments, thoroughly till area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. Soil Conditioners and Fertilizer shall be applied topically once final grade has been established and just prior to sodding or seeding.

- C. Soil Preparation in Native Grass Areas:
1. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
  2. Mycorrhizal inoculants: Apply per manufacturer’s instructions and quantities appropriate to the planting type.
  3. Thoroughly till the area to depth of 6-inches minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. If a soil conditioner is to be applied ensure that the product is spread evenly over the surface of the soil and not tilled into the soil.
  4. Soil Conditioner Installation:
    - a. Apply Soil Conditioner only as directed by per soils tests performed for the areas to be seeded. Apply topically once fine grade has been established and just prior to seeding per the manufactures recommendations for native seed areas.
- D. Fine Grading in all Landscape Areas:
1. Complete fine grading for all areas prior to seeding or planting. Allow for natural settlement.
  2. For ground surface areas surrounding buildings to be landscaped, maintain required positive drainage away from buildings.
  3. Establish finish grades to within plus or minus one tenth (0.10’) foot of grades indicated, in order to prevent “bird-baths” or ponding.
  4. Finish grade shall be below edge of pavement prior to sodding, seeding or planting.
    - a. Sodded Areas: Allow one and one half inches (1-1/2”) for sod.
    - b. Seeding Areas: Allow one inch (1”) for seed.
    - c. Planting Beds: Allow four inches (4”) for mulch.
  5. Noxious weeds or parts thereof shall not be present in the surface grade prior to seeding.
  6. Compaction of Surface Grade Prior to Landscape Installation: Firm, but not hard, eighty five percent (85%) standard Proctor density within two percent (2%) optimum moisture.
  7. Hand Raking:
    - a. Turfgrass Lawn Areas: Prior to acceptance of grades, hand rake to smooth, even surface, free of debris, clods, rocks and organic matter greater than one inch(1”).
    - b. Native Seed Areas: Area shall not be raked smooth but left in a uniform condition after tilling. Rough raking may occur parallel to the contours only.
  8. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

### 3.4 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove debris and excess materials from site. Clean out drainage inlet structures. Clean paved and finished surfaces soiled as a result of work under this Section, in accordance with Section 208 of the General Specifications or as directed by the Project Manager.

### 3.5 PROTECTION

- A. Provide and install barriers as required and as directed by Project Manager to protect completed areas against damage from pedestrian and vehicular traffic until acceptance by City.

- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Vehicle traffic.
  - 4. Foot traffic.
  - 5. Erection of sheds or structures.
  - 6. Impoundment of water.
  - 7. Excavation or other digging unless otherwise indicated.
  
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Project Manager and replace contaminated planting soil with new planting soil.

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for soil preparation.

##### 4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

**END OF SECTION 32 91 13**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The Work of this Section includes furnishing, stockpiling, and placing topsoil on a previously prepared subgrade.
- B. Related Work:
  - 1. Division 01 Section "Submittals".
  - 2. Division 01 Section "Erosion and Sedimentation Control".
  - 3. Division 31 Section "Earthwork"
  - 4. Division 32 Section "Soil Preparation".
  - 5. Division 32 Section "Sodding".
  - 6. Division 32 Section "Plants".

**1.3 DEFINITIONS**

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Planting Area: Areas to be planted.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.



- I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

#### 1.4 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Soil Analysis Report: As indicated in Article 1.5 "Quality Control", below.

#### 1.5 QUALITY CONTROL

- A. Existing On-Site Topsoil:
  1. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
  2. A minimum of [3] sample locations are required, with individual tests completed for each sample.
  3. A map of the site illustrating the locations of each sample location is to be submitted to Project Manager for approval prior to collecting samples.
  4. Follow instructions from soil testing laboratory when collecting samples.
  5. Testing will be at the expense of the Contractor.
- B. Imported Topsoil:
  1. Submit source location for topsoil to be imported to site for approval by Denver 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 sample per 500 CY 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.
- C. Manufactured Topsoil:
  1. Submit source of manufactured topsoil to be imported to site for approval by Denver Project Manager.
  2. Submit certified soil analysis report for specific manufactured topsoil product to be imported to site. Test is to be completed within 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).
    - a. Submit a 1-quart sample along with analysis results.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver or place topsoil in a frozen, wet, or muddy condition.
- B. Protect stored and placed topsoil from vehicular traffic, equipment storage, material storage, or from contaminants or pollution sources. Topsoil that is compacted or tainted during construction is to be removed from site and disposed of at a licensed landfill at no additional cost to the City.

## PART 2 - PRODUCTS

### 2.1 ON-SITE TOPSOIL

- A. Topsoil previously stripped and stockpiled prior to earthwork operations. See Division 31 Section "Earth Moving".

### 2.2 IMPORTED TOPSOIL

- A. All topsoil shall be a loam or sandy loam conforming to ASTM D 5268. At least 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 6-inches of well drained areas.
- C. Fertile, friable, loamy soil, reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than 1-inch, coarse sand, noxious seeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 6.5 and 7.5.
- D. Soil Texture:
  - 1. Sand: 30% - 50%
  - 2. Silt: 30% - 50%
  - 3. Clay: 5% - 30%
- E. Additives: As determined by soil fertility tests.
- F. Percent Organic Content:
  - 1. Turf grass shall be 3% maximum after amending or conditioning.
  - 2. Native grass shall be 1% maximum after amending or conditioning.
- G. Soluble Salts: Electric conductivity (EC) shall be less than 2.0 mmhos/cm for turfgrass areas, dryland areas, and planting beds.

### 2.3 MANUFACTURED TOPSOIL

- A. "Amended Topsoil" as manufactured by A1 Organics, 16350 WCR 76, Eaton, CO 80615 Ph: (970) 454-3492, (800) 776-1644 Fax: (970) 454-3232 [www.a1organics.com](http://www.a1organics.com), or substitution as approved by Denver Project Manager.

## PART 3 - EXECUTION

### 3.1 PLACING TOPSOIL

- A. Scarify compacted subgrade to a 6-inch depth to bond topsoil to subsoil. Place topsoil to a minimum depth of 6-inches after settlement. Topsoil shall be free from weeds, sod, and material larger than 1-inch, toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown on 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 6-inches.

### 3.2 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 Denver Project Manager, become compacted due to Contractor's construction traffic shall be reconstructed to specified requirements and approved by Denver Project Manager.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for topsoil.

### 4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

END OF SECTION 32 91 20

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes requirements for furnishing and installation of bluegrass sod, and maintenance of sodded areas as outlined in Maintenance Section 1.8.B. until Substantial Completion.
- B. Related Sections:
  - 1. Division 01 Section "Erosion and Sedimentation Control".
  - 2. Division 32 Section "Irrigation System".
  - 3. Division 32 Section "Soil Preparation".

## 1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, pesticides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, herbicide, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. Weeds: Including but not limited to Goathead, Bindweed, Twitch, Dandelion, Jimsonweed, Knapweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter,

Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Weed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broom Grass.

#### 1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product indicated.
  - 1. Pesticides: Include product label and manufacturer's application instructions specific to this Project.
- C. Sod Certificates:
  - 1. State, Federal and other inspection certificates for sod shall be provided to the Project Manager a minimum of 10 working days prior to anticipated date of sod delivery.
  - 2. Submit a list of varieties contained in the sod, and include the source and origin for approval by the Project Manager.
- D. Qualification Data: For qualified landscape Installer.
- E. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- F. Material Test Reports: For existing-in-place surface soil.
  - 1. Soil analysis for each topsoil to be used.
  - 2. Analysis for manufactured topsoil.
  - 3. Analysis for each soil amendment.
  - 4. Analysis for each amended planting soil.
- G. Analysis and standards: Wherever applicable, for non-packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
- H. Planting schedule: Submit in writing two copies of proposed planting schedule, indicating dates for topsoil placing, site preparation, pesticide treatments, soil preparation, sodding, seeding, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- I. Maintenance Instructions: Recommended procedures for maintenance of turf and dryland grasses during a calendar year. Submit before expiration of required initial maintenance periods.
- J. Contract Closeout Submittals:
  - 1. Operating and Maintenance Data: At completion of work, submit one digital copy and two hard copies to the Project Manager in accordance with Division 01 Section “Contract Closeout”. Include directions for irrigation, aeration, mowing, fertilizing and spraying as required for continued and proper maintenance through full growing season and dormant period.
  - 2. Warranty for Turfgrass Sod Areas: At completion of work, furnish written warranty to Project Manager based upon specified requirements.

- K. The Project Manager reserves the right to reject the sod at any time prior to acceptance and that fails to meet specification requirements.

## 1.5 QUALITY CONTROL

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and dryland grass establishment.
  - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  - 2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Control."
  - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 4. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years' experience, and certified by the State of Colorado Department of Agriculture.
  - 5. Personnel Certifications: Installers shall have certification the following categories from the Professional Landcare Network:
    - a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
  - 6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
  - 7. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: See Division 32 Section "Soil Preparation".
- D. Preinstallation Conference: Conduct conference at Project site to coordinate the process with other trades, to coordinate equipment movement within planting areas and to avoid soil compaction, to review proposed methods of installation, performance criteria, and maintenance procedures. Review underground utility location maps and plans. This meeting shall be coordinated by the Contractor, and comply with requirements in Division 1.
- E. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All sod shall be free from insects and disease. Species shall be true to their scientific name as specified.
- F. Materials: The Contractor shall submit to the Project Manager for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Project Manager.
- G. Source Quality Control:
  - 1. Sod Materials: Subject to inspection and acceptance. The Project Manager reserves the right to reject at any time or place prior to acceptance, any work and sod which in the Project Manager's opinion fails to meet these specification requirements.

2. Inspection will be made periodically during sodding, at completion and at end of warranty period by the Project Manager. Primarily for quality; however, other requirements are not waived even though visual inspection results in acceptance.
3. Promptly remove rejected sod from site.

H. Sod Standards:

1. Sod shall consist of healthy, thick turf having undergone a program of regular fertilization, mowing and weed control; free of weeds; uniform in green color, leaf texture and density; healthy, vigorous root system; inspected and found free of disease, nematodes, pests and pest larvae by the State Department of Agriculture.
2. Each piece of Sod shall consist of a sandy-loam soil base that will not break, crumble or tear during sod installation.
3. Sod thickness shall be a minimum three quarters inch (3/4") thick, excluding top growth and thatch.
4. Thatch layer shall not exceed one half inch (1/2"), uncompressed.
5. Sod shall be delivered and installed within twenty four (24) hours of being cut.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver on pallets properly loaded on vehicles with root system protected from exposure to sun, wind, and heat in accordance with standard practice. Sod that has been damaged by poor handling or improper storage is subject to rejection by the Project Manager.
1. Protect from dehydration, contamination, freezing and heating at all times. Keep stored sod moist and under shade or covered with moistened burlap.
  2. Do not drop sod rolls from carts, trucks or pallets.
  3. Do not deliver more sod than can be installed within twenty four (24) hours.
- B. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, warranty and conformance to state law.
- C. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
  4. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- D. Material will be inspected upon arrival at project site. Project Manager will reject any opened or unacceptable materials as described above.
- E. Immediately remove unacceptable material from job site.

## 1.7 PROJECT/SITE CONDITIONS

- A. Work scheduling: Proceed with and complete landscape work as rapidly as portions of the site become available, working within the specified planting season and approved schedule.
- B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Install sod between April 15 and October 1 or when irrigation is available for twenty one (21) days per Denver Water's guidelines for sod establishment.
- D. Schedule work for periods of favorable weather. Do not install sod on saturated or frozen soil. The Project Manager reserves the right to deny sod installation on days that are deemed to be unfavorable for installation.
- E. Existing conditions:
  - 1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Project Manager.
  - 2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
  - 3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Project Manager before planting.
  - 4. If weeds are present on site, treat with pesticide prior to preparing soil for installing sod as specified in this or other Sections.
- F. Coordination:
  - 1. Coordinate with construction of utilities on site. Do not begin placing topsoil and sod until underground work is completed in the area.
  - 2. Coordinate sodding with Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed if placement is completed more than 3 days prior to commencement of landscaping in the area. Limit fine grading to areas that can be prepared for planting within twenty four (24) hours after fine grading.
  - 3. Coordinate with Contractors work requiring access to site over sodded areas.
  - 4. Coordinate with installation of underground irrigation system.

## 1.8 WARRANTY

- A. Warranty for Sod Areas: Warrant areas in sod to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of one year from date of Substantial Completion as a full stand of grass. Re-sod any spots larger than 12" square where sod has failed to establish, as defined in this Section. Continue this procedure until a successful stand of grass is growing and accepted by the Project Manager.
  - 1. During the original warranty period, re-sod at once with comparable blend/mix, those areas that have failed to achieve a stand of grass or which in the Project Manager's opinion are unhealthy.
  - 2. Re-sodding will not be allowed in any season considerable unfavorable for sodding by the Project Manager.



- B. Re-sod in a manner to achieve quality as originally specified per the Project Manager's direction

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Topsoil: See Division 32 Section "Topsoil".
- B. Soil Preparation: See Division 32 Section "Soil Preparation.
- C. Sod:
  - 1. Colorado grown Kentucky Bluegrass blend having a healthy, vigorous root system. Blend shall contain a minimum of three (3) improved varieties, of which at least one variety is an aggressive type.
  - 2. Sod to be produced in accordance with requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding."
  - 3. Harvesting: Sod shall be fertilized 2–3 weeks prior to harvesting. Mow sod to a height of one and one-half inches (1-1/2") before the sod is lifted. Sod shall be harvested in rolls, and shall not be cut more than 24 hours prior to planting.
  - 4. Size: Machine cut to a minimum pad thickness of three quarters inch (3/4), excluding top growth and thatch. Provide sod of uniform pad sizes eighteen inches (18") maximum width by twenty four (24") minimum length, with maximum five percent (5%) deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically from upper ten percent (10%) of pad will be rejected. Sod which has dried out, sod with adhering soil which breaks, tears, or crumbles away will not be accepted. Sod cut for more than twenty-four (24) hours will not be accepted.
  - 5. Plastic netting: Sod to be free of plastic netting used during establishment by sod grower.
- D. Fertilizer: Inorganic mixture with following chemical composition: (20-5-10) with fifty percent (50%) sulfur coated urea (no iron), or as recommended by testing lab based on soil sample results.
- E. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for watering. Refer to Division 31 Section "Watering". Water shall be free of substances that may be harmful to sod growth. Hoses and other watering equipment necessary to water the sod to be furnished by Contractor.

### 2.2 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by Project Manager and authorities having jurisdiction.

1. Pre-Emergent Pesticide (Selective and Non-Selective): Use only with approval by Project Manager. Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
2. Post-Emergent Pesticide "Round-up" by Monsanto, or approved equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
  1. Verify that finish grades are consistent with the slopes and grades indicated on the Contract Drawings. Verify grades are in conformance with Division 31 Section "Earth Moving".
  2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  3. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  4. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  5. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by the Project Manager.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.
- D. Acceptance: Beginning of installation means acceptance of existing conditions by the Contractor.

### 3.2 PREPARATION

- A. Work notification: Notify the Project Manager at least seven (7) working days prior to start of sodding operations.
- B. Limit turf subgrade preparation to areas that can be sodded within twenty four (24) hours.
- C. Newly Graded Subgrades: Prepare soil as required by Division 32 Section "Soil Preparation".
- D. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
  1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  2. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top six inches (6") of soil. Till soil to a homogeneous mixture of fine texture.

3. Remove stones larger than one-half (½”) inch in any dimension and sticks, roots, trash, and other extraneous matter.
  4. Legally dispose of waste material, including grass, vegetation, and turf, off City property.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
  - F. Verify that all areas are graded to drain at a minimum of two percent (2%) or as indicated on the Contract Drawings. Verify that subsurface drainage system and drain inlets if any, are operative.
  - G. Verify that irrigation system is operable and provides adequate coverage prior to planting.
  - H. Adjustment: Adjust irrigation heads to proper watering height according to depth of sod material but lower than compacted blade height to enable lawn mowers to cut grass freely without damage to the sprinkler system.
  - I. When completed, the soil shall be firmed by float dragging, followed by steel raking, to provide for the proper sodded subgrade. The sod bed shall be totally free from rock or clay clods over one-half inch (1/2”) inch in diameter.
  - J. Repair: Re-establish grade and specified conditions to damaged sod areas prior to placing sod.

### 3.3 INSTALLATION

- A. Sodding:
  1. Sod within twenty-four (24) hours after preparation of bed.
  2. If plastic netting is present within sod, remove all netting during sod installation and discard from site.
  3. Subgrade on which sod is laid shall be slightly moist during installation.
  4. Lay sod with longest dimension parallel to contours and in continuous rows.
  5. Tightly butt ends and sides of sod together. Stagger and compact vertical joints between sod strips.
  6. Sod shall not be overlapped or stretched during placement. Exposed joints due to shrinkage will require replacement of sod in affected areas.
- B. Topsoil: Where new sod abuts an existing turf area topsoil shall be placed along seams and or joints to provide a smooth transition.
- C. Rolling: Sod shall be rolled after installation to ensure proper contact with the subgrade, and to ensure tight joints between adjacent pieces. Sod shall be moist prior to rolling. Once rolling is complete additional watering shall occur. Roller shall weigh one-hundred (100) pounds.
- D. Drainage: Contractor shall ensure that finished areas are graded so that positive drainage of storm and irrigation water is achieved.
- E. Water thoroughly with a fine spray as laying progresses and immediately after planting. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (1-1/2”) below sod.

- F. After sod and soil have dried, roll sodded areas to ensure a good bond between sod and soil and to remove minor depressions and irregularities. Roller shall not exceed one hundred (100) pounds.

### 3.4 FERTILIZING

- A. Distribute (20-5-10) fertilizer uniformly at the rate of five (5) pounds of material per one-thousand (1,000) square feet, one (1) pound of actual nitrogen per thousand (1,000) square feet for sixty (60) days after initial sodding operations and every sixty (60) days thereafter until Substantial Completion of project by the Project Manager.

### 3.5 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by sodding operations, Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from sodded areas until grass is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during sodding operations. Repair irrigation system components damaged during sodding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

### 3.6 MAINTENANCE

- A. General: The maintenance period shall begin immediately after each area is sodded and continue until Substantial Completion of entire project. Final Acceptance of sodded areas will not be given until Project Manager is satisfied with establishment and a full stand of grass, in a vigorous growing condition, and thoroughly rooted to the soil and absence of visible joints. During this time, the Contractor is responsible for watering, mowing, spraying, weeding, fertilizing and all related work as necessary to ensure that sodded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to develop and maintain sodded areas from time of installation, then for a period of two (2) years from Substantial Completion. After Final Acceptance, maintenance shall become the responsibility of the City.
- B. The sodded areas shall be accepted on the basis of having a healthy, uniform stand of turf over the entire sodded area. Forty five (45) days after sodding, the sodded areas shall be reviewed by the Project Manager and the Contractor. Any areas as determined by the Project Manager where the sod has failed to establish shall be re-sodded. Acceptable sod establishment shall be defined healthy uniform turf that does not contain any stressed or bare spots greater than one square foot.
- C. Mowing and Trimming: When turfgrasses reach three and one-half inches (3-1/2") in height, begin weekly mowing program to maintain turf at two and one-half inches (2-1/2") to three inches (3") in height. Do not remove more than 1/3 the height of the grass blade in single mowing. Do not mow when grass is wet. All clippings from adjacent paved areas shall be

removed and clippings from mowed turf areas shall be removed to the satisfaction of Project Manager.

- D. Fertilizing: Within thirty (30) days of sodding and every sixty (60) days thereafter until Final Acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.
- E. Weed Control: Control annual weeds by mowing. Do not use pesticides unless approved by the Project Manager and Denver Parks Operations Supervisor.
- F. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the Project Manager and the Parks Operations Supervisor.

### 3.7 CLEANING

- A. General: Provide and install barriers as required and as directed by Project Manager to protect sodded areas against damage from pedestrian and vehicular traffic until Final Acceptance.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for sodding.

### 4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

**END OF SECTION 32 92 23**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. The Work of this Section includes furnishing, installing, and maintaining live woody plant material.
- B. Related Work:
  - 1. Division 01 Section "Submittals".
  - 2. Division 01 Section "Tree Retention & Protection".
  - 3. Division 31 Section "Clearing and Grubbing".
  - 4. Division 32 Section "Irrigation System".
  - 5. Division 32 Section "Soil Preparation".
  - 6. Division 32 Section "Topsoil".

## 1.3 DEFINITIONS

- A. ANSI: American National Standards Institute. Z60.1 is the national standard for nursery stock.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- C. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Caliper: Trunk diameter is measured six inches (6") from the ground; if the caliper is greater than four inches (4"), the measurement is taken at twelve inches (12") from the ground.
- F. Cane: A cane shall be considered a primary stem which starts from the ground or at a point close to the ground at a point not higher than one-fourth (1/4) the height of the plant, and which reaches the minimum height stated in the plant size specification.
- G. Central leader: Also referred to as leader or the dominant leader. A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main scaffold branch and extending to the top of the tree.
- H. Circling root(s): One or more roots whose diameter is greater than ten percent (10%) of the trunk caliper circling more than one-third of the trunk. Circling roots are unacceptable.

- I. Clear trunk: The portion of the trunk below the main crown which may include shortened temporary branches.
- J. Co-dominant: Two or more vigorous, upright branches or stems of relatively equal diameter that originate from a common point, usually where the leader was lost or removed. Co-dominant stems are unacceptable.
- K. Container-Grown: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- L. Critical Root Zone: ADD DEFINITION
- M. Crown: The portion of a tree beginning at the lowest main scaffold branch extending to the top of the tree. On younger trees, the crown may be comprised of temporary branches.
- N. Cultivar: A named plant selection from which identical or nearly identical plants can be produced, usually by vegetative propagation or cloning.
- O. Drip Zone: ADD DEFINITION
- P. Finish Grade: Elevation of finished surface of planting soil.
- Q. Included bark: Bark embedded in the union between a branch and the trunk or between two or more stems that prevents the formation of a normal branch bark ridge. Included bark is unacceptable.
- R. Kinked root: A main root that is sharply bent. Kinked roots are unacceptable.
- S. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- T. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- U. Root collar: Also referred to as the root flare. The base of a tree where the main roots and trunk meet.
- V. Scaffold branches: Large main branches that form the main structure of the crown.
- W. Stem-girdling root: A circling, bent, or straight root that touches or rests on the trunk or root flare that can become a permanent root. Stem-girdling roots are unacceptable.
- X. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

- Y. Temporary branch: A small branch that is temporarily retained along the lower trunk of young trees.
- Z. Trunk: The main stem of a tree, beginning at the root collar and ending at the lowest main scaffold branch.
- AA. Taper: The thickening of a trunk or branch toward its base.

#### 1.4 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Product Data: For each type of product.
  - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
- C. Product Samples: At a minimum provide the following samples for approval by the Denver Project Manager, additional product samples may be required at the direction of the Denver Project Manager.
  - a. Mulch- 1 gallon bag minimum of each type of mulch.
  - b. Tree Stakes- 1 of each type.
  - c. Tree Straps- 1 each.
  - d. Guy Material- 1 linear foot.
  - e. Guy Signal- 1 linear foot.
  - f. Tree Wrap- 1 linear foot.
- D. Pesticides: Product label, MSDS labels and manufacturer's application instructions specific to Project.
- E. Proper Identification: All plants shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by species and cultivar (as appropriate).
- F. Contractor shall provide a complete list of all plant material for approval by the Project Manager a minimum of ten (10)days prior to delivery. Any substitutions of plant material, including but not limited to size, type, species and variety shall be listed and submitted to the Project Manager for approval.
- G. Contractor shall provide the following certificates:
  - 1. State Inspection Certificate from the origin nursery.
  - 2. Certificate from origin state.
  - 3. Quarantine Certificate from origin state.
  - 4. Any Certificates required by the USDA Animal and Plant Health Inspection Service (APHIS) and ANSI-Z-160 and accompanying Rules and Regulations.
- H. Analysis of existing soil shall be per Division 32 Sections "Topsoil" and "Soil Preparation".
- I. Contract Close Out Submittals:
  - 1. Operating and Maintenance Data: At completion of work, submit 1 digital copy and 2 hard copies to the Project Manager in accordance with Division 01 Section "Contract Closeout". Include recommended procedures for continued and proper maintenance during a full calendar year.



2. Warranty for Trees, Plants, and Groundcovers: At completion of work, furnish written warranty to the Project Manager based upon specified requirements.

#### 1.5 QUALITY CONTROL

- A. 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 prior to delivery at the nursery(s) 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 Denver Project Manager.
  1. The Project Manager reserves the right to reject, at any time or place prior to final acceptance, all plant materials that fail to meet these specifications in the Denver Project Manager’s opinion. Inspection of materials is primarily for quality, size, and variety, but other requirements are not waived even though visual inspection results in approval. Plants are to be inspected where available; however, inspection at the places of supply shall not preclude the right of rejection at the site or at a later time prior to final acceptance. Rejected material shall be removed from the site within twenty-four (24) hours.
  2. 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.
  3. The Contractor shall pay all expenses for the Project Manager and Denver 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.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Materials: Deliver materials in original containers with tags showing genus, species and size. Protect materials from damage during delivery and while stored at site. The Project Manager reserves the right to inspect containers before or after installation to verify compliance with Specifications.
- B. Bulk Materials:
  1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants or critical root zone.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Trees: Nursery stock shall be harvested and planted during the same growing season. Do not prune, except as approved by the Denver City Forester and Denver Project Manager. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other

handling and tying damage. Do not bend or tie trees in such a manner as to destroy natural shape. Provide protective covering during delivery. Plant materials delivered without protective covering may be rejected. Do not drop trees during delivery. All trees shall be labeled with a securely attached waterproof tag bearing a legible plant name. Remove all tags and flagging as directed by the Denver Project Manager.

- D. Deliver bare-root stock plants within twenty-four (24) hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
  - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Handle planting stock by the root ball only.
- H. Deliver trees after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.
  - 1. Set balled stock on ground and cover ball with wood chips, or other acceptable material.
  - 2. Do not remove container-grown stock from containers before planting.
  - 3. Water root systems of trees stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

#### 1.7 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Vehicular accessibility on site shall be as directed by Denver Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Utilities: Contractor shall be responsible locating utilities and, repair of utilities damaged during the work. Determine location of overhead and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain markings until their removal is mutually agreed upon by the Contractor and Denver Project Manager.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Project Manager before planting.
- E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be

obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

- F. Protection: Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site from exposed excavations.

#### 1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required. Planting materials should be planted between April 15 and October 1, or at the direction of the Denver Project Manager. If irrigation is not available at the time of planting then the Contractor is responsible for watering of all plant material and no additional cost to the City, refer to Division 32 Section "Watering".
- B. Plant trees after final grades have been accepted and prior to seeding or sodding, unless otherwise authorized by Denver Project Manager.

#### 1.9 WARRANTY

- A. Warranty: The warranty specified in this Article shall not deprive the City of other rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Trees, Plants, and Groundcovers shall be warranted for a period of one (1) year after date of Substantial Completion, against defects including death, structural failures, dieback as determined by the City Forester and or Denver Project Manager. Warranty shall not cover defects resulting from lack of adequate maintenance, neglect or abuse by City staff, hail, or incidents that are beyond Contractor's control.
- C. The warranty shall not be enforced should any plant die due to vandalism after Final Acceptance.
- D. Remedial Actions:
  - 1. Replace any plant materials that have been excessively pruned, more than twenty percent (20%) percent dead, or in an unhealthy or declining condition immediately upon notice from the Project Manager during warranty period.
  - 2. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
- E. All plants shall be true to name and meet all conditions of these specifications. Any plant that is not true to name as indicated by form, leaf, flower, or fruiting characteristics shall be replaced at the Contractor's expense.

#### 1.10 TREE MAINTENANCE DURING CONSTRUCTION PERIOD

- A. Maintain trees by pruning, cultivating, watering, mulching, winter watering, weeding, wrapping, unwrapping, restoring planting saucers, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Control as required to keep trees free of insects and disease. Restore or replace damaged tree wrappings, stakes, guying. Trees shall be maintained by the Contractor through the Warranty period of the project.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIALS

- A. General: Furnish and install nursery-grown trees and shrubs conforming to the requirements of ANSI-Z-160, with healthy root systems developed by transplanting or root pruning. Provide well shaped, symmetrical, fully branched, healthy, and vigorous stock free of disease, insects, eggs, larvae, girdling, and defects such as sun scald, injuries, abrasions, and disfigurement. Trees of a larger size than that specified in the plant list may be used with a proportionate increase in size of roots and balls, if acceptable to the Denver 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 Drawings. No substitutions will be accepted without the prior written approval of the City Forester and or the Denver Project Manager. Contractor must provide proof of non-availability.

### 2.2 TREES

- A. These specifications shall apply to deciduous, broadleaf evergreen and coniferous species. Note that leaf characteristics will not be evident on deciduous trees during the dormant season.
- B. Crown: The form and density of the crown shall be typical for a young specimen of the species/cultivar. Changes in form caused by wind, pruning practices, pests, or other factors shall not substantially alter the form for the species/cultivar. These crown specifications do not apply to plants that have been specifically trained in the nursery to be: topiary, espalier, multi-stem, or clump; or unique selections such as contorted or weeping cultivars.
  - 1. Trees shall have a single, relatively straight trunk, and central leader, unless noted on plans to be "Multi-trunk" or "Clump". They shall be free of co-dominant stems and vigorous, upright branches that compete with the central leader. If the original leader has been headed, a new leader at least one-half of the diameter of the original leader shall be present.
  - 2. Main branches shall be evenly distributed along the central leader, not clustered together. They shall form a balanced crown appropriate for the age of the species/cultivar.
  - 3. Branch diameter shall be no larger than one-half the diameter of the central leader measured one inch (1") above where the branch is attached.
  - 4. The attachment of the largest scaffold branches shall be free of included bark.
  - 5. Temporary branches, unless otherwise specified, should be present along the lower trunk below the lowest scaffold branch, particularly for trees less than one inch (1") in caliper. These branches should be no greater than three-eighths inch (3/8") diameter. Clear trunk shall be no more than thirty percent (30%) of the total height of the tree, unless otherwise noted
- C. Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds, except properly made pruning cuts, which shall be closed over or less than three-quarters inch (3/4") diameter open, sunburned areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers, stem-girdling ties, or lesions (mechanical injury).
  - 1. Trunk caliper and taper shall be sufficient so that the tree will remain vertical without a stake. Trunk caliper at six inches (6") above the soil media (substrate) surface shall be

within the diameter range shown for each container size below and as specified in current edition of ANSI Z60.1.

2. The cut made when re-growing the top should be just above the major structural roots. The “shank” that results from this procedure should be at a consistent height above the structural roots and no longer than five inches (5”), to ensure that the trees are consistently planted at the correct depth. The base of the trunk should not have a large pruning cut from re-growing the top.
- D. Roots: The root system shall be substantially free of injury from biotic (e. g., insects and pathogens) and abiotic (e. g., pesticide toxicity and salt injury) agents.
1. The uppermost roots or root collar shall be within the upper two inches (2”) of the soil media (substrate). Depth of the root-ball shall be measured from the top of the ball, which in all cases shall begin at the root flare. Soil above the root flare shall not be included in the root-ball depth measurement, and shall be removed.
  2. The root collar and the inside portion of the root-ball shall be free of defects, including circling, kinked, and stem-girdling roots. Soil removal or root washing near the root collar may be necessary to inspect for the aforementioned root defects.
  3. Roots on the periphery and bottom of the root-ball shall be less than one-eighth inch (1/8”) diameter.
  4. The tree shall be well rooted in the soil media (substrate). Root distribution shall be uniform throughout the soil or media. Structure and growth shall be appropriate for the species/cultivar. When the burlap or container is removed, the root-ball shall remain intact. Trees should have several lateral roots or many fibrous roots spaced evenly around the trunk to provide support so the trees are stable when planted. Trees should have as many small roots as possible. These roots are key to the uptake of sufficient water and nutrients. Fibrous roots can be achieved by root-pruning, using air-pruning containers, or under-cutting or root pruning and transplanting at any stage of production.
  5. As a general rule for young nursery-grown trees, there should be two or more structural roots within one to three inches (1” – 3”) of the soil surface. “First order lateral roots” is another term that has been used for these roots. If the roots are deeper than three inches (3”) , the stock shall be rejected.
  6. Root-balls that are undersized as specified in current edition of ANSI Z60.1. shall be rejected. Field grown trees for balled and burlap delivery shall have the roots pruned at least six inches (6”) inside the **final root-ball size performed within adequate time for the tree to develop fibrous roots at the outer** edge of the root-ball prior to harvest and delivery.
- E. Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of prolonged moisture stress or extended drought as indicated by wilted, shriveled, or dead leaves.
- F. Branches: Shoot growth (length and diameter) throughout the crown shall be appropriate for the age and size of the species/cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.
- G. All deciduous trees of one species used in formal rows or groupings shall exhibit cultural uniformity, i.e. “matched” in height, crown width and shape, height to first branch, and trunk taper. For this reason it is desired that these trees be produced by a single grower.

- H. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated, and only if approved by the City Forester and or the Denver Project Manager.

2.3 SHRUBS

- A. Container Grown Shrubs: All specifications for container grown plants shall include both plant size and container size. Plant size intervals and reference to height or spread shall be in accordance with the guidelines for the appropriate plant type set forth in ANSI Z60.1; Section 2.2 Types of Deciduous Shrubs.
- B. Container size shall be by container classification (i.e., not by container volume) as set forth in the ANSI Z60.1 Container Class Table.
- C. In all cases, container grown nursery stock shall meet the following general requirement:
  - 1. All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.
- D. The container shall be sufficiently rigid to hold the ball shape and to protect the root mass during shipping.
- E. Minimum shrub sizes shall conform to the following standards:
  - 1. Tender shrubs (Type 0) that do not produce top growth that is winter hardy:

Height or Spread	Minimum number of canes	Minimum spread of roots
15 inches	3 canes	9 inches

- 2. Small shrubs (Type 1) that grow to a mature height of not more than three feet (3’):

Height or Spread	Minimum number of canes	Minimum spread of roots
15 inches	4 canes	9 inches

- 3. Intermediate shrubs (Type 2) that grow to a mature height between three feet (3’) and seven feet (7’):

Height or Spread	Minimum number of canes	Minimum spread of roots
2 feet	4 canes	12 inches

- 4. Large shrubs (Type 3) that grow to a mature height exceeding seven feet (7’):

Height or Spread	Minimum number of canes	Minimum spread of roots
4 feet	6 canes	20 inches

2.4 PERENNIALS, GRASSES, GROUNDCOVERS, AND VINES

- A. All container grown plants shall be healthy, vigorous, well rooted, and established in the container in which they are growing, and be in conformance with ANSI Z60.1. A container

grown plant shall have a well established root system reaching the sides of the container to maintain a firm root ball, but shall not have excessive root growth encircling the inside of the container. Top growth is to be in conformance with established nursery standards.

## 2.5 TREE-STABILIZATION MATERIALS

### A. Trunk-Stabilization Materials:

1. Deciduous Tree Stakes: Rough-sawn, sound, new softwood, free of knots, holes, cross grain, and other defects, two inch (2") diameter by six foot (6'), pointed at one end.
2. Evergreen Tree Stakes: 2-foot steel T-posts; green color.
3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, #14 galvanized-steel wire, two-strand, twisted.
4. Tree-Tie Webbing: UV-resistant nylon webbing with brass grommets, size as indicated.
5. Guy signals: one-half inch (1/2") diameter PVC pipe, length as indicated.

### B. Tree-Wrap:

1. Two layers of crinkled paper cemented together with bituminous material, four inches (4") wide minimum, with stretch factor of thirty-three percent (33%).
2. Tree wrap tape: Duct tape or other tape as approved by the City Forester and or the Project Manager.

## 2.6 MULCH

- ### A. Organic Mulch:
- Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of chipped wood material not larger than four inches (4") in length. Submit a one (1) gallon bag sample to Project Manager for approval. Mulch is to be weed-free.

## 2.7 PLANT PIT BACKFILL MATERIAL

- ### A. Unless otherwise directed by the Denver Project Manager, the plant pit backfill material shall consist of the following, thoroughly mixed:
1. Soil originally excavated from the pit: two thirds (2/3) proportion of total mix.
  2. Soil Amendment as specified in Division 32 Section "Soil Preparation"; one-third (1/3) proportion of total mix.
- ### B. If imported topsoil is required, it shall meet the requirements specified in Division 32 Section "Topsoil", Article 2.2.

## 2.8 WATER

- ### A. During the irrigation season (generally May through September), water will be available from on-site quick couplers. When the system is not charged, it shall be the Contractor's responsibility to supply adequate amounts of water from a water truck or other approved source. Hoses and other watering equipment shall be supplied by Contractor.
1. Watering Amount: 10 gallons per caliper inch.
- ### B. Watering: Refer to Division 32 Section "Watering".

- C. Maintenance: Refer to Division 32 Section "Landscape Maintenance".

## 2.9 MISCELLANEOUS MATERIALS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees, as approved by the City Forester and or the Denver 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 Denver Project Manager.
- C. Pesticides: EPA registered and approved, and as approved by the City Forester and the Denver Project Manager.
- D. Subdrainage: See Division 33 Section "Subdrainage Systems".

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 1. Verify that no foreign or deleterious material or hazardous liquid that may be detrimental to plant growth are removed from the site prior to planting.
  - 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 Denver Project Manager.
- C. Cooperate with any other contractors and trades, who may be working in and adjacent to the landscape work areas. Examine drawings which show the development of the entire site and become familiar with the scope of all work required.

### 3.2 FINISH AND FINE GRADING

- A. See Division 31 Section "Earth Moving and 32 Sections "Soil Preparation" and "Topsoil".



### 3.3 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas and existing plants from damage caused by planting operations. Repair damage to surrounding areas and site elements 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 Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- D. Prepare planting area for soil placement and mix planting soil according to Division 32 Section "Soil Preparation".

### 3.4 WEED CONTROL

- A. Do not proceed with landscape work until weed growth has been controlled and eliminated, per Division 32 Section "Soil Preparation".
- B. See Division 32 Section "Soil Preparation" for detailed weed control measures.
- C. Use herbicides only with the written approval of Denver Project Manager, and in strict accordance with manufacturer's instructions.

### 3.5 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits: Excavate by hand or with a backhoe. Scarify sides of tree pit. Tree spade may not be used to dig tree pits.
  - 1. Balled and Burlapped Trees: Excavate a minimum two times (2X) as wide as ball diameter at base of pit. The base of the root collar shall be three inches (3") higher than the grade at which the tree originally grew and finished grade. Slope sides of the pit as shown on the detail.
  - 2. Container-Grown Trees and Shrubs: Excavate approximately two times (2X) times as wide as container diameter. Plants shall be set one inch (1") higher than finished grade.
  - 3. Do not excavate deeper than depth of the root ball, measured from the base of the root flare to the bottom of the root ball.
  - 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly compact the added soil to prevent settling.
- B. Obstructions:
  - 1. Utilities: Notify Project Manager immediately of utilities that conflict or may potentially conflict with proposed plant locations. In such cases, alternative plant locations will be determined by Denver 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 Denver Project Manager.

### 3.6 PLANTING TREES AND SHRUBS

- A. Balled and Burlapped Stock:
  - 1. Set balled and burlapped stock plumb and in center of pit with base of root flare three inches (3") above adjacent finish grades as indicated.
  - 2. Remove burlap from top two-thirds (2/3) of balls and partially from sides, but do not remove from under balls. Remove wire baskets and all twine entirely. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.
  - 3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.
- B. Container Grown Stock:
  - 1. Carefully remove containers so as not to damage root balls.
  - 2. Lightly scratch sides of exposed root ball to loosen surface roots.
  - 3. Set plants plumb and in center of pit with top of ball raised one inch (1") above adjacent finish grades or as indicated.
  - 4. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly, then place remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.
- C. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare two inches ( 2")above adjacent finish grade.
  - 1. Backfill: As specified in Part 2 of this Section.
  - 2. Spread roots laterally without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
  - 3. Carefully work backfill in layers around roots by hand eliminating air pockets. Bring roots into close contact with the soil.
  - 4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Tree Staking: Stake trees as shown on the details.
- 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 15<sup>th</sup> or per the direction of the City Forester and or the Project Manager. All tree wrap shall be removed by May 15.
2. Contractor shall be responsible for wrapping and unwrapping trees during the warranty period.

### 3.7 PRUNING OF PLANTS

- A. Prune only damaged or dead branches as directed by the the City Forester and or the Denver Project Manager.

### 3.8 TREE STABILIZATION

- A. Trunk Stabilization by Staking: Install trunk stabilization as follows unless otherwise indicated on Drawings.
  1. Stake trees as indicated on details.
    - 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. Attach thirty-six inch (36") long x one-half inch (½") diameter pvc pipe flagging to each wire.

### 3.9 MULCHING

- A. Trees: Create a forty-eight inch (48") diameter formed soil berm around tree and fill with three inch (3") deep specified wood mulch. Mulch shall be kept four to six inches (4"-6") away from tree trunk.
- B. Shrubs:
  1. Mulch backfilled surfaces of pits, planting beds areas, and other areas indicated or as directed by the Denver Project Manager.
  2. Mulch in shrub bed areas: Apply three inch (3")thick layer of mulch and finish level with adjacent finish grades. Do not place mulch against stems of plants.

### 3.10 INSTALLATION OF MISCELLANEOUS MATERIALS

- A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.
  1. 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.

### 3.11 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations, Contractor shall repair any damage at no additional cost to the City.

- B. Restrict vehicular and pedestrian traffic from planted areas. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during seeding operations. Repair irrigation system components damaged during seeding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

#### 3.12 CLEANING

- A. General: Provide and install barriers as required and as directed by Project Manager to protect sodded areas against damage from pedestrian and vehicular traffic until Final Acceptance.

#### 3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil including excess subsoil and unsuitable soil, waste material, including, trash, and debris generated during installation off site at no additional cost to the City.

### PART 4 - MEASUREMENT AND PAYMENT

#### 4.1 MEASUREMENT

- A. Measurement will be based on the percentage complete for the lump sum contract amount for plants.

#### 4.2 PAYMENT

- A. Payment will be made at the lump sum contract price, and shall include all of the Contractor's costs including labor, materials and incidental work and equipment necessary to complete the work.

**END OF SECTION 32 93 00**

## Appendix 1



October 13, 2015

Russel + Mills Studios  
Attn: Paul Mills  
141 S Broadway Suite 202, Denver, CO 80209

**RE: Subsurface Exploration, Soil testing and Post-tensioned Slab Recommendations  
Berkeley Park Tennis Courts  
Denver, Colorado**

Dear Mr. Mills:

This letter provides our findings from subsurface investigations and subsequent soil laboratory testing performed for the Berkeley Park Tennis Court Replacement project located in Denver, Colorado. Included are surficial observations, the results of borings drilled for the project, laboratory test results for soils used to evaluate subsurface soil and groundwater conditions, and recommendations for post-tensioned slab design for the proposed new South tennis courts.

## **SITE CONDITIONS**

The project site is situated in an area of low rolling uplands that have been slightly to moderately modified by a long history of construction associated with roadway, drainage control, residential and parkland development. It is located near the southeast corner of City/County of Denver's mature and well developed Berkeley Lake Park and bounded on the south by an arterial roadway, West 46<sup>th</sup> Avenue. The greater north portion of the Park is occupied by Berkeley Lake with other parkland generally sloping in that direction. The tennis courts are surrounded by irrigated grass parkways, picnic areas and open play areas with dense to scattered large, deciduous trees. The relatively small, single-story Smiley Branch of the Denver Public Library System is near the east side of the tennis complex with which it shares asphalt-paved parking facilities. The project-associated south tennis complex (four fenced-in courts with night overhead lighting) is approximately one foot high to the companion north complex and separated from it by a narrow asphalt-paved access walkway and drainage swale. A substantial multi-strand overhead electric power line extends along the east side of the south courts and terminates in a group of poles with transformers and drops near the northeast corner. The southeast corner of the south courts sets slightly low to the adjacent grass parkland which appears to have created a tendency for storm, and possibly irrigation, water to flow onto the court's surface.

Quadrangle-scale published geologic mapping (U.S.G.S. Map GQ-1453, 1979) assigns all natural (pre-construction) surficial soil in the immediate project area to "Eolian Sand". These originally wind-bourne deposits are typified as commonly cross-bedded fine sand, sandy silt and clay with occasional areas dominated by silty clay and clay. The deposits are reported as generally less than 10-feet thick, but locally to almost 30-feet thick. Sub-regional scale published hydrogeologic maps (U.S.G.S. Map HA-736, Sheet 1, 1996) shows less than 20-feet of unspecified "alluvial soil" on bedrock in the project area. Bedrock is indicated to be very gently dipping, well-stratified sedimentary members of the Denver-Arapahoe Formations Undifferentiated; typified at normal

construction depths as dominated by interbeds of claystone and siltstone with lessor interbeds and lenses of clayey sandstone.

## SUBSURFACE EXPLORATION

The subsurface exploration for this project was conducted on September 17, 2015, and consisted of drilling two exploratory borings at the approximate locations shown on Figure 1, Locations of Exploratory Borings. Borings were drilled to a depth of 5 feet and soil samples were collected for the purpose of measuring soil engineering properties. The borings were drilled with a truck mounted Central Mine Equipment CME-45 drill-rig equipped with 4-inch diameter solid-stem augers. A representative of Geocal, Inc. logged the borings and collected the soil samples.

Soil samples were obtained from the exploratory borings using a nominal 2 inch diameter modified California split barrel sampler. The sampler was driven into the various strata with blows from a 140 pound hammer falling 30 inches, in general accordance with the ASTM D3550 test standard. Penetration resistance values, when properly evaluated, provide an indication of the relative density or consistency of the soils or relative hardness of bedrock. Samples were obtained at 1 foot and 4 feet. Composite bulk soil samples were collected from between 1 foot and 5 feet. After drilling, the borings were backfilled with make-up sand and compacted.

Boring logs summarizing the subsurface conditions encountered at the locations shown in Figure 1, including depths at which samples were collected, penetration resistance values, a description of the materials encountered, and notes regarding the symbols used are shown on Figures 2A and 2B. Soil samples collected from each boring were returned to our laboratory for review by our project engineer and selected samples were programmed for testing.

## SUBSURFACE CONDITIONS

At the locations shown on Figure 1, represented by the boring logs shown in Figures 2A and 2B, each boring was drilled upon sodded topsoil and extended to a depth of 5 feet. The top 6 inches of each boring encountered topsoil. Below the topsoil, Boring 1 encountered silty sand, loose to medium dense, no plasticity, lightly moist, medium brown, with fine sand. Boring 2 encountered silty sand, very loose to loose, no plasticity, lightly moist, medium brown, with fine sand. Groundwater was not encountered in either boring at the time of drilling. Groundwater levels can be expected to fluctuate with varying seasonal and weather conditions.

## LABORATORY TESTING

Laboratory tests conducted on the selected soil samples consisted of Atterberg Limits and grain size distribution (gradation), natural moisture content, dry unit weight, swell-compression, standard proctor, buried metal corrosion, and water soluble sulfate content. Geocal laboratory test results are presented on Figures 3 through 6, and are summarized on Table 1.

**Gradation Analyses, Percent Fines, and Atterberg Limits:** These tests were performed to classify the soils in accordance with the American Association of State Highway and Transportation Officials (AASHTO) classification system and Unified Soil Classification System (USCS). These classifications provide qualitative

information on the soil suitability for use in engineering applications. Gradation, Percent Fines, and Atterberg Limits tests results are shown on Figure 4 and indicate that the materials tested classify as silty sand (AASHTO A-2-4).

**Moisture – Density Relationship:** The moisture-density relationship test is performed to evaluate the density variation that occurs with a particular soil sample with different moisture contents using the same compaction effort. The results shown on Figure 5 for the bulk sample taken from the upper 5 feet of Boring 1 indicate that the sample of silty sand tested has a maximum standard Proctor dry density of 117.0 pounds per cubic foot (pcf) with an optimum moisture content of 11.9%. Figure 6 for the bulk sample taken from the upper 5 feet of Boring 2 indicate that the sample of silty sand tested has a maximum standard Proctor dry density of 117.6 pounds per cubic foot (pcf) with an optimum moisture content of 12.0%.

**Buried Metal Corrosion:** Laboratory resistivity, chloride, and pH tests were conducted on selected samples obtained from the borings, and the results are summarized on Table 1. These test results may be used to help evaluate the corrosion potential to buried metal; however, a corrosion specialist should be consulted to interpret the results. In general, testing showed a resistivity value of 5,500 ohm-cm, chloride content at 0.0177%, and a pH value of 6.7.

**Water-Soluble Sulfates:** The water-soluble sulfate test is a measurement of the potential degree of sulfate attack on concrete exposed to the onsite soils and bedrock. Sulfate solutions react with tri-calcium aluminate hydrate, which is a normal constituent of Portland cement concrete, forming calcium sulfo-aluminate hydrate with an accompanying substantial volume expansion, which causes cracking. Sulfate expansion problems will typically exist when the soils have water-soluble sulfate concentrations in excess of 0.10%.

The concentration of water-soluble sulfates measured on the selected sample tested measured 0.02%, which indicates a Class 0 “Severity of Sulfate Exposure” in accordance with Table 601-2 of the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction (CDOT standard specifications).

## POST-TENSIONED SLAB FOUNDATION RECOMMENDATIONS

The subgrade soils where the proposed tennis courts are to be constructed are expected to consist of silty sand soils with no expansion potential; however, testing showed a potential for some collapse upon wetting of the subgrade soil under load, so proper grading in order to provide good site drainage is needed. Settlement is expected to be negligible for the proposed construction, since the new post-tensioned concrete slab is to be constructed atop the existing tennis courts. It is reasonable to assume that settlement of the existing courts has ceased, and that placing the proposed post-tensioned slab atop of the existing courts will undergo nil to very minimal settlement.

The post-tensioning manual recommends a friction coefficient of 0.5 to 0.6 for flat slabs cast on polyethylene sheeting; however, the use of polyethylene may result in uneven curing of the slab and could result in surface shrinkage cracking, and that mitigating the potential for non-uniform curing is recommended. It has also been found that the friction coefficient can further be reduced to a range of 0.4 to 0.45 by using two layers of polyethylene sheeting, reducing the need for additional tendons for larger slabs.



If the owner elects to construct the new courts atop of the existing courts, the slab should be constructed on a vapor barrier such as PVC or polyethylene; however, placing concrete on such materials may adversely affect curing conditions. Curing conditions can be improved by placing at least 3 inches of free-draining sand between the vapor barrier and the concrete slab. The intent of the vapor barrier is to mitigate the potential for moisture from within the subgrade soils to accumulate below the slab. Because the slabs will be exposed to snow and rain, provisions for surface water infiltration should also be made. We recommend that the vapor barrier be sloped at a minimum 1% grade toward any underdrains. The vapor barrier should be terminated at the underdrains so that water collected within the sand layer can be removed. The thickness of sand above the vapor barrier will vary to account for the sloped surface. The concrete slab and any joints should be designed to prevent surface water infiltration.

If the owner elects to remove the existing tennis courts prior to construction of the proposed new courts, an underdrain system below the tennis court area will help reduce the potential for saturated subgrade conditions to develop after construction. Underdrains should consist of perforated pipe surrounded by free draining gravel wrapped in a filter fabric. The drains should be at least 4 inches in diameter and placed at least 18 inches below the finished slab. Underdrains should be sloped at a minimum 1% grade to a sump or gravity outlet. Free draining granular materials used in the drain system should contain less than 2% passing the No. 200 sieve and more than 50% retained on the No. 4 sieve. The free draining granular material should be wrapped in a filter fabric.

Additional imported material that is required to meet final grades should be granular and non-expansive and be placed in uniform lifts. CDOT specification for a Class-1 type fill should meet the grading requirements for the material. This subgrade fill should be compacted to at least 95% of a maximum standard Proctor density (ASTM D698) at moisture contents within 2% of the optimum. The subgrade should be proof-rolled with a heavy pneumatic tired construction vehicle. Areas that deflect or rut excessively should be removed and replaced with stable material.

The Post Tensioning Institute recommends that large trees and vegetation be removed closer than one half their ultimate height. Tree roots have been shown to produce large differential movement from both moisture removal from the soil to the roots and uplift pressures from the trees growth.

## **SURFACE DRAINAGE**

The proposed slab should be constructed at an elevation to which local irrigation and drainage will not collect at the edges of the slabs. The collection and diversion of surface drainage away from court surface areas is extremely important for the satisfactory performance of the foundations. The design of surface drainage should be carefully considered to remove water from bearing areas. Localized depressions should be graded to allow for proper drainage. The predominant soil types are clayey soils and they are moderately frost susceptible. Frost heave potential can be minimized through proper surface drainage and construction control.

## Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practices used in this area, and is provided for use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the borings drilled at the approximate locations shown on Figure 1, and onsite observations. Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No warranty, express or implied, is made.

If you have any questions or we can be of further assistance, please contact me at (303) 337-0338.

Sincerely,



**GEOCAL**

Tristan R. Siegel, P.E.  
Project Engineer

Reviewed By: Robert E. Barton, P.E.  
Project Manager

TRS/G15.1612.001

Enclosures: Figure 1 – Location of Exploratory Borings  
Figure 2 – Logs for Exploratory Borings  
Table 1 – Summary of Laboratory Test Results  
Figure 3 – Swell – Compression Test Results  
Figure 4 – Gradation Test Results  
Figures 5 & 6 – Standard Proctor Test Results



NOTE: Base Image from Google, Inc. under Earth Pro License to Geocal, Inc. Image Dated 10-06-2015.

N  
Google earth  
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4500 BLOCK, W. 46TH AVE.

200 ft

W 46th

GEOCAL, INC.  
G15.1612.001

BERKELEY PARK TENNIS COURTS  
LOCATIONS OF EXPLORATORY BORINGS

FIGURE 1

<b>CLIENT</b> <u>Russell + Mills Studios</u>	<b>PROJECT NAME</b> <u>Berkeley Park Tennis Courts</u>
<b>PROJECT NUMBER</b> <u>G15.1612.001</u>	<b>PROJECT LOCATION</b> <u>Berkeley Park</u>
<b>DATE STARTED</b> <u>9/17/15</u> <b>COMPLETED</b> <u>9/17/15</u>	<b>GROUND ELEVATION</b> _____ <b>NORTH</b> _____
<b>DRILLING CONTRACTOR</b> <u>Old Dirt Drilling</u>	<b>GROUND WATER LEVELS:</b> _____ <b>EAST</b> _____
<b>DRILLING METHOD</b> <u>HSA</u> <b>HOLE SIZE</b> <u>4 inches</u>	<b>AT TIME OF DRILLING</b> ---
<b>LOGGED BY</b> <u>Ben Walter</u> <b>CHECKED BY</b> _____	<b>AT END OF DRILLING</b> ---
<b>NOTES</b> <u>Northwest corner</u>	<b>AFTER DRILLING</b> ---

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 10/13/15 07:56 - W:\ENGINEERING\CLIENTS\RUSSELL + MILLS STUDIOS\BERKELEY PARK SOUTH TENNIS COURTS\BERKELEY PARK S. TENNIS COURTS LOGS GINT.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONFINED COMP. STRENGTH (psi)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		TOPSOIL-Grass and Dark brown soil										
0.5		(SM) silty SAND, loose to medium dense, no plasticity, medium brown, lightly moist, fine sand										
1			MC	100	6-6		110.0	6.9	NV	NP	NP	24.0
2												
3			GB	100								
4												
5			MC	100	3-4							

Bottom of borehole at 5 feet.

<b>CLIENT</b> <u>Russell + Mills Studios</u>	<b>PROJECT NAME</b> <u>Berkeley Park Tennis Courts</u>
<b>PROJECT NUMBER</b> <u>G15.1612.001</u>	<b>PROJECT LOCATION</b> <u>Berkeley Park</u>
<b>DATE STARTED</b> <u>9/17/15</u> <b>COMPLETED</b> <u>9/17/15</u>	<b>GROUND ELEVATION</b> _____ <b>NORTH</b> _____
<b>DRILLING CONTRACTOR</b> <u>Old Dirt Drilling</u>	<b>GROUND WATER LEVELS:</b> _____ <b>EAST</b> _____
<b>DRILLING METHOD</b> <u>HSA</u> <b>HOLE SIZE</b> <u>4 inches</u>	<b>AT TIME OF DRILLING</b> ---
<b>LOGGED BY</b> <u>Ben Walter</u> <b>CHECKED BY</b> _____	<b>AT END OF DRILLING</b> ---
<b>NOTES</b> <u>Southeast corner</u>	<b>AFTER DRILLING</b> ---

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 10/13/15 07:56 - W:\ENGINEERING\CLIENTS\RUSSELL + MILLS STUDIOS\BERKELEY PARK SOUTH TENNIS COURTS\BERKELEY PARK S. TENNIS COURTS LOGS GINT.GPJ

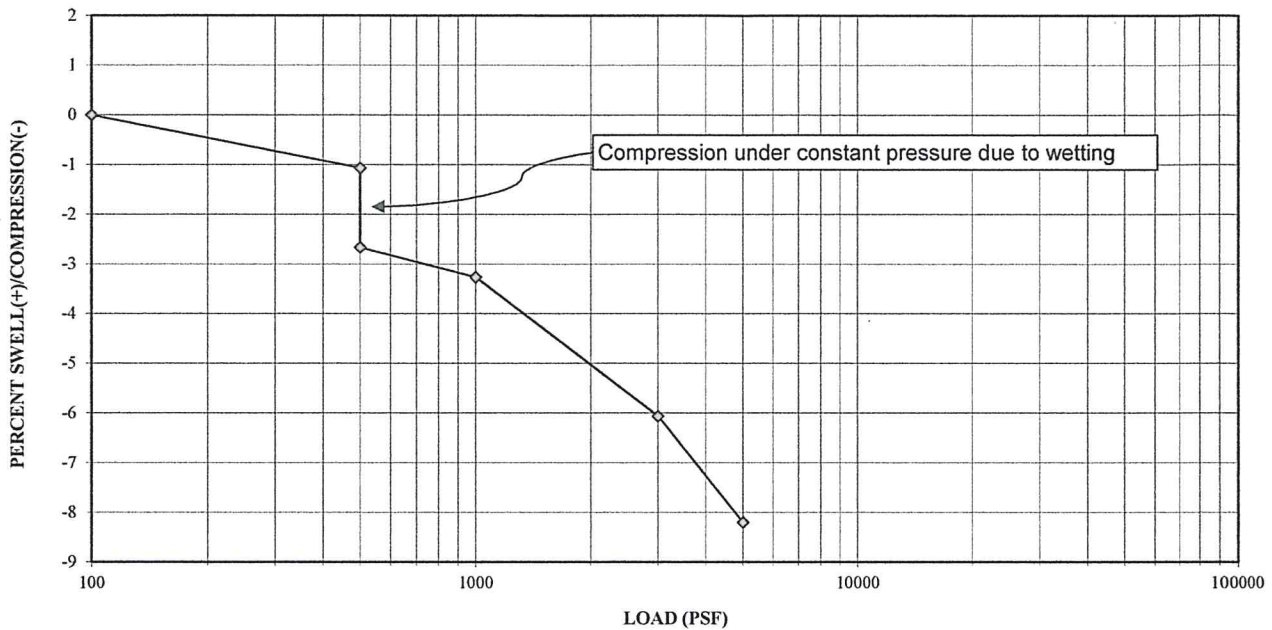
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONFINED COMP. STRENGTH (psi)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		TOPSOIL-Grass and Dark brown soil										
0.5		(SM) silty SAND , very loose to loose, no plasticity, medium brown, lightly moist, fine sand										
1.5			MC	100	2-2		105.0	15.1	NV	NP	NP	24.0
2.0												
3.5			GB	100								
4.0			MC	100	3-3							
5.0												

Bottom of borehole at 5 feet.



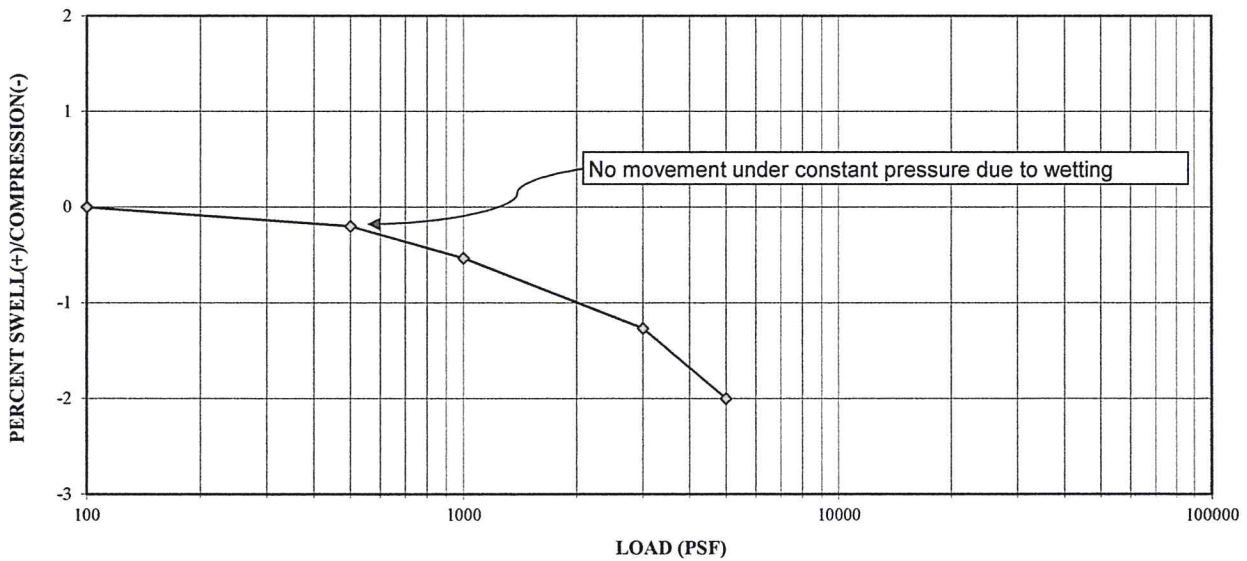


**SWELL-COMPRESSION TEST**



Sample Location	#1
Sample Depth	1 foot
Sample Description	Silty sand
USCS Classification	SM
AASHTO Classification	A-2-4(0)

Dry Density	110 pcf
Moisture Content	6.9 %
Volume Change	-1.6 %
Swell Pressure	0 psf



Sample Location	#2
Sample Depth	1 foot
Sample Description	Silty sand
USCS Classification	SM
AASHTO Classification	A-2-4(0)

Dry Density	105 pcf
Moisture Content	15.1 %
Volume Change	0.0 %
Swell Pressure	0 psf

**GEOCAL, INC.**

Berkeley Lake Park-South Tennis Courts

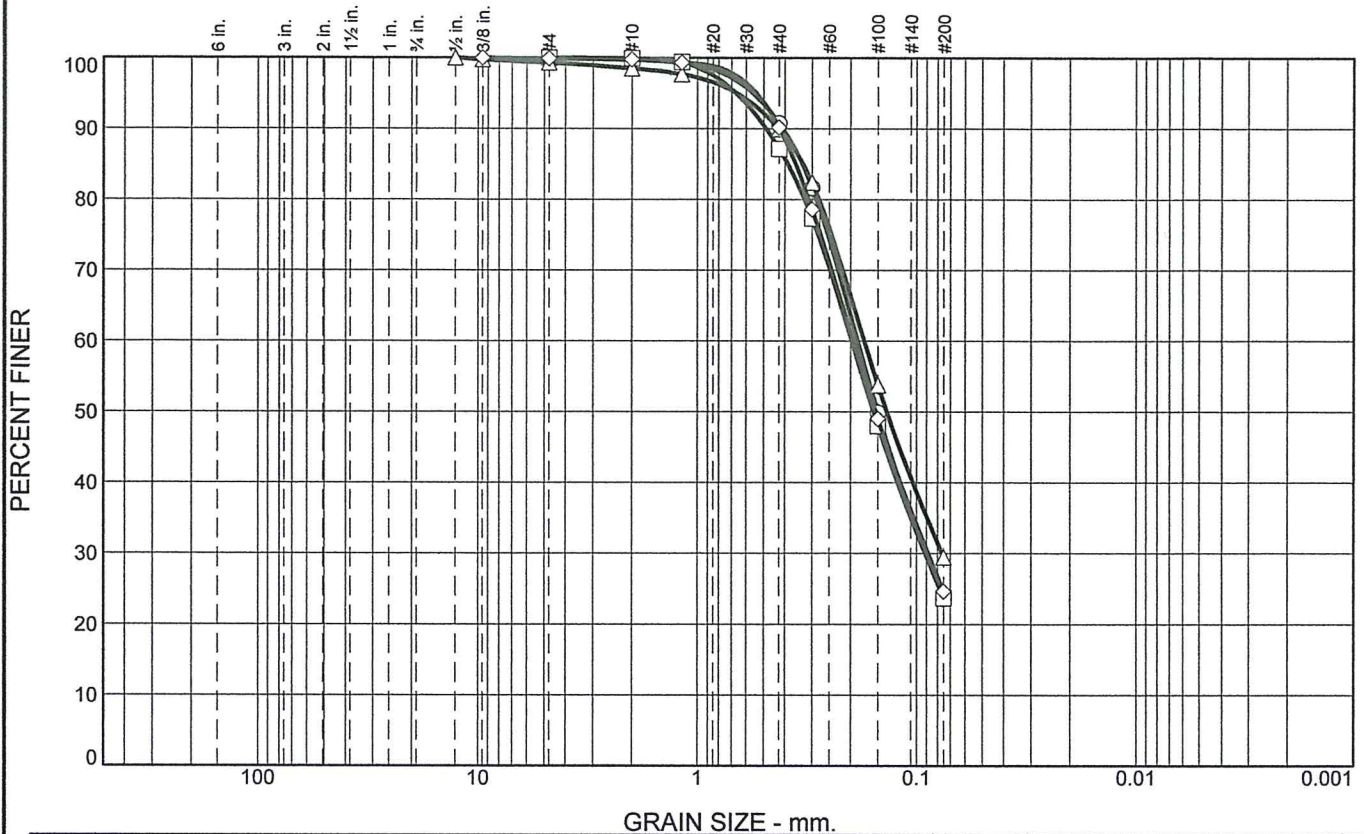
JOB NO. G15.1612.001

SWELL - COMPRESSION TEST RESULTS

FIGURE NO.

3

# Gradation Test Results



	% +3"	% Gravel	% Sand		% Silt	% Clay
○	0	0	76		24	
□	0	0	76		24	
△	0	1	70		29	
◇	0	0	75		25	

	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
○	NV	NP	0.3328	0.1853	0.1504	0.0903				
□	NV	NP	0.3884	0.1972	0.1572	0.0912				
△	NV	NP	0.3299	0.1732	0.1367	0.0762				
◇	NV	NP	0.3573	0.1941	0.1537	0.0884				

Material Description	USCS	AASHTO
○ silty sand	SM	A-2-4(0)
□ silty sand	SM	A-2-4(0)
△ silty sand	SM	A-2-4(0)
◇ silty sand	SM	A-2-4(0)

**Project No.** G15.1612.001 **Client:** Russell + Mills Studios  
**Project:** Berkeley Lake Park- South Tennis Courts

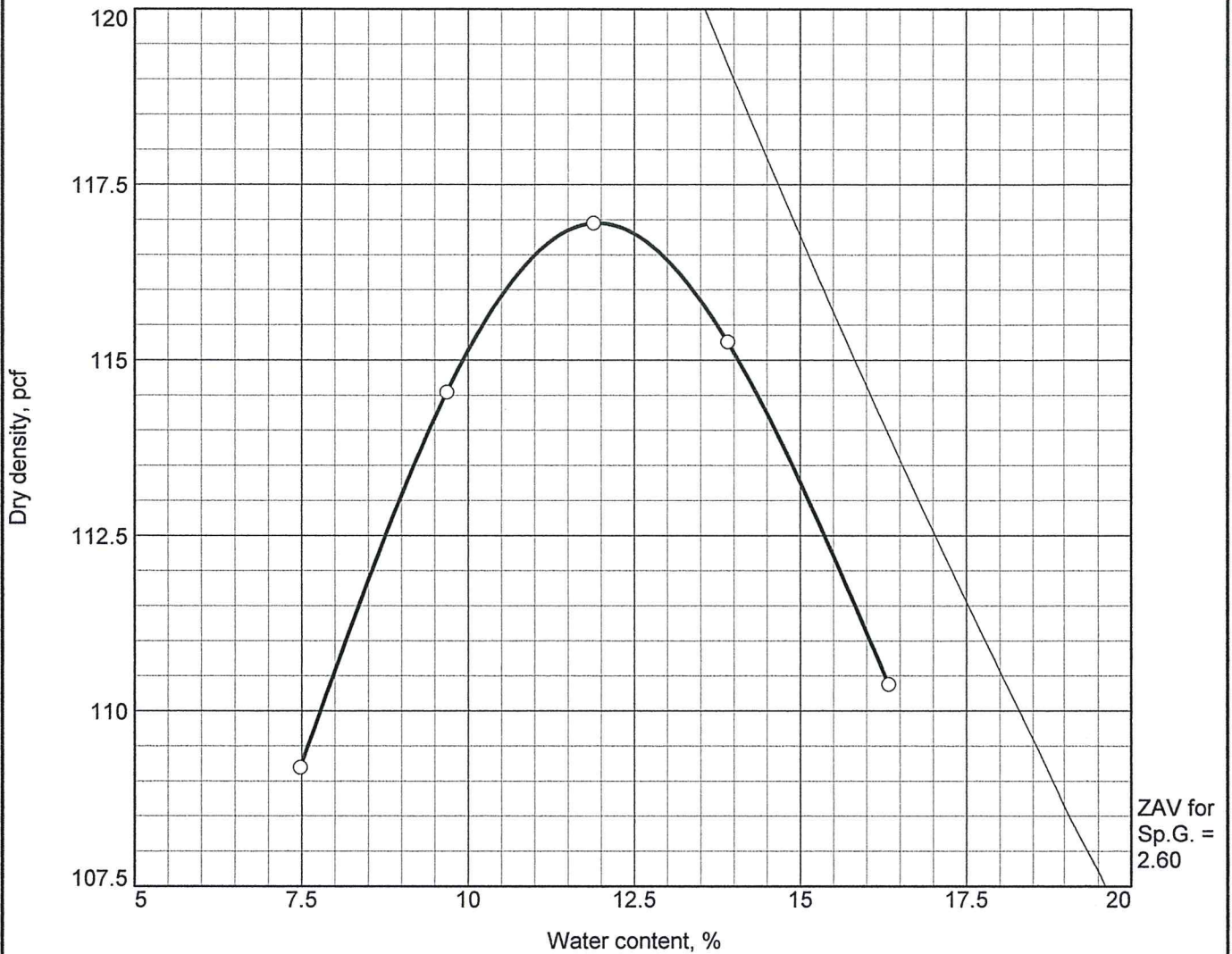
○ **Location:** Boring #1      **Depth:** 1 foot      **Sample Number:** 7208-1  
 □ **Location:** Boring #2      **Depth:** 1 foot      **Sample Number:** 7208-3  
 △ **Location:** Boring #1 bulk      **Depth:** 1-5 feet      **Sample Number:** 7208-5  
 ◇ **Location:** Boring #2 bulk      **Depth:** 1-5 feet      **Sample Number:** 7208-6

**Remarks:**

**GEOCAL, INC.**



# Moisture-Density Relationship Test Results

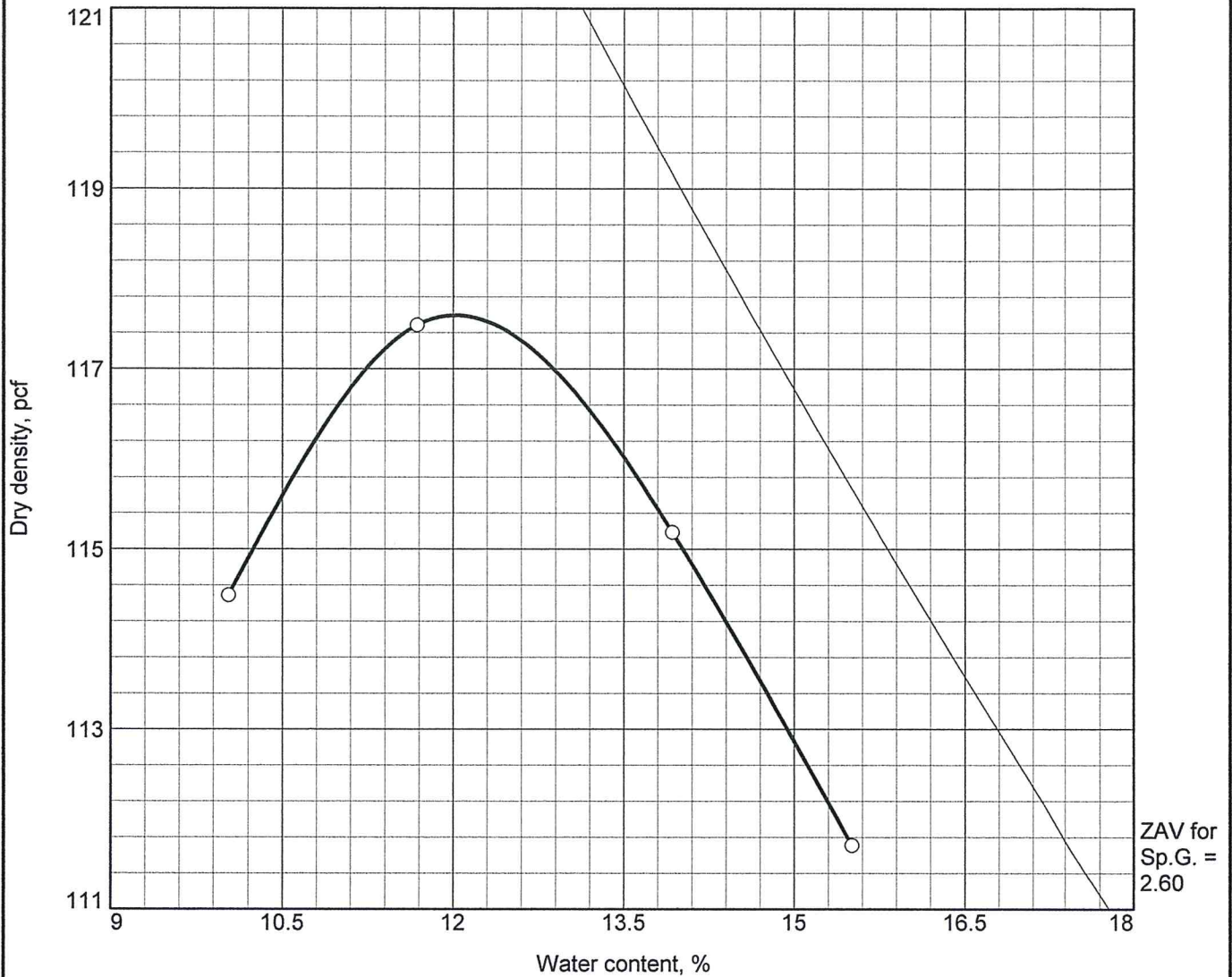


Test specification: AASHTO T 99-01 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
1-5 feet	SM	A-2-4(0)			NV	NP	1	29

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.0 pcf Optimum moisture = 11.9 %	silty sand
<b>Project No.</b> G15.1612.001 <b>Client:</b> Russell + Mills Studios <b>Project:</b> Berkeley Lake Park- South Tennis Courts ○ <b>Location:</b> Boring #1 bulk <b>Sample Number:</b> 7208-5	<b>Remarks:</b>
<b>GEOCAL, INC.</b>	

# Moisture-Density Relationship Test Results



Test specification: AASHTO T 99-01 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
1-5 feet	SM	A-2-4(0)			NV	NP	0	25

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.6 pcf Optimum moisture = 12.0 %	silty sand
<b>Project No.</b> G15.1612.001 <b>Client:</b> Russell + Mills Studios <b>Project:</b> Berkeley Lake Park- South Tennis Courts ○ <b>Location:</b> Boring #2 bulk <b>Sample Number:</b> 7208-6	<b>Remarks:</b>
<b>GEOCAL, INC.</b>	

CITY AND COUNTY OF DENVER  
STATE OF COLORADO



Department of Public Works

Drawings

Contract Number: 201736166



BERKELEY TENNIS COURTS

AUGUST 2, 2017



# BERKELEY PARK TENNIS COURTS

Denver, Colorado

## BID DOCUMENTS

### DESIGN TEAM

**Russell + Mills Studios Inc**  
Landscape Architecture  
Fort Collins, CO

**San Engineering, LLC**  
Structural Engineer  
Littleton, CO

**SSG MEP, Inc**  
Electrical Engineer  
Aurora, CO

**JF Sato & Associates**  
Survey/Engineer  
Littleton, CO

**Denver Parks and Recreation Project Manager:**  
Jason Himick - Senior Project Manager  
Phone: (720) 913-0656  
jason.himick@denvergov.org

**Denver Public Works Project Manger:**  
David Brown  
Phone: (720) 865-3039  
david.brown@denvergov.org



Context Plan

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

APPROVED BY:		
	EXECUTIVE DIRECTOR OF PUBLIC WORKS	7.17.17 DATE
	CITY ENGINEER	7.14.17 DATE
	DIRECTOR OF ENGINEERING CAPITAL PROJECTS	7/10/2017 DATE
	CITY TRAFFIC ENGINEER	7/11/2017 DATE

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# BERKELEY PARK TENNIS COURTS

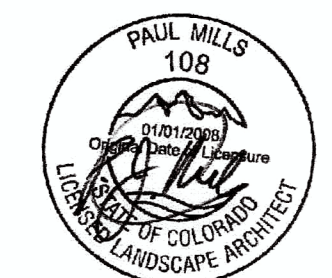


Denver Parks & Recreation  
201 West Colfax Avenue  
Denver, CO 80202  
720.913.0616

**r**  
russell + mills studios  
141 s. college ave., suite 104  
fort collins, co 80524  
p: 970.484.8855  
www.russellmillsstudios.com

REV.	COMMENT	DATE

SEAL:



DATE: June 29, 2017  
JOB NO.: -  
DRAWN BY: JB  
CHECKED BY: PM

DRAWING TITLE:  
**Cover Sheet**

SHEET NO.:  
**G001**

### LIST OF DRAWINGS

- |   |   |
|---|---|
| <b>GENERAL</b><br>G001 - Cover Sheet  | <b>LIGHTING</b><br>LL101 - Lighting Plan                                |
| <b>Survey</b><br>Topographic/Design Survey  | <b>LANDSCAPE</b><br>LP101 - Landscape Plan<br>LP501 - Landscape Details |
| <b>DEMOLITION</b><br>LD101 - Demolition Plan  |   |
| <b>GRADING</b><br>LG101 - Grading Plan  |   |
| <b>SITE</b><br>LS101 - Site Plan<br>LS501 - Site Details<br>LS502 - Site Details<br>LS503 - Site Details<br>LS504 - Site Details                          |   |
| <b>STRUCTURAL</b><br>S101 - General Notes<br>S102 - Tennis Court Slab Plan<br>S103- Tennis Court Slab Details   |   |
| <b>ELECTRICAL</b><br>E000 - Cover Sheet<br>E100 - Electrical Site Plan<br>E400 - One-Line Diagram<br>E600 - Panel Schedules<br>E601 - Luminaire Schedules |   |



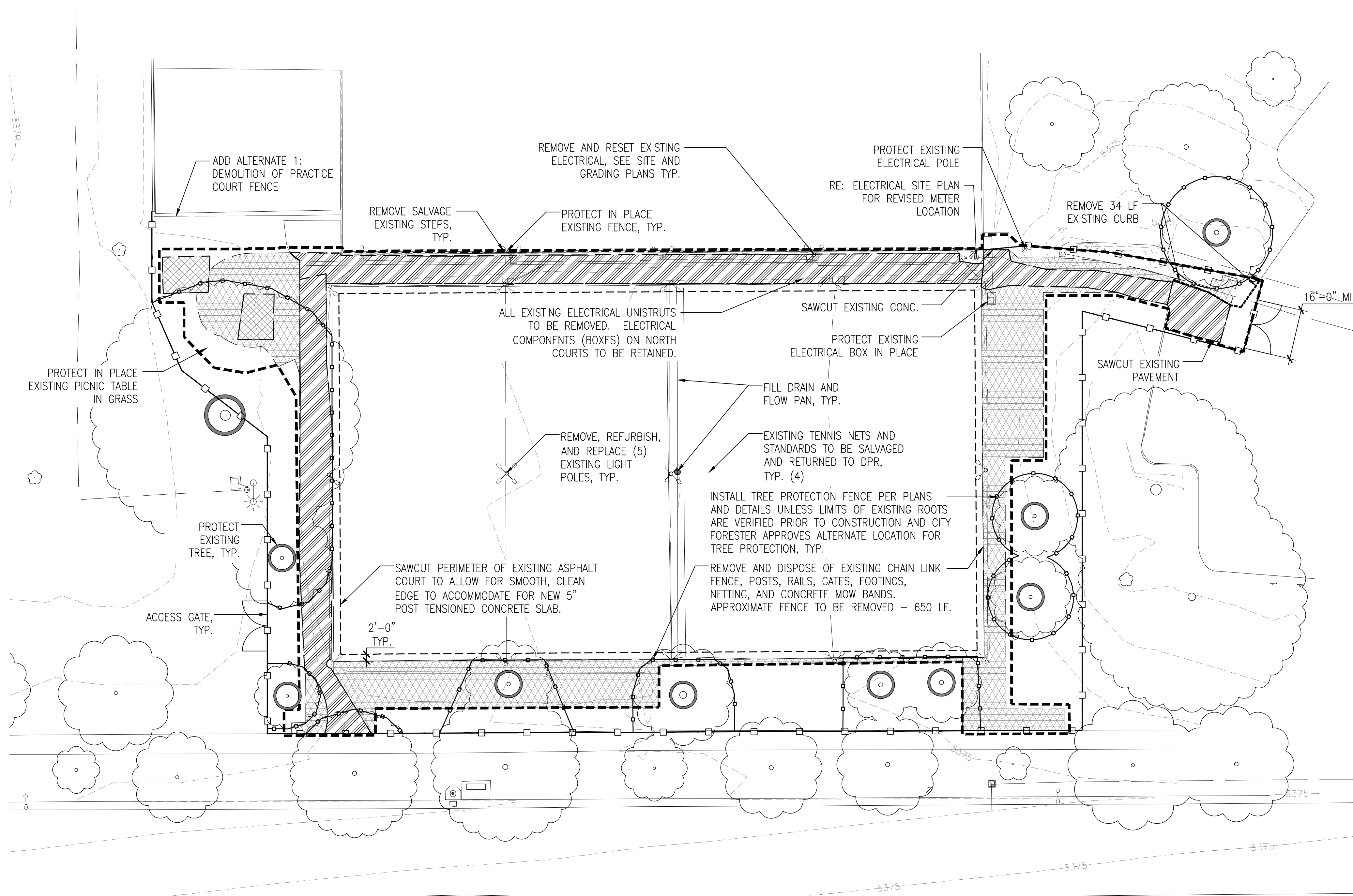
# BERKELEY PARK TENNIS COURTS



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www.russellmillsstudios.com



### DEMOLITION LEGEND:

- ASPHALT PAVEMENT TO BE REMOVED & RECYCLED
- CONCRETE PAVEMENT TO BE REMOVED & RECYCLED
- CLEAR AND GRUB FOR CONSTRUCTION
- SAWCUT EXISTING PAVEMENT
- REMOVE EXISTING CURB
- EXISTING TREE TO BE PROTECTED
- TREE PROTECTION FENCE
- LIMIT OF CONSTRUCTION
- CONSTRUCTION FENCE - 6' CHAIN LINK FENCE

### DEMOLITION NOTES:

1. ALL TREES NOT INDICATED FOR REMOVAL TO BE PROTECTED DURING CONSTRUCTION.
2. CLEAR AND GRUB EXISTING SHRUBS AND PERENNIALS WITHIN LIMITS OF WORK UNLESS OTHERWISE NOTED.
3. ALL SAWCUTS TO BE IN STRAIGHT LINES ACCORDING TO PLANS.
4. CONTRACTOR IS RESPONSIBLE FOR FAMILIARITY WITH CONSTRUCTION DOCUMENTS.
5. REMOVE AND RETAIN EXISTING SITE FURNISHINGS.
6. CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL EXCESS SALVAGED MATERIALS FROM SITE. ALL NON-RECYCLABLE CONSTRUCTION DEBRIS IS TO BE TAKEN TO THE DADS WASTE MANAGEMENT FACILITY. DUMP TICKETS TO BE PROVIDED TO CONTRACTOR BY CITY AND COUNTY OF DENVER PROJECT MANAGER.
7. CONTRACTOR SHALL REMOVE ALL ITEMS TO EXTENT REQUIRED TO ACCOMMODATE COMPLETION OF WORK.
8. CONTRACTOR RESPONSIBLE FOR ALL REPAIRS TO STAGING AREA INCLUDING BUT NOT LIMITED TO PAVING, IRRIGATION, AND TURF.
9. CONTRACTOR TO HAND DIG WITHIN DRIP LINE OF PROTECTED TREES ON SITE.
10. CONTRACTOR TO RETAIN ALL IRRIGATION HEADS ADJACENT TO EXISTING TENNIS COURT AS NEEDED.
11. IRRIGATION SYSTEM TO REMAIN FUNCTIONAL THE FULL DURATION OF CONSTRUCTION.
12. CONSTRUCTION ACCESS AND STAGING AREA TO BE CONFIRMED AT PRE-CONSTRUCTION MEETING.
13. THE CONTRACTOR SHALL ENSURE THAT ALL POTENTIAL POLLUTANTS GENERATED DURING DEMOLITION OR CONSTRUCTION WORK ASSOCIATED WITH THIS PROJECT, BE PREVENTED FROM DISCHARGE TO STORMWATER CONVEYANCE SYSTEMS, PARKING LOTS, PARK ROADS, SIDEWALKS, AND PUBLIC ROADS IN THE VICINITY OF THIS PROJECT SITE.

**CALL BEFORE YOU DIG**  
**CALL UTILITY NOTIFICATION CENTER OF COLORADO AT**  
**1-800-922-1987**  
**WWW.UNCC.ORG**

REV.	COMMENT	DATE

SEAL:



DATE: June 29, 2017  
JOB NO.: -  
DRAWN BY: JB  
CHECKED BY: PM

DRAWING TITLE:  
**Demolition Plan**

SHEET NO.:  
**LD101**



# BERKELEY PARK TENNIS COURTS



Denver Parks & Recreation  
201 West Colfax Avenue  
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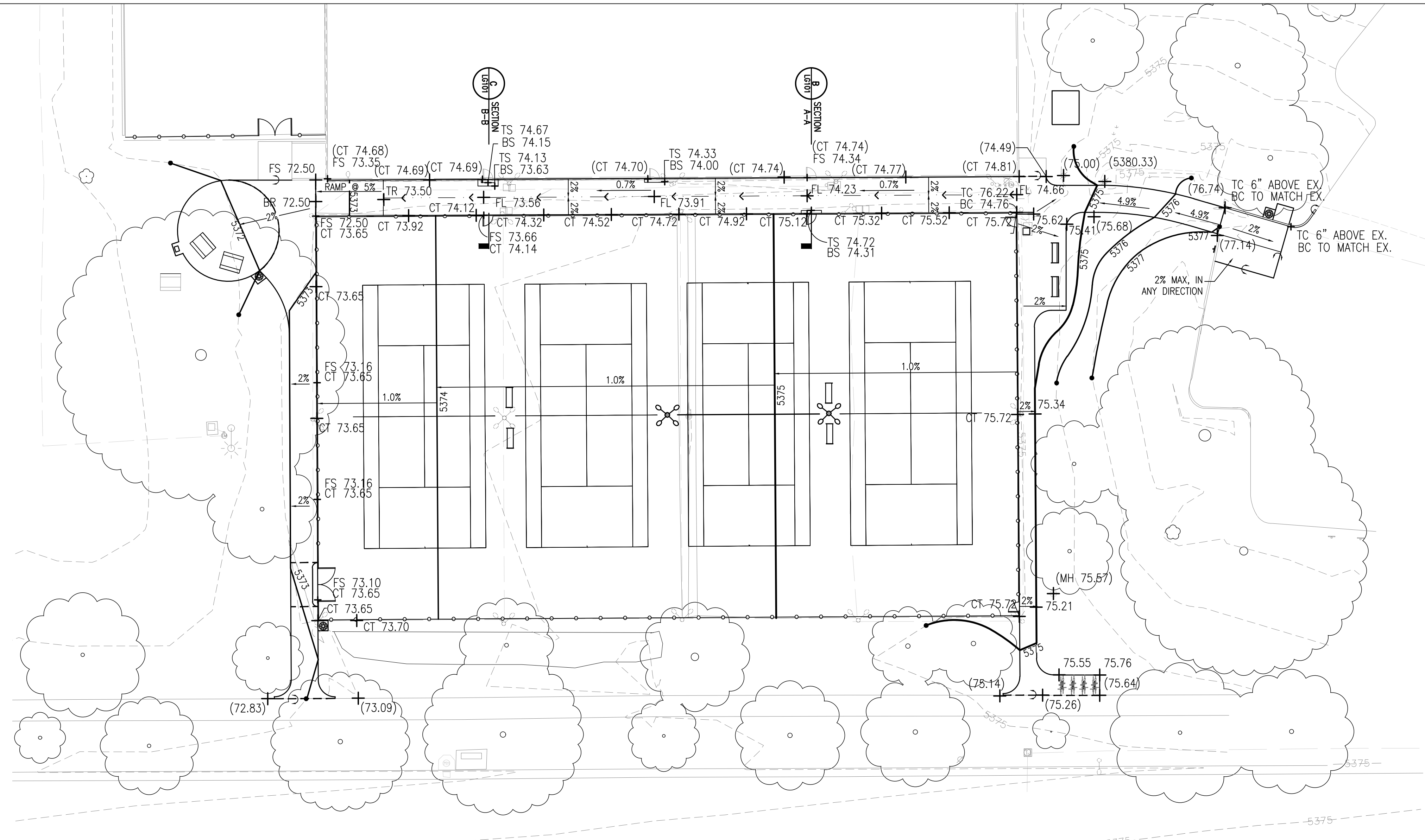
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## GRADING LEGEND:

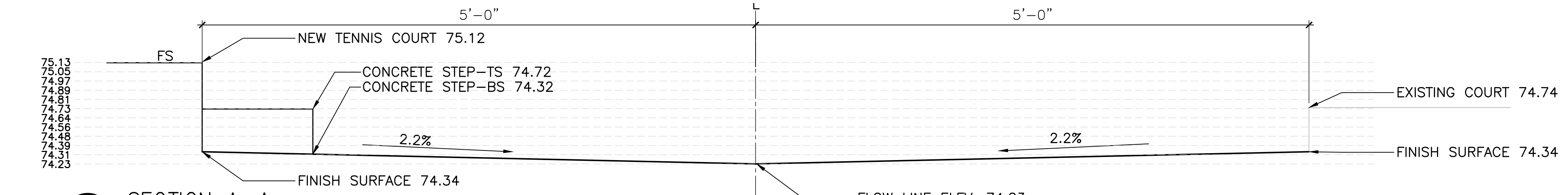
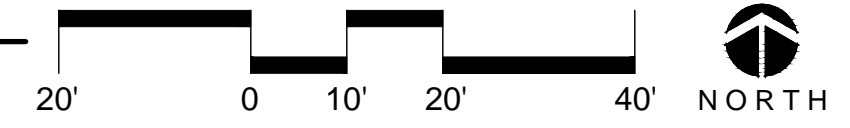
- EXISTING CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- MEET AND MATCH ELEVATION
- (00.00) + EXISTING SPOT ELEVATION
- 00.00 + FINISH SURFACE ELEVATION
- FS 00.00 + FINISH SURFACE OF CONC. PAN
- CT 00.00 + FINISH SURFACE OF TENNIS COURT
- TR 00.00 + TOP OF RAMP ELEVATION
- BR 00.00 + BOTTOM OF RAMP ELEVATION
- TS 00.00 + TOP OF STEP ELEVATION
- BS 00.00 + BOTTOM OF STEP ELEVATION

## GRADING NOTES:

1. ALL EXISTING TREES TO REMAIN, UNLESS OTHERWISE NOTED ON PLANS. SEE PROJECT SPECIFICATION SECTION 015639 FOR TREE RETENTION AND PROTECTION. GRADING AROUND EXISTING AND PROTECTED TREES TO BE DONE IN MANNER TO PROVIDE THE MOST PROTECTION TO EXISTING ROOTS AND DRIP LINE OF TREE.
2. ALL GRADES TO BE A MINIMUM OF 1% AND MAXIMUM OF 5% WITH THE EXCEPTION OF THE TENNIS COURTS.
3. ALL SIDEWALK GRADES TO BE A MAXIMUM OF 5% WITH A MAXIMUM CROSS SLOPE OF 2%.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION SURVEYING. LAYOUT AND STAKING OF ALL IMPROVEMENTS SHALL BE APPROVED BY PROJECT MANAGER PRIOR TO INSTALLATION OF IMPROVEMENTS. DISCREPANCIES TO THE BASE INFORMATION SHALL BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR A DECISION PRIOR TO COMMENCING WORK. NOTIFICATION OF REQUEST FOR FIELD REVIEW SHALL BE MADE A MINIMUM OF 24 HOURS IN ADVANCE.
5. PROVIDE EROSION CONTROL PLAN PER CITY AND COUNTY OF DENVER CONSTRUCTION ACTIVITIES STORMWATER MANUAL.
6. CONTRACTOR TO COORDINATE LOCATION OF CHUTE WASHOUT CONTAINMENT AREA WITH PROJECT MANAGER.
7. REFER TO STRUCTURAL ENGINEER FOR NOTES REGARDING SUB-BASE (GRADING, AMENDING, AND COMPACTION).

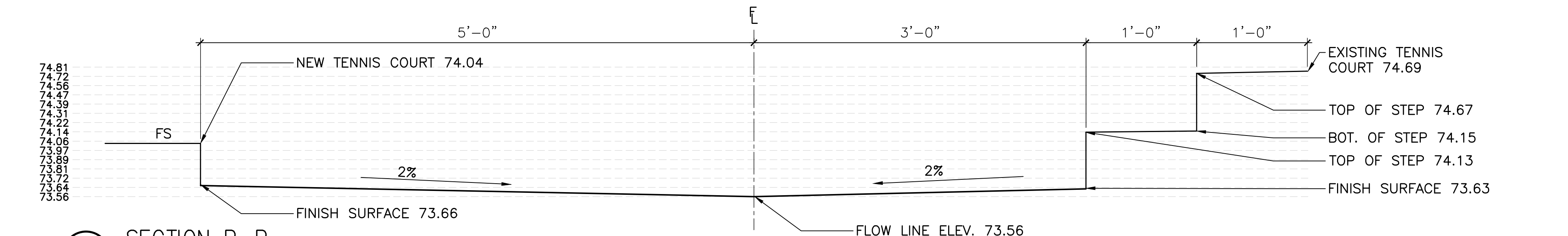


### (A) GRADING PLAN



### (B) SECTION A-A

SCALE: 1 1/2" = 1'-0"

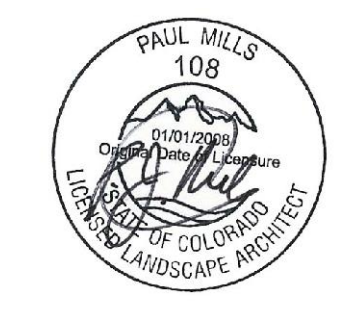


### (C) SECTION B-B

SCALE: 1 1/2" = 1'-0"

REV.	COMMENT	DATE

SEAL:



DATE: June 29, 2017  
JOB NO.: —  
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CHECKED BY: PM

DRAWING TITLE:  
**Grading Plan**

SHEET NO.:

# LG101

BID DOCUMENTS



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## SITE LEGEND:

- TENNIS COURT PAVEMENT - SEE STRUCTURAL ENGINEERING DRAWINGS FOR POST TENSION SLAB DETAILS
- CONCRETE PAVEMENT-STD GRAY 6" THICK
- CONCRETE PAVEMENT - STD GRAY 4" THICK
- COLOR CONCRETE PAVEMENT - DAVIS COLOR 5084-OMAHA TAN - 4" THICK
- EXPANSION JOINT
- CHAIN LINK FENCE, SEE DETAIL A, LS503 FOR FENCE MATERIALS AND SPECIFICATIONS
- BENCH
- GRILL
- TRASH RECEPTACLE
- ACCESSIBLE SIGN
- BIKE RACK
- PICNIC TABLE
- LIMIT OF CONSTRUCTION

## SITE NOTES:

1. ALL DIMENSIONS ARE INSIDE OF LANDSCAPE CURB AND EDGE OF PAVEMENT UNLESS OTHERWISE NOTED. ALL NORTHING AND EASTINGS ARE SHOWN FOR CENTER POINT OF ALL RADII.
2. ALL SIDEWALK RADII 5'-0" UNLESS OTHERWISE DIMENSIONED.
3. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS.
4. CONTRACTOR SHALL NOTIFY ALL NECESSARY UTILITY COMPANIES 48 HOURS (MINIMUM) PRIOR TO DIGGING FOR VERIFICATION OF ALL UNDERGROUND UTILITIES, IRRIGATION AND ALL OTHER OBSTRUCTIONS AND COORDINATE W/ PROJECT MANAGER PRIOR TO INITIATING OPERATIONS.
5. CONTRACTOR SHALL MAINTAIN AT LEAST ONE COPY OF APPROVED PLANS, SPECIFICATIONS AND STANDARDS ON THE JOB SITE AT ALL TIMES.
6. ANY SALVAGED IRRIGATION EQUIPMENT TO BE REINSTALLED TO MEET CURRENT CITY AND COUNTY OF DENVER IRRIGATION STANDARDS AT THE TIME OF INSTALLATION.
7. CONTRACTOR SHALL TAKE REASONABLE MEASURES TO PREVENT PARTICULATE MATTER FROM BECOMING AIRBORNE AND TO PREVENT THE VISIBLE DISCHARGE OF FUGITIVE PARTICULATE EMISSIONS BEYOND THE PROPERTY ON WHICH THE EMISSIONS ORIGINATE. THE MEASURES TAKEN MUST BE EFFECTIVE IN THE CONTROL OF FUGITIVE PARTICULATE EMISSIONS AT ALL TIMES ON THE SITE, INCLUDING PERIODS OF INACTIVITY SUCH AS EVENINGS, WEEKENDS, AND HOLIDAYS AS WELL AS ANY OTHER PERIOD OF INACTIVITY.
8. IF UNKNOWN/UNIDENTIFIED UNDERGROUND STORAGE TANKS, DRUMS, ODOROUS SOIL, STAINED SOIL, ASBESTOS-CEMENT PIPE, TRANSITE, BUILDING DEBRIS OR WASTE MATERIALS ARE ENCOUNTERED DURING THE PROJECT, CONTRACTOR SHALL IMMEDIATELY STOP WORK IN THE AREA OF THE DISCOVERY UNTIL DENVER ENVIRONMENTAL HEALTH (DEH) MAKES A DETERMINATION OF HOW TO PROCEED. CONTRACTOR SHALL IMMEDIATELY NOTIFY DEH OF THE DISCOVERY VIA THE PHONE NUMBER 720-460-1706.
9. ANY FILL MATERIAL OR SOILS TO BE MOVED TO AND PLACED ON CITY OWNED PROPERTY MUST BE FREE OF KNOWN CONTAMINATION (OBSERVED OR PREVIOUSLY DOCUMENTED) AND BE ACCEPTABLE FOR UNRESTRICTED RESIDENTIAL USE. CONTACT DAVE ERICKSON, DENVER ENVIRONMENTAL HEALTH (720-865-5433) FOR CLARIFICATION, IF NEEDED, REGARDING THIS REQUIREMENT.
10. THE CONTRACTOR SHALL DIRECT NON-RECYCLABLE, NON-HAZARDOUS WASTES FROM CITY OWNED OR CONTROLLED PROPERTY OR FACILITIES TO THE DENVER ARAPAHOE DISPOSAL SITE (DADS) LANDFILL FOR DISPOSAL, FOLLOWING THE REQUIREMENT AND PROCEDURAL GUIDANCE OUTLINED IN EXECUTIVE ORDER 115.
11. NOISE CONTROL. EXEMPTED HOURS FOR CONSTRUCTION IN THE CITY AND COUNTY OF DENVER ARE FROM 7 A.M. TO 9 P.M. MONDAY THROUGH FRIDAY AND 8 A.M. TO 5 P.M. ON SATURDAYS AND SUNDAYS PER SECTIONS 36-6.(B)(7) AND 36-7.(5)A, B. AND C. OF DENVER'S NOISE ORDINANCE, CHAPTER 36 'NOISE CONTROL,' DENVER REVISED MUNICIPAL CODE (DRMC). IF THERE IS AN ANTICIPATED NEED TO WORK OUTSIDE OF THE EXEMPTED HOURS FOR CONSTRUCTION: 1) THE CONTRACTOR WILL NEED TO MAKE A REQUEST FOR A NIGHTTIME NOISE VARIANCE AS ALLOWED FOR IN SECTION 36-7.(5)C. OF THE DRMC AND 2) THE VARIANCE PROCESS NEEDS TO BE STARTED A MINIMUM OF TWO TO THREE MONTHS PRIOR TO THE DESIRED START DATE OF ANY WORK NEEDING TO OCCUR OUTSIDE OF EXEMPTED HOURS. ANY NOISE VARIANCE QUESTIONS SHOULD BE DIRECTED TO PAUL RIEDESEL, DEPARTMENT OF ENVIRONMENTAL HEALTH, DENVER COMMUNITY NOISE PROGRAM, (PHONE 720-865-5410; FAX 720-865-5532) A MINIMUM OF THREE MONTHS PRIOR TO THE START OF THE PROJECT.
12. TENNIS COURT SIGNS SHALL BE PLACED AT EACH COURT PER DETAIL B&C, SHEET LS503.
13. SIGNS WILL BE PROVIDED BY CITY, TO BE INSTALLED BY CONTRACTOR. FOUR (4) COURT NUMBER SIGNS(1,2,3,4), ONE AT EACH COURT, INSTALLED ON THE NORTH FENCE, NUMBERED WEST TO EAST; AND TWO (2) RULES AND REGULATIONS SIGNS TO BE LOCATED AT THE SW AND SE GATES

REV.	COMMENT	DATE

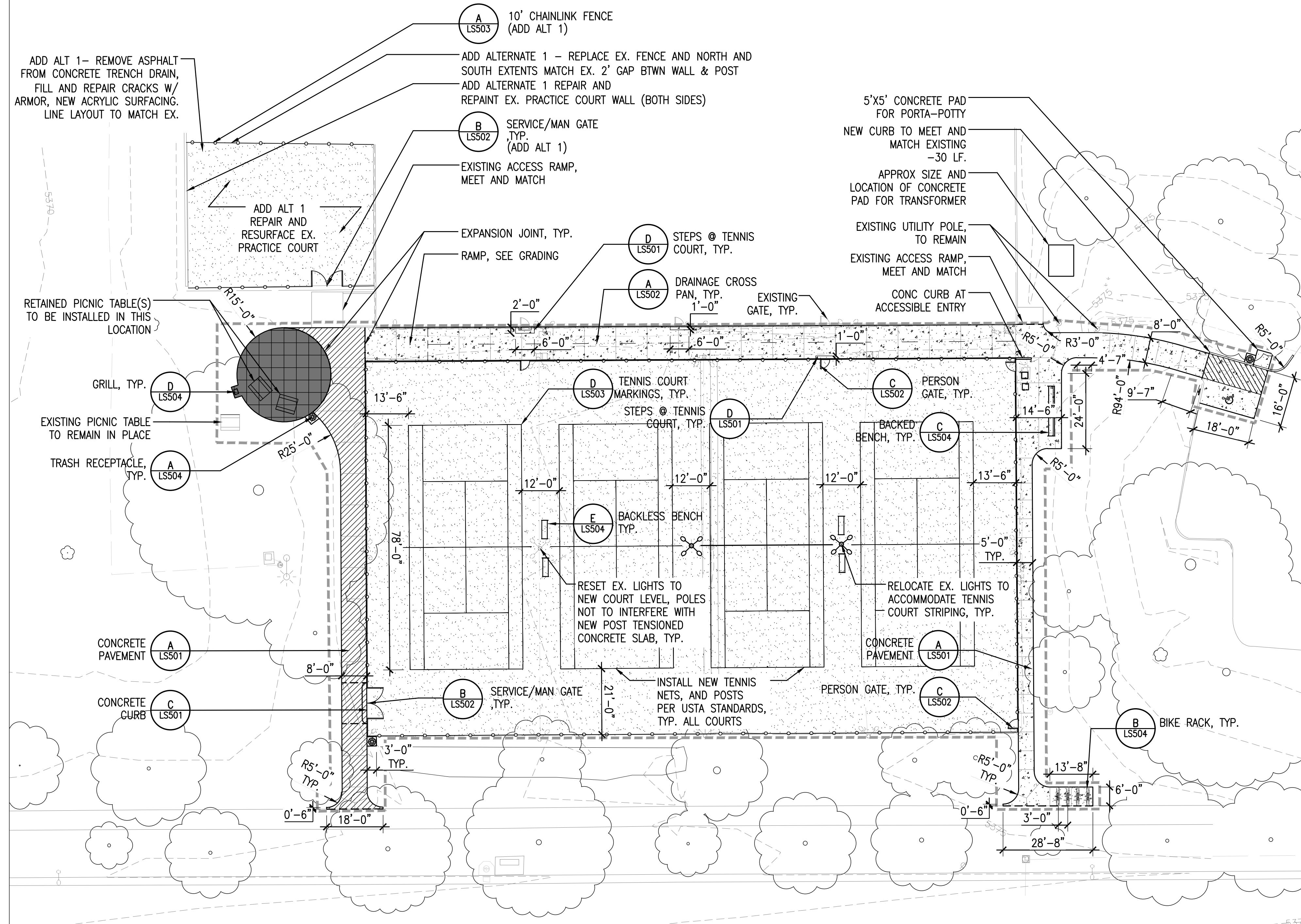
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DRAWING TITLE:  
**Site Plan**

SHEET NO.:  
**LS101**



**A SITE PLAN**

20' 0 10' 20' 40' NORTH

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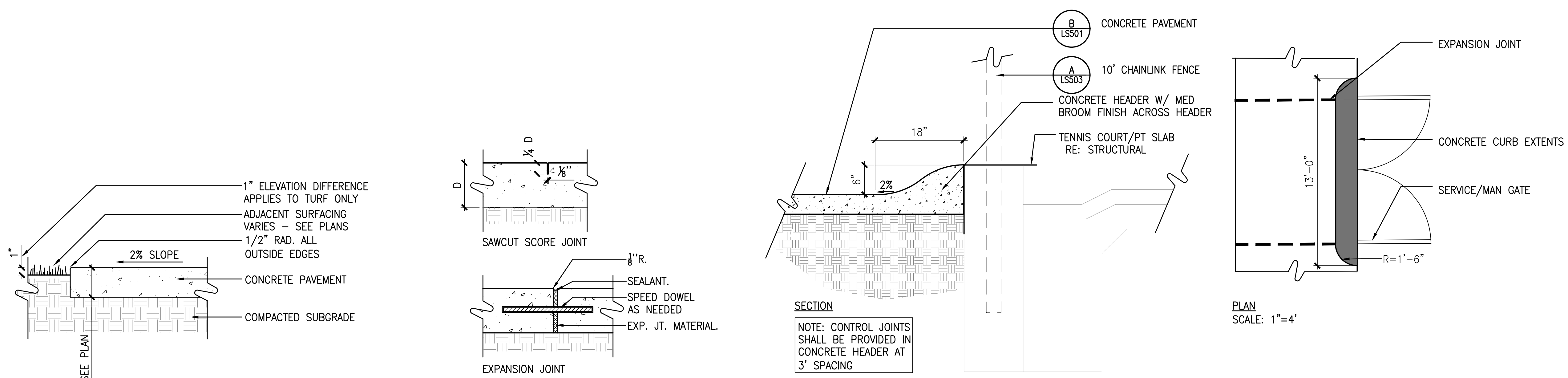


# BERKELEY PARK TENNIS COURTS



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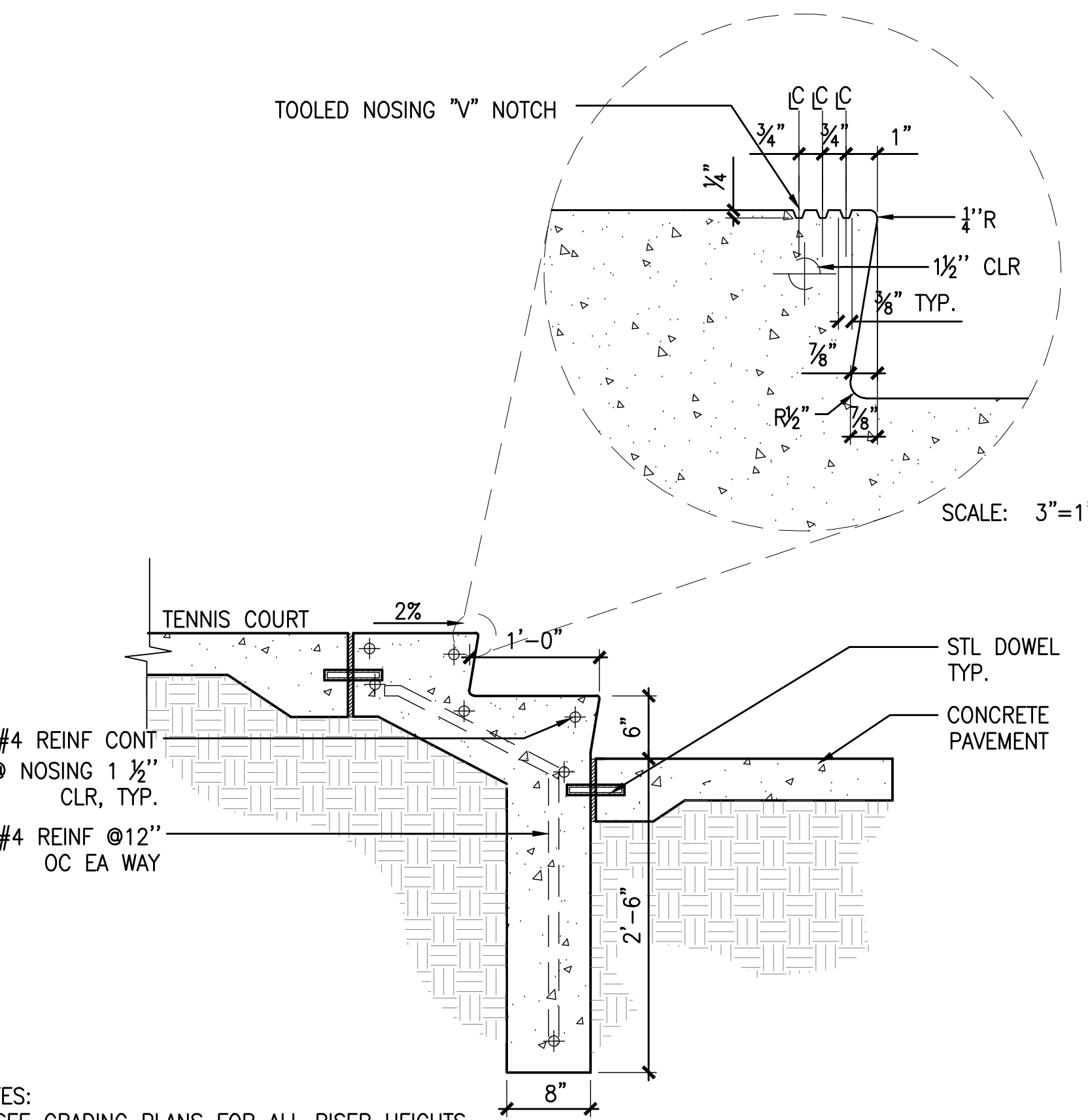
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**A** CONCRETE PAVEMENT  
SCALE: 1 1/2" = 1'-0"

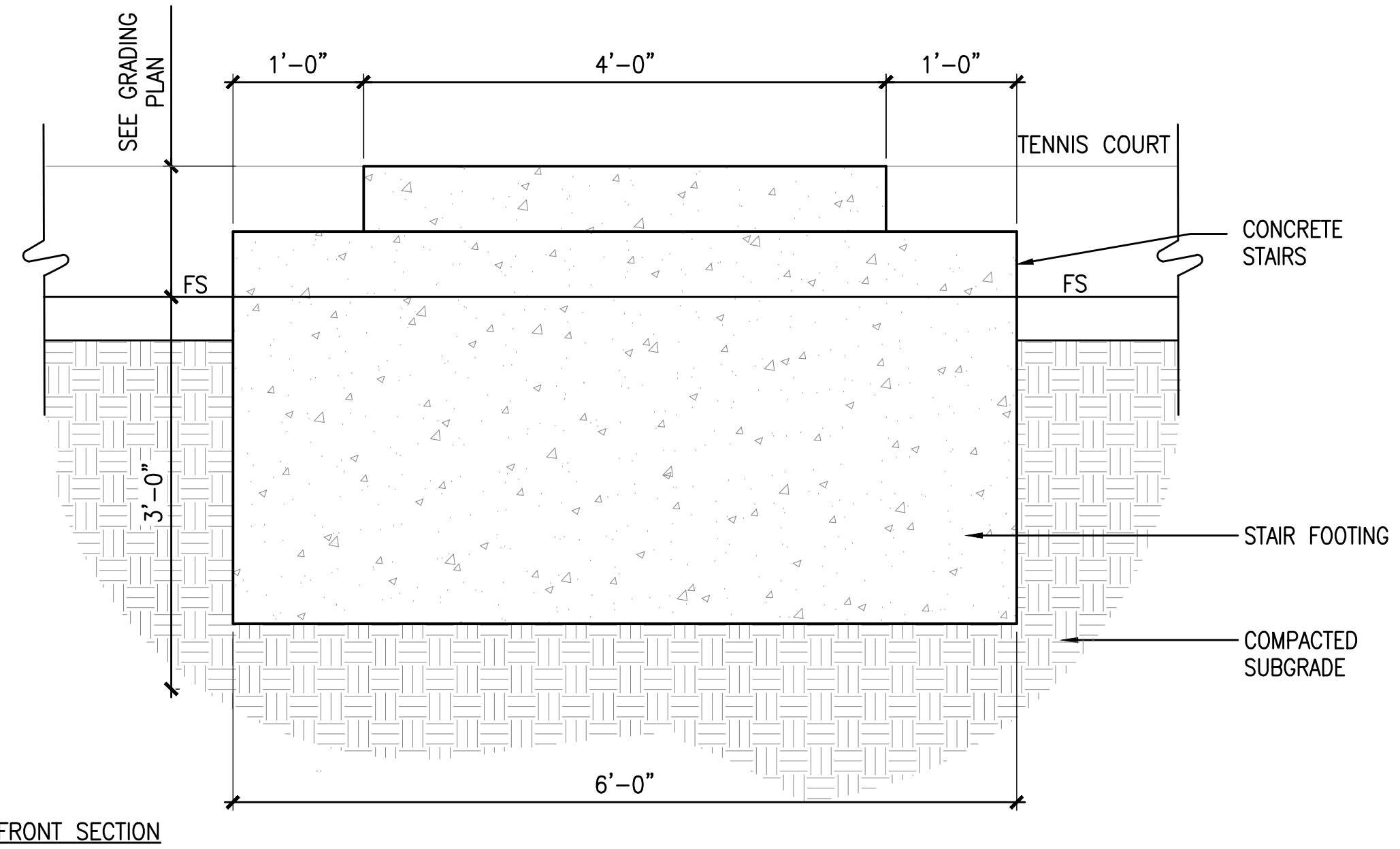
**B** CONCRETE PAVEMENT JOINTS  
SCALE: 1 1/2" = 1'-0"

**C** CONCRETE CURB  
SCALE: 1" = 1'-0"



NOTES:  
1. SEE GRADING PLANS FOR ALL RISER HEIGHTS.  
2. MEDIUM BROOM FINISH ON ALL EXPOSED SURFACES.  
3. SEE PLANS FOR NUMBER OF RISERS.

**D** STEPS @ TENNIS COURT  
SCALE: 1" = 1'-0"



FRONT SECTION

REV.	COMMENT	DATE

SEAL:



DATE: June 29, 2017  
JOB NO.: -  
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CHECKED BY: PM

DRAWING TITLE:  
**Site Details**

SHEET NO.:  
**LS501**

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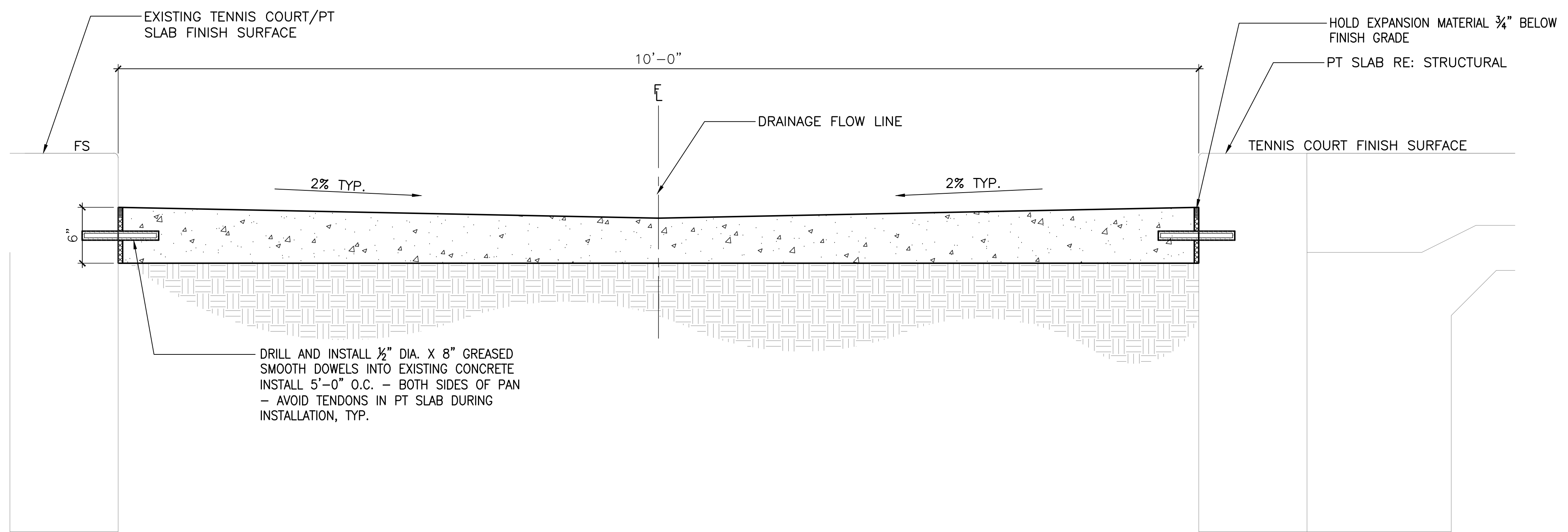


# BERKELEY PARK TENNIS COURTS

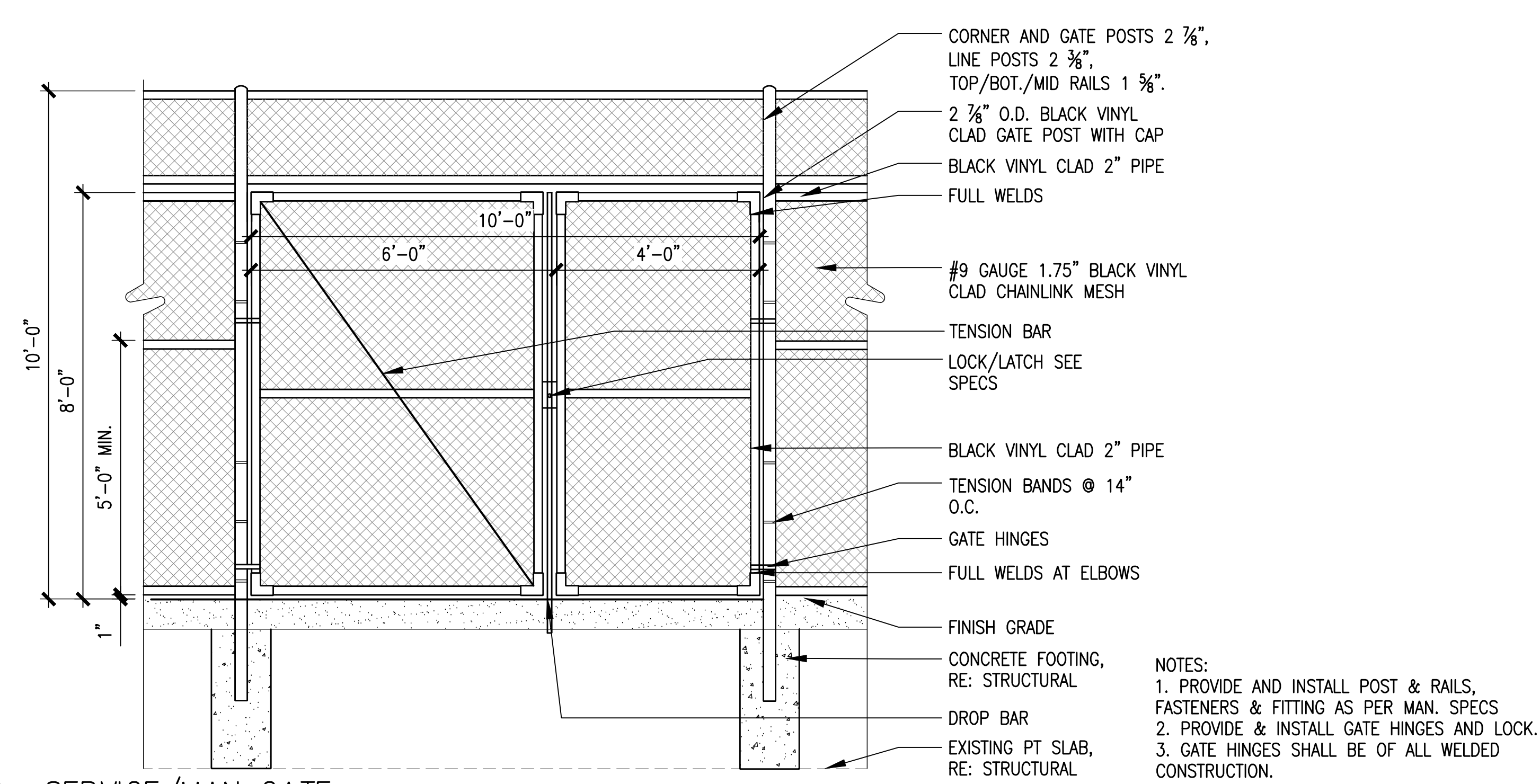


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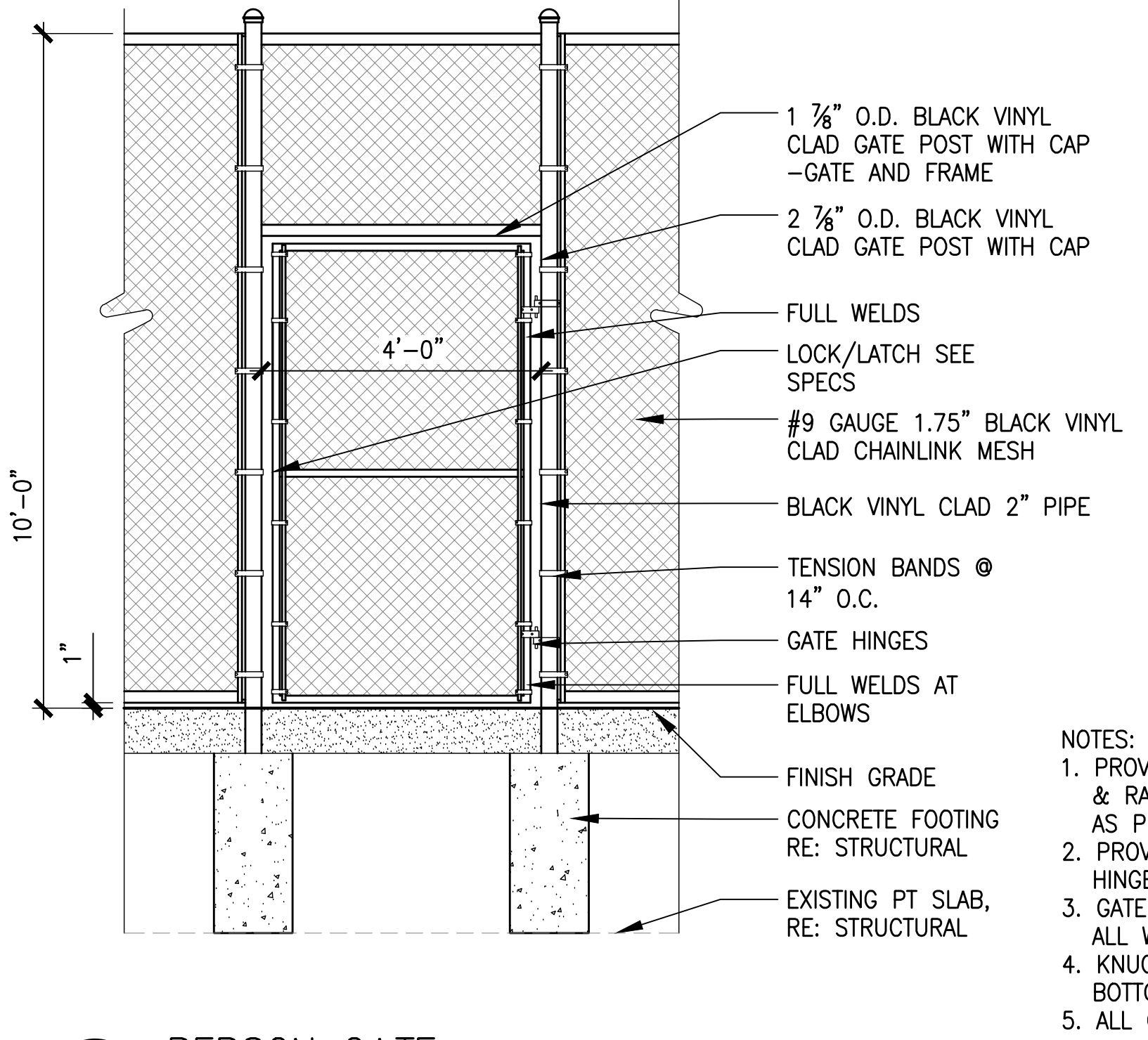
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**A** DRAINAGE CROSS PAN  
SCALE: 1 1/2" = 1'-0"



**B** SERVICE/MAN GATE  
SCALE: 1/2" = 1'-0"



**C** PERSON GATE  
SCALE: 1/2" = 1'-0"

- NOTES:  
1. PROVIDE AND INSTALL POST & RAILS, FASTENERS & FITTING AS PER MAN. SPECS  
2. PROVIDE & INSTALL GATE HINGES AND LOCK.  
3. GATE HINGES SHALL BE OF ALL WELDED CONSTRUCTION.  
4. MATCH EXISTING NORTH COURT FENCE/GATE

- NOTES:  
1. PROVIDE AND INSTALL POST & RAILS, FASTENERS & FITTING AS PER MAN. SPECS  
2. PROVIDE & INSTALL GATE HINGES AND LOCK.  
3. GATE HINGES SHALL BE OF ALL WELDED CONSTRUCTION.  
4. KNUCKLE SALVAGE TOP & BOTTOM OF ALL CHAIN LINK.  
5. ALL GATES TO OPEN 180 DEGREES.  
6. MATCH EXISTING NORTH COURTS FENCE/GATE

REV.	COMMENT	DATE

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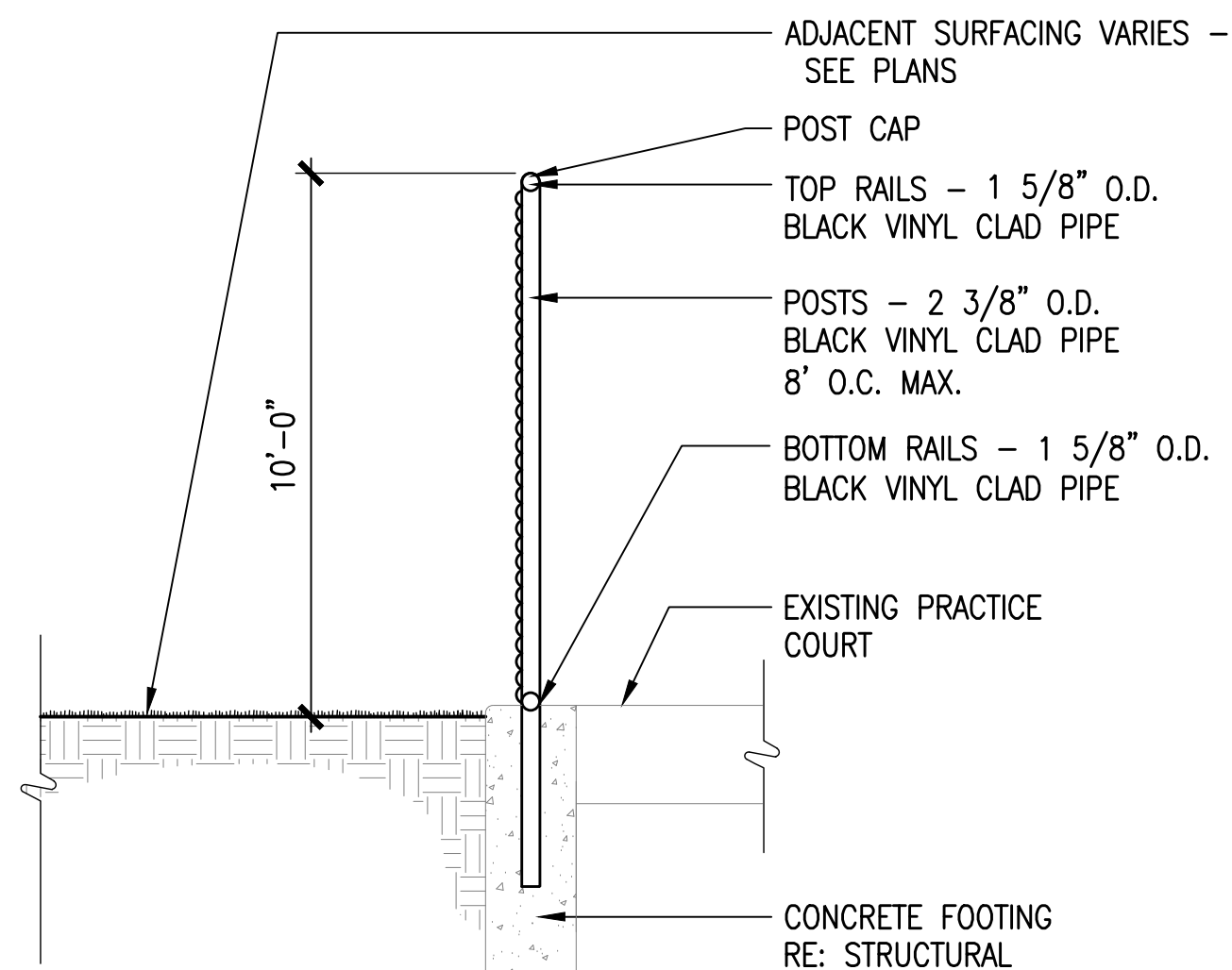
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**Site Details**

SHEET NO.:

**LS502**

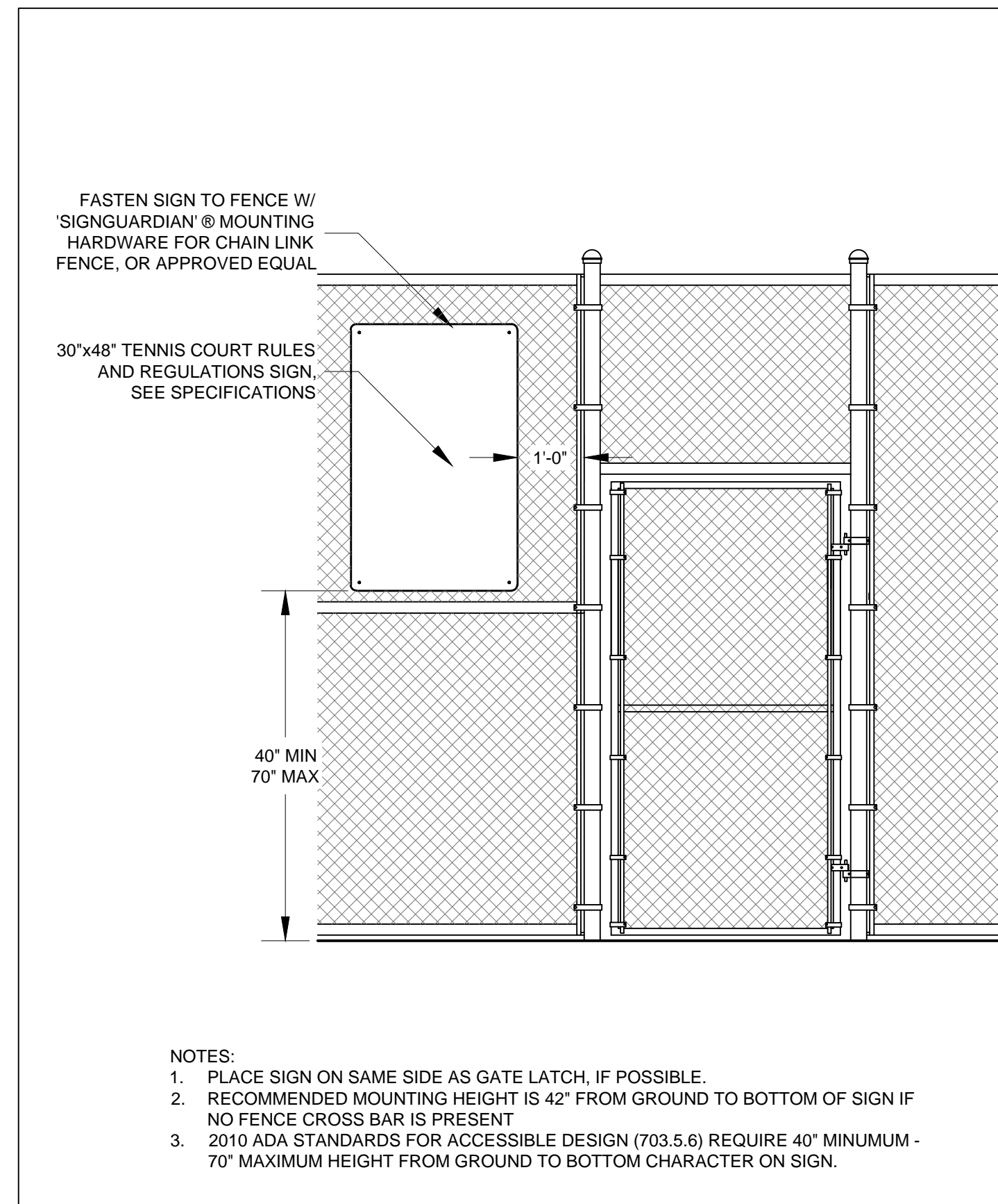
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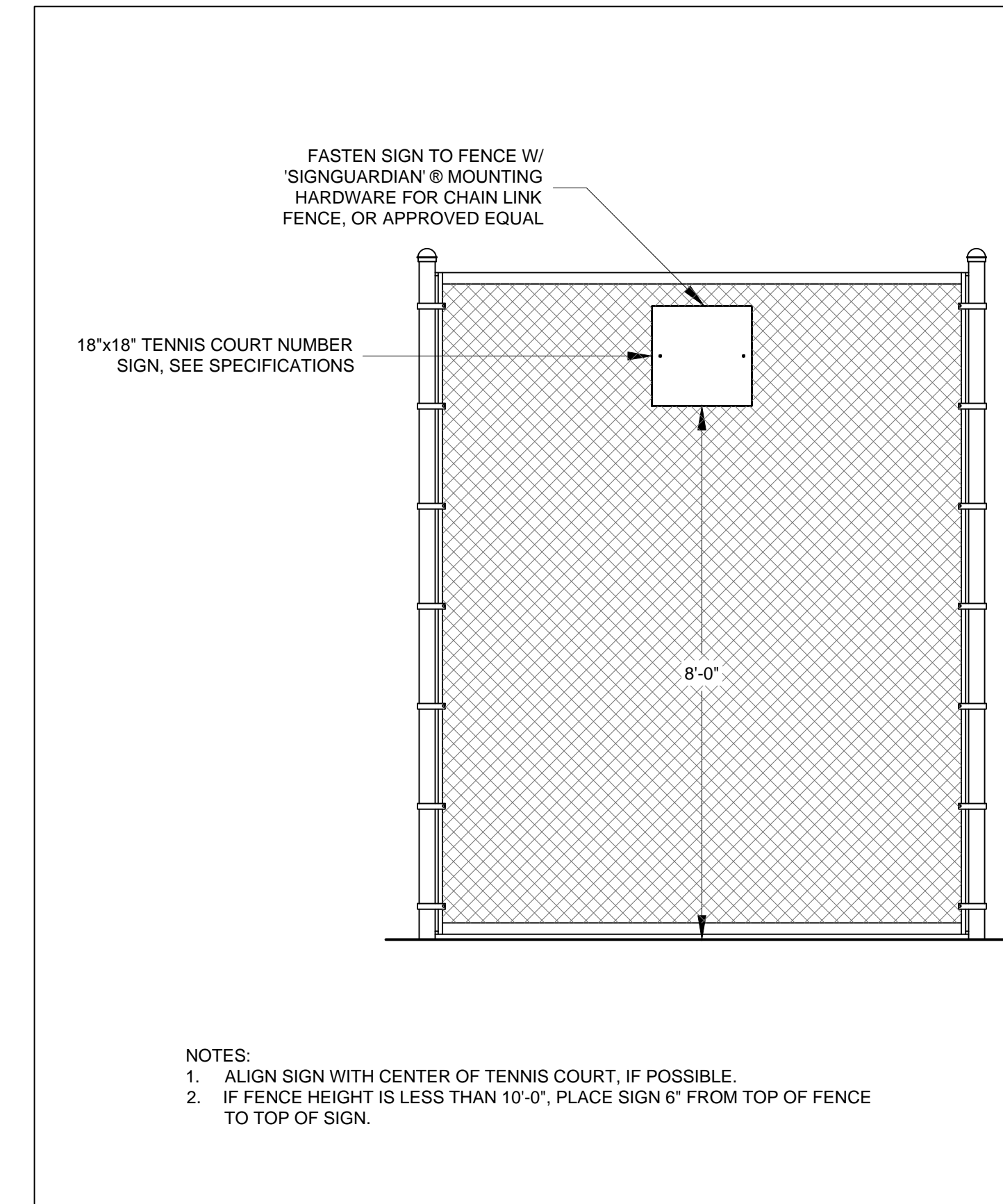
- NOTE:
1. PROVIDE CONTROL JOINT AT ALL POSTS
  2. MATCH EXISTING NORTH FENCE
  3. REFERENCE STRUCTURAL DRAWINGS FOR ONLY REINFORCEMENT AND FOOTING DIMENSIONS

**A** 10' CHAINLINK FENCE  
SCALE: 1/2"=1'-0" DT-FENC-CHAN-LINK



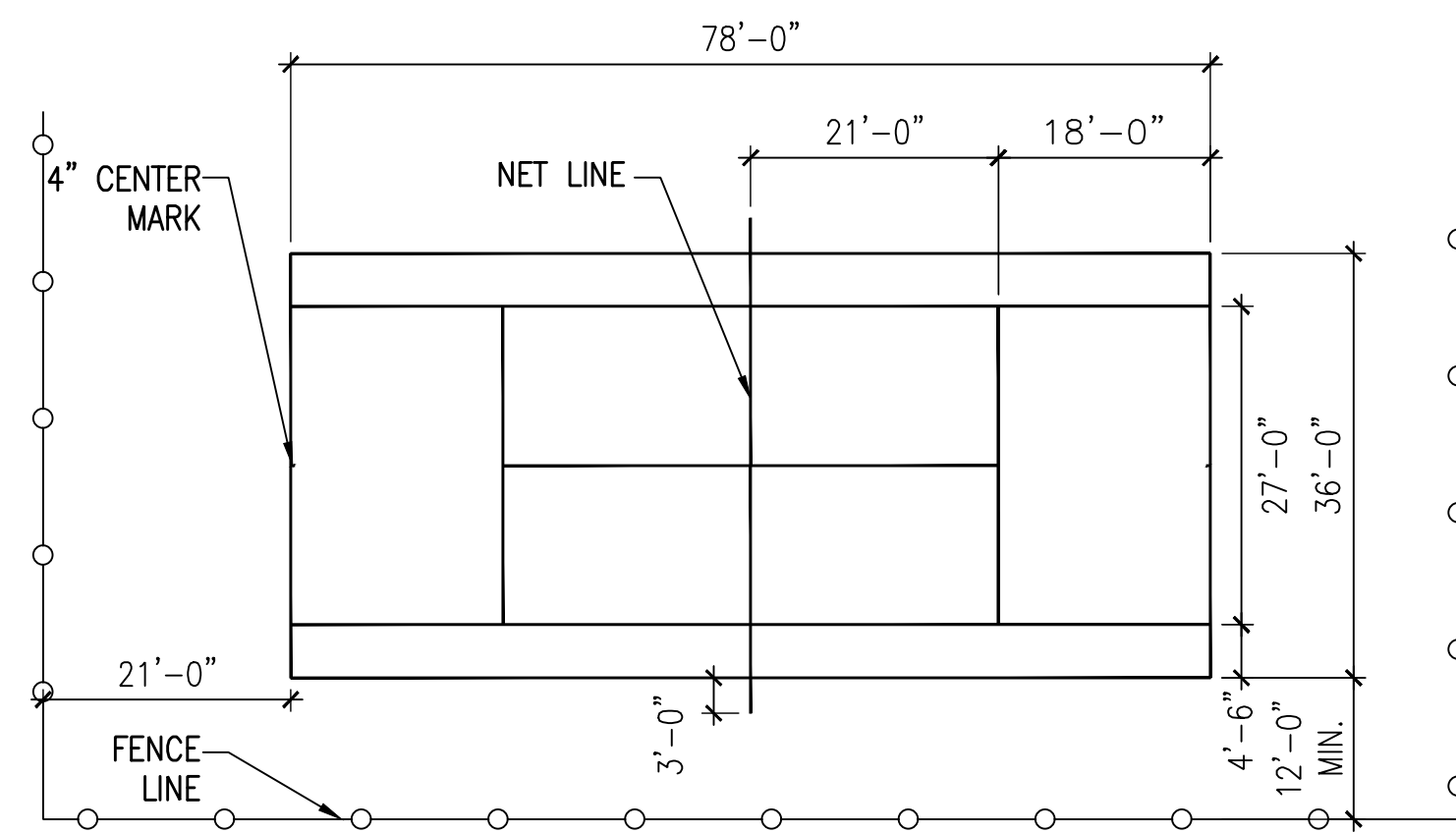
- NOTES:
1. PLACE SIGN ON SAME SIDE AS GATE LATCH, IF POSSIBLE.
  2. RECOMMENDED MOUNTING HEIGHT IS 42" FROM GROUND TO BOTTOM OF SIGN IF NO FENCE CROSS BAR IS PRESENT
  3. 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN (703.5.6) REQUIRE 40" MINIMUM - 70" MAXIMUM HEIGHT FROM GROUND TO BOTTOM CHARACTER ON SIGN.

CITY OF DENVER  
**B** TENNIS RULES & REGULATIONS SIGN  
MOUNTING DETAIL  
SCALE: N.T.S.



- NOTES:
1. ALIGN SIGN WITH CENTER OF TENNIS COURT, IF POSSIBLE.
  2. IF FENCE HEIGHT IS LESS THAN 10'-0", PLACE SIGN 6" FROM TOP OF FENCE TO TOP OF SIGN.

CITY OF DENVER  
**C** TENNIS COURT NUMBER SIGN  
MOUNTING DETAIL  
SCALE: N.T.S.



- NOTES:
1. LINE WIDTH TO BE 2" FOR ALL LINES.
  2. ALL DIMENSIONS ARE TO THE OUTSIDE EDGE OF THE PLAYING LINES, WITH THE EXCEPTION OF THE CENTER LINES WHICH ARE MEASURED OUT TO THE CENTER
  3. 78' COURT LAYOUT WITH 36' AND 60' BLENDED LINES, PER USTA/ASBA STANDARDS

**D** TENNIS COURT MARKINGS  
SCALE: 1/16"=1'-0" DT-BASKETBALL-MARKINGS

# BERKELEY PARK TENNIS COURTS



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**Site Details**

SHEET NO.:

**LS503**





**TRASH RECEPTACLE**  
 COMPANY: WAUSAU TILE INC.  
 MODEL: MF# 3202 SIDE DOOR, RIBBON STYLE, SURFACE MOUNT  
 QUANTITY: 3  
 COLOR: RAL 6012 BLACK GREEN

**A TRASH RECEPTACLE**  
 SCALE: NTS



**BIKE RACK**  
 COMPANY: WAUSAU TILE INC.  
 MODEL: MF # 9006 INVERTED "U" SURFACE MOUNT  
 QUANTITY: 4  
 COLOR: RAL 6012 BLACK GREEN

**B BIKE RACK**  
 SCALE: NTS



**BENCH**  
 COMPANY: VICTORY STANLEY  
 MODEL: MF #2200 RIBBON SLATS  
 QUANTITY: 2  
 COLOR: RAL 6012 BLACK GREEN

**C BACKED BENCH**  
 SCALE: NTS



**GRILL**  
 COMPANY: LITTLE TIKES  
 MODEL: 200 ROTATING PEDESTAL GRILL  
 QUANTITY: 1  
 COLOR: BLACK

**D GRILL**  
 SCALE: NTS

DT-GRILL



**BENCH**  
 COMPANY: VICTORY STANLEY  
 MODEL: MF #2202 RIBBON SLATS BACKLESS  
 QUANTITY: 4  
 COLOR: RAL 66012 BLACK GREEN

**E BACKLESS BENCH**  
 SCALE: NTS

**BERKELEY PARK  
 TENNIS COURTS**



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SHEET NO.:  
**LS504**

BID DOCUMENTS



**GENERAL REQUIREMENTS**

- BUILDING CODE: 2009 INTERNATIONAL BUILDING CODE (IBC), CITY AND COUNTY OF DENVER AMMENDMENTS AND ANY OTHER REGULATORY AGENCIES THAT HAVE AUTHORITY OVER ANY PORTION OF THE WORK.
- USE STRUCTURAL DRAWINGS IN CONJUNCTION WITH LANDSCAPE ARCHITECT DRAWINGS
- ALL DIMENSIONS SHOWN ON STRUCTURAL DRAWINGS ARE BASED ON DIMENSIONS AND INFORMATION FURNISHED BY THE OWNER AND LANDSCAPE ARCHITECT AND ARE INTENDED TO LOCATE STRUCTURAL COMPONENTS RELATIVE TO NON-STRUCTURAL COMPONENTS. ENGINEER SHALL BE NOTIFIED OF ANY DEVIATIONS PRIOR TO COMMENCEMENT OF WORK ON COMPONENTS WHICH MIGHT BE AFFECTED BY LOCATION CHANGES.
- AT DETAIL, SECTION, ELEVATION, ETC REFERENCE MAY BE INDICATED ONLY ONCE ON A STRUCTURAL DRAWING, BUT IT IS TO BE USED AT ALL LIKE AND SIMILAR CONDITIONS.

**LOADING CRITERIA**

- LIVE LOADS  
FLOOR LIVE LOAD 100 PSF
- SNOW LOADS  
Pg GROUND SNOW LOAD 25 PSF
- WIND LOADS  
100 MPH EXPOSURE C

**CONCRETE**

- CONCRETE CONSTRUCTION SHALL CONFORM TO ALL REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE AND CURRENT ACI 350, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
- CONCRETE DESIGN MIXES SHALL PROVIDE CONCRETE WITH THE PROPERTIES SHOWN IN THE CONCRETE MIX SCHEDULE.
- PREPARE CONCRETE MIX DESIGNS FOR EACH TYPE AND STRENGTH OF CONCRETE. STRENGTH OF CONCRETE SHALL BE DETERMINED BY USING EITHER LABORATORY TRIAL BATCH OR FIELD EXPERIENCE METHODS AS SPECIFIED IN ACI 301. IF TRIAL BATCH METHOD IS USED, USE AN INDEPENDENT TESTING FACILITY ACCEPTABLE TO ENGINEER FOR PREPARING AND REPORTING PROPOSED DESIGN MIX.
- SUBMIT WRITTEN REPORTS TO ENGINEER OF EACH PROPOSED MIX DESIGN A MINIMUM OF 14 DAYS PRIOR TO START OF CONCRETE POUR. DO NOT POUR CONCRETE UNTIL ENGINEER HAS REVIEWED MIX DESIGNS.
- DO NOT USE CALCIUM CHLORIDE. USE ACCELERATING ADMIXTURES IN COLD WEATHER IF DESIRED. USE SET RETARDING ADMIXTURES DURING HOT WEATHER IF DESIRED. ALL ADMIXTURES SHALL BE APPROVED BY ENGINEER.
- WATER REDUCING ADMIXTURES SHALL CONFORM TO ASTM C494, AND USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- AIR ENTRAINMENT SHALL CONFORM TO ASTM A C260 AND SHALL BE USED IN ALL CONCRETE MIXES EXPOSED TO WEATHER.
- PORTLAND CEMENT SHALL CONFORM TO ASTM C150 TYPE I / II.
- AGGREGATE FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33.
- CONCRETE MIXING OPERATIONS SHALL CONFORM TO ASTM C94 AND ACI 304.
- NON SHRINK GROUT SHALL CONFORM TO ASTM C1107.
- ALL CONCRETE SHALL BE CONSOLIDATED BY VIBRATION, SPADING, RODDING OR FORKING SO THAT THE CONCRETE IS THOROUGHLY WORKED AROUND THE REINFORCEMENT AND EMBEDDED ITEMS AND INTO THE CORNERS OF FORMS WITHOUT SEGREGATION OF MATERIALS.
- REFER TO ARCHITECTURAL DRAWINGS FOR REVEALS, AREAS OF TEXTURED CONCRETE OR SPECIAL FINISHES, ITEMS REQUIRED TO BE CAST INTO CONCRETE, CURBS AND SLAB DEPRESSIONS.
- REINFORCING BARS SHALL HAVE CLEAR COVER AS FOLLOWS:
  - A. CONCRETE EXPOSED TO EARTH WITHOUT FORMS 3"
  - B. CONCRETE POURED IN FORMS BUT EXPOSED TO EARTH, LIQUID, WEATHER, OR BEARING ON WORK MAT OR SLABS SUPPORTING EARTH COVER:
    - SLABS 2"
    - FOOTINGS AND BASED SLABS: FORMED SURFACES 2"
    - TOP OF FOOTINGS AND BASED SLABS 2"
  - C. SEE PLANS FOR ADDITIONAL COVERAGE REQUIREMENTS.
- CONCRETE TOLERANCES SHALL BE AS SPECIFIED IN ACI 301:
  - A. TOPS OF WALLS AND COLUMNS -3/4", +0"
  - B. PLUMBNESS 1/4" PER 10 FT, 1" MAX TOTAL
  - C. PLAN ALIGNMENT 1/2" PER 20 FT, 1" MAX TOTAL
  - D. CROSS SECTIONAL DIMENSION -1/4", + 1/2"
  - E. SIZE AND LOCATION OF SLEEVES & BLOCKOUTS +/- 1/4"

CONCRETE MIX SCHEDULE						
CONCRETE TYPE	COMP STRENGTH (28 DAYS)	MAX W/C RATIO	MAX AGG SIZE	SLUMP LIMITS	AIR CON-TENT	ADMIX REQUIRED
EXTERIOR SLAB ON GRADE AND FOUNDATIONS	5000 PSI	0.40	3/4"	3-5"	5-8%	AEA [1]

FOOTNOTES:  
 [1] AIR ENTRAINING ADMIXTURE  
 [2] NORMAL WEIGHT AGGREGATE UNLESS NOTED OTHERWISE

CONCRETE DURABILITY SCHEDULE EXPOSURE CLASS					
CONCRETE TYPE	FREEZE / THAW	SULFATE	PERMEABILITY	CORROSION	MAX CI
POST TENSIONED BASKETBALL COURT AND EXTERIOR SLAB ON GRADE	F3	S0	P1	C2	0.06

NOTES:  
 [1] REQUIREMENTS PER ACI-318 CHAPTER 4  
 [2] MAX CI INDICATES THE MAXIMUM WATER SOLUBLE CHLORIDE ION CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT.

**POST TENSIONED SLAB ON GRADE**

- SLAB ON GRADE FRICTION COEFFICIENT,  $\mu$  0.45 ON DOUBLE LAYER POLYETHYLENE SHEATHING
- DESIGN AND FABRICATION OF ALL POST-TENSIONING TENDONS, ANCHORAGES AND COUPLINGS SHALL CONFORM TO ACI 318 AND 301.
- FABRICATOR SHALL SUBMIT ALL SHOP DRAWINGS FOR ARCHITECT AND ENGINEER APPROVAL PRIOR TO FABRICATION. STAMPED AND SIGNED CALCULATIONS SHALL BE SUBMITTED FOR FRICTION, LONG TERM LOSSES AND TOTAL ELONGATION. ASSUME 3/8" SEAT LOSS ADD RELATIVE HUMIDITY = 50% FOR CALCULATION PURPOSES. SHOP DRAWINGS SHALL BE SUBMITTED WHICH INCLUDE TENDON LAYOUT, DEAD END AND STRESSING END ANCHORAGES AND DETAILS.
- CONCRETE SHALL REACH A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI PRIOR TO STRESSING OPERATIONS.
- CONTRACTOR SHALL SUBMIT A RECORD OF JACKING FORCES AND TENDON ELONGATION MEASUREMENTS BY SPECIAL INSPECTOR PRIOR TO CUTTING TENDONS.
- ALL TENDONS SHALL BE UNBONDED LOW-RELAXATION TYPE 1/2" DIAMETER (0.153 SQ IN), 7 WIRE STRAND WITH AN ULTIMATE STRENGTH OF 270 KSI, CONFORMING TO ASTM A416.
- ALL POST-TENSIONED TENDONS SHALL HAVE AN ENCAPSULATED WATER TIGHT SYSTEM. SYSTEM SHALL INCLUDE EPOXY COATED ANCHORS, GREASE CAPS OVER ALL WEDGE CAVITIES, LONGER STRESSING POCKETS AND NO EXPOSED STRAND.
- SHEATHING FOR ALL UNBONDED TENDONS SHALL BE CONTINUOUS TO THE STRESSING AND DEAD END ANCHORS. REPAIR ANY CUTS OR BREAKS IN SHEATHING WITH SHEATHING REPAIR TAPE PRIOR TO PLACING CONCRETE.
- ANCHOR HARDWARE SHALL MEET THE MINIMUM REQUIREMENTS OF ACI318 CHAPTER 18 AND POST TENSIONING INSTITUTE'S "SPECIFICATION FOR UNBONDED SINGLE STRAND TENDONS".
- SUBSTITUTIONS OF POST TENSIONING SYSTEMS OR CHANGES IN TENDON SIZES, SPACING OR LAYOUT REQUIRE PRIOR WRITTEN APPROVAL BY ENGINEER.
- DRILLED OR POWER DRIVEN INSERTS REQUIRING MORE THAN 3/4" PENETRATION ARE NOT ALLOWED IN POST TENSIONED SLABS. ALL ITEMS REQUIRING ANCHORS SHALL BE PLACED PRIOR TO CONCRETE POUR.
- PROVIDE BLOCKOUTS OR SLEEVES PRIOR TO CONCRETE PLACEMENT FOR ANY OPENINGS REQUIRED BY DRAWINGS BY ARCHITECT, MECHANICAL, ELECTRICAL, PLUMBING OR CIVIL. ANY OPENING REQUIRING CUTTING OR DRILLING SHALL BE LOCATED TO MISS TENDONS AND ANCHORS LOCATED BY X-RAY OR GROUND PENETRATING RADAR. LOCATIONS FOR CUTTING OR DRILLING SHALL BE SUBMITTED PRIOR TO CUTTING.
- PROVIDE 2-#4 CONTINUOUS BACK UP BARS AT ALL POST-TENSIONING ANCHORS, INCLUDING AT ANCHORS FOR ADDED TENDONS. EXTEND BACK UP BARS 18" BEYOND THE LAST ANCHOR.
- THE RAM AND ATTENDANT GAUGE TO BE USED FOR STRESSING SHALL BE CALIBRATED WITHIN THIRTY DAYS OF USE. CALIBRATION RECORDS SHALL BE SUBMITTED TO ENGINEER.
- PIPES MAY PASS THROUGH STRUCTURAL CONCRETE IN SLEEVES BUT SHALL NOT BE EMBEDDED THEREIN. CONDUITS AND PIPES MAY CROSS ON TOP OF BEAMS OR THROUGH BEAMS PERPENDICULAR. CONDUITS MAY NOT RUN PARALLEL ON TOP OF BEAMS. THEY MUST BE A MINIMUM OF ONE FOOT FROM THE EDGE OF BEAM. CONDUITS OR PIPES MUST BE SPACED WITH A MINIMUM OF 4" CONCRETE BETWEEN THEM AND CAN RUN IN MAXIMUM GROUPS OF 4.
- CONTRACTOR SHALL NOTIFY ENGINEER IF SHRINKAGE CRACKS APPEAR IN SLAB PRIOR TO STRESSING OPERATIONS. IF SHRINKAGE CRACKS APPEAR GREATER THAN HAIRLINE CRACKS, COVER THE CRACK WITH DUCT TAPE TO AVOID GETTING DEBRIS IN THE CRACK BEFORE STRESSING.
- SPECIAL INSPECTOR SHALL MONITOR STRESSING OPERATIONS. THE SERIAL NUMBER OF THE RAM AND GAUGE SHALL BE NOTED FOR EACH STRESSING OPERATION. ELONGATIONS SHALL BE MEASURED ON THE SAME DAY STRESSING TAKES PLACE. FIELD READINGS OF ELONGATION SHALL NOT VARY FROM CALCULATED VALUES BY MORE THAN PLUS OR MINUS 7%.
- DO NOT BURN OFF TENDON TAILS UNTIL THE ENTIRE SLAB HAS BEEN STRESSED AND THE STRESSING RECORD IS APPROVED BY ENGINEER. TENDON TAILS SHALL BE BURNT OFF IN SUCH A MANNER THAT GREASE CAPS CAN BE PROPERLY INSTALLED.
- GREASE CAPS SHALL BE APPLIED TO TENDONS. STRESSING POCKETS SHALL BE GROUTED WITHIN 3 DAYS OF BURNING OFF TENDON TAILS.
- PARTIAL TENSIONING OF THE TENDONS, LIMITED TO A FORCE NOT TO EXCEED 50% OF THE FINAL JACKING FORCE (16 KIPS FOR 1/2"Ø GRADE 270 KSI STRAND), SHALL BE APPLIED AT 24 HOURS AFTER COMPLETION OF CONCRETE PLACEMENT.

**REINFORCING STEEL**

- DEFORMED REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60. REINFORCING TO BE WELDED OR FIELD BENT SHALL BE ASTM A706, GRADE 60.
- DETAIL BARS IN ACCORDANCE WITH THE CURRENT ACI DETAILING MANUAL AND ACI BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
- ALL REINFORCING BAR BENDS SHALL BE MADE COLD WITH A BAR BENDER ACCORDING TO ACI 350 BAR BEND RADIUS.
- LAP ALL HORIZONTAL BARS AT CORNERS, INTERSECTIONS AND SPLICES.
- AT LOCATIONS WHERE ALL REINFORCING WITHIN A STRUCTURAL ELEMENT WILL BE SPLICED, THE SPLICES MUST BE STAGGERED.
- PROVIDE ALL ACCESSORIES NECESSARY TO SUPPORT REINFORCING AT POSITIONS SHOWN ON THE PLANS.

**CONTRACTOR NOTES**

- ALL OMISSIONS OR CONFLICTS BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND/OR SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH WORK.
- CONTRACTOR MUST CHECK ALL DIMENSIONS, FRAMING CONDITIONS, AND SITE CONDITIONS BEFORE STARTING WORK. ARCHITECT/ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES OR POSSIBLE DEFICIENCIES.
- NO MODIFICATION SHALL BE MADE TO ANY STRUCTURAL MEMBER WITH THE APPROVAL OF THE STRUCTURAL ENGINEER. THIS ALSO APPLIES TO ANY OPENINGS FOR PLUMBING, ELECTRICAL AND MECHANICAL TRADES. SUBSTITUTIONS ARE NOT ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE PROJECT MANAGER. REQUEST FOR SUBSTITUTION MUST BE ACCOMPANIED BY PROPER INFORMATION NECESSARY TO EVALUATE THE SUBSTITUTION. COMPENSATION MAY BE REQUIRED FROM THE CONTRACTOR TO CONDUCT THE EVALUATION PROCESS.
- NOTHING SHALL RELIEVE THE GENERAL CONTRACTOR AND THEIR SUB CONTRACTORS OF:
  - A) THE RESPONSIBILITY TO DETERMINE ANY ASPECT OF HOW THE WORK IS TO BE PERFORMED
  - B) DEALING WITH MATTERS OF SAFETY OF PERSONNEL
  - C) SAFETY OF PROPERTY D) SUPERINTENDING OF WORK
  - E) CONSTRUCTION MEANS AND METHODS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION PROCEDURE AND PROTECTION OF ADJACENT PROPERTIES, STRUCTURE, UTILITIES, ETC. IN ACCORDANCE WITH REQUIRED CODES AND ORDINANCES.
- ANY CALCULATIONS REQUESTED THAT INVOLVE CONSTRUCTION MEANS AND METHODS ARE CONSIDERED ADDITIONAL SERVICES TO BE COMPENSATED BY THE GENERAL CONTRACTOR.
- SHOP DRAWINGS AND CALCULATIONS WHERE APPLICABLE SHALL BE SUBMITTED TO ARCHITECT/ENGINEER FOR REVIEW PRIOR TO FABRICATION OR CONSTRUCTION. ALLOW TWO WEEKS FOR REVIEW OF SHOP DRAWINGS. PROVIDE BUILDING DEPARTMENT WITH APPROVED SHOP DRAWINGS FOR THEIR RECORD.

CONCRETE REINFORCING TENSION LAP SPLICE LENGTH (CLASS B)

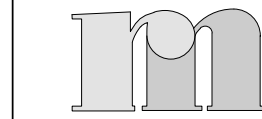
BAR SIZE	COVER	fc=3000psi			fc=4000psi			fc=5000psi			STD HOOK LENGTH
		TOP BARS	OTHER BARS	tdh	TOP BARS	OTHER BARS	tdh	TOP BARS	OTHER BARS	tdh	
#3	1"	17	13	6	15	12	6	13	12	6	
	1 1/2"	17	13		15	12		13	12		
	2"	17	13		15	12		13	12		
#4	1"	23	17	8	20	15	8	18	14	8	
	1 1/2"	23	17		20	15		18	14		
	2"	23	17		20	15		18	14		
#5	1"	33	26	10	29	22	10	26	20	10	
	1 1/2"	28	22		24	19		22	17		
	2"	28	22		24	19		22	17		
#6	1"	46	35	12	40	31	12	36	27	12	
	1 1/2"	34	26		29	23		26	20		
	2"	34	26		29	23		26	20		
#7	1"	74	57	14	64	50	14	57	44	14	
	1 1/2"	55	43		48	37		43	33		
	2"	49	38		42	33		38	29		
#8	1"	93	72	16	81	62	16	72	56	16	
	1 1/2"	70	54		61	47		54	42		
	2"	56	43		49	37		43	33		
#9	1"	113	87	18	98	76	19	88	68	19	
	1 1/2"	86	66		75	57		67	51		
	2"	69	53		60	46		54	41		
#10	1"	137	106	20	119	92	22	107	82	22	
	1 1/2"	105	81		91	70		82	63		
	2"	85	66		74	57		66	51		

- NOTES:
- TABULATED VALUES ARE BASED ON NON- EPOXY COATED GRADE 60 REINFORCING BARS AND NORMAL WEIGHT CONCRETE. LENGTHS ARE IN INCHES.
  - TENSION DEVELOPMENT LENGTHS AND TENSION LAP SPLICE LENGTHS ARE CALCULATED PER ACI 318-08
  - CLEAR SPACING OF BARS MUST BE AT LEAST DOUBLE THE CONCRETE COVER.
  - TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
  - FOR LIGHT WEIGHT AGGREGATE CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.33.
  - DEVELOPMENT LENGTH (td) = TENSION LAP SPLICE LENGTH DIVIDED BY 1.3.
  - MINIMUM COVER FOR t<sub>dh</sub> IS 2 1/2" MEASURED NORMAL TO THE PLANE OF THE HOOKED BAR (SIDE COVER).

**BERKELEY PARK TENNIS COURTS**



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REV.	COMMENT	DATE

SEAL:

DATE: APRIL 18, 2016  
 JOB NO.: BERKELEY PARK  
 DRAWN BY: RJK  
 CHECKED BY: JUM

DRAWING TITLE:  
**GENERAL NOTES**

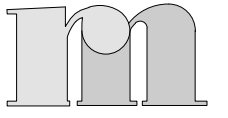
SHEET NO.:  
**S101**  
 SCALE: As indicated



# BERKELEY PARK TENNIS COURTS



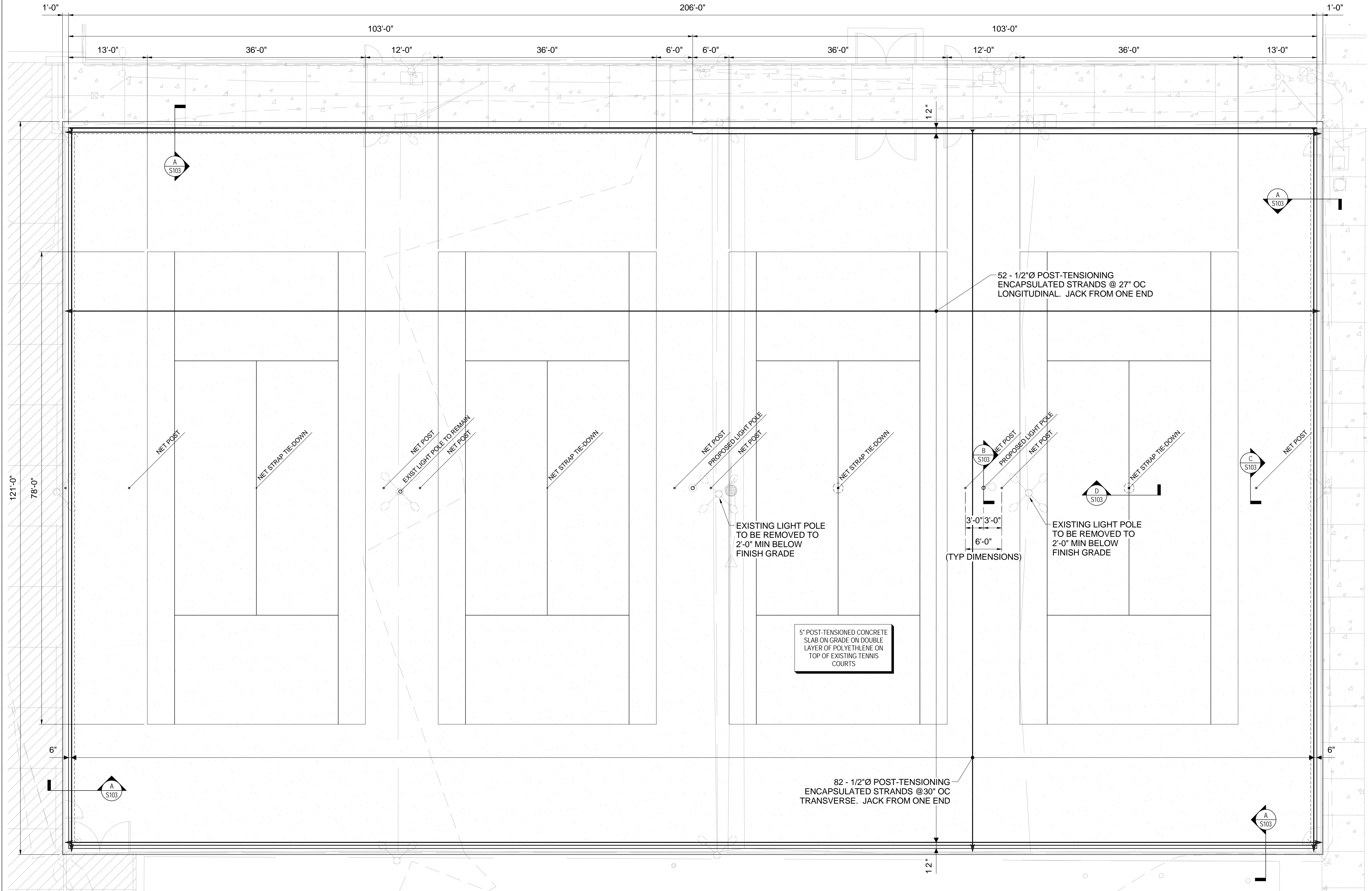
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REV.	COMMENT	DATE

SEAL:



DATE: MARCH 29, 2016  
JOB NO.: BERKELEY PARK  
DRAWN BY: RJK  
CHECKED BY: JUM

DRAWING TITLE:  
**TENNIS COURT  
SLAB PLAN**

SHEET NO.:

**S102**

SCALE: 1/8" = 1'-0"

## 1 TENNIS COURT SLAB PLAN

1/8" = 1'-0"

### PLAN NOTES:

- DOUBLE LAYER POLYETHYLENE SHEETING VAPOR BARRIER SHALL BE PLACED ON EXISTING COURT.
- NEW TENNIS COURTS TO BE CONSTRUCTED ATOP EXISTING COURTS, TO REMAIN IN PLACE WITH SAWCUT AND REMOVAL AS SHOWN ON THE PLANS.
- SUB GRADE SHALL BE PREPARED IN ACCORDANCE WITH THE GEOTECHNICAL RECOMMENDATIONS DONE BY GEOCAL, DATED OCTOBER 13, 2015.

3/29/2016 2:08:37 PM

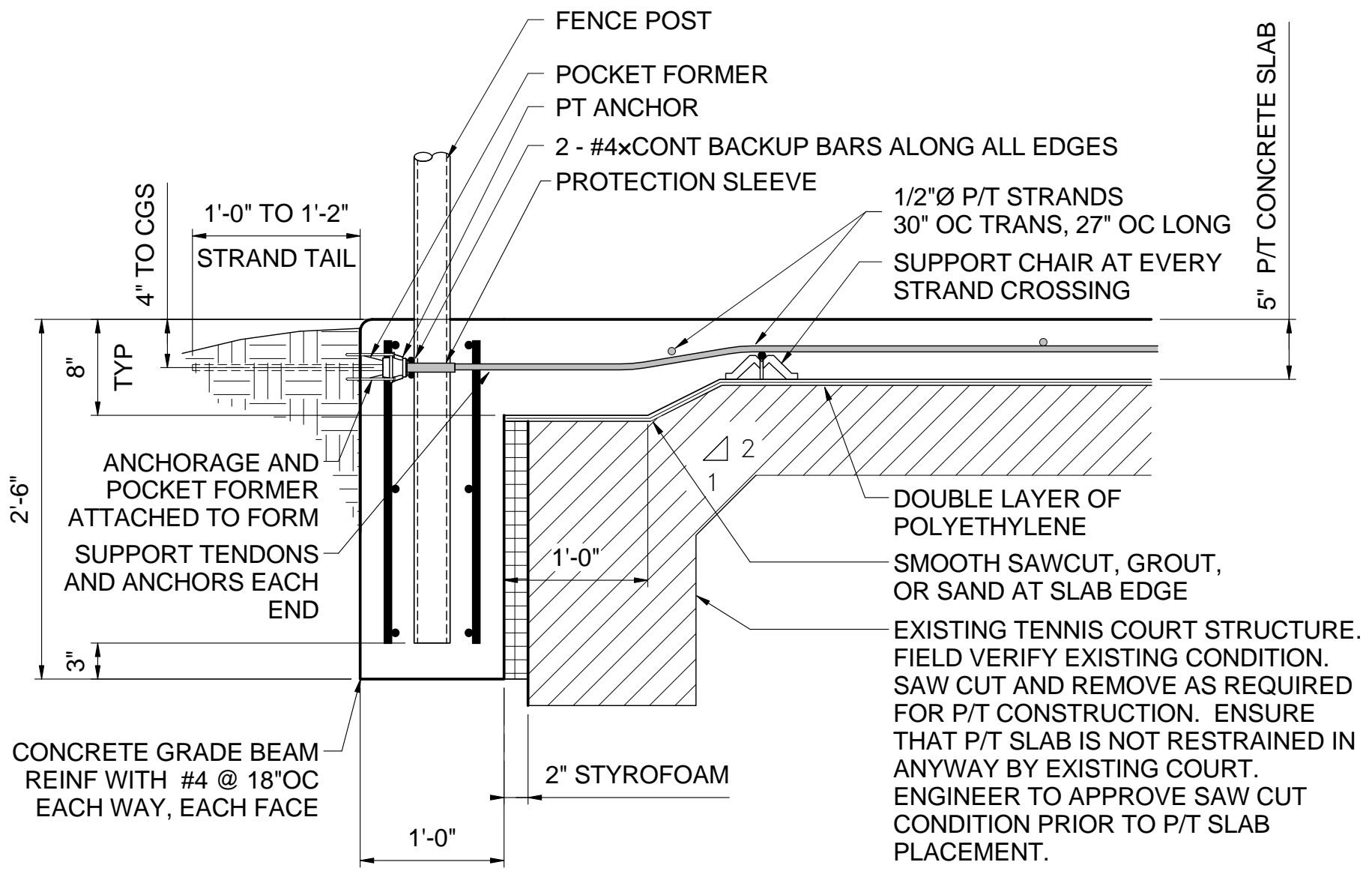
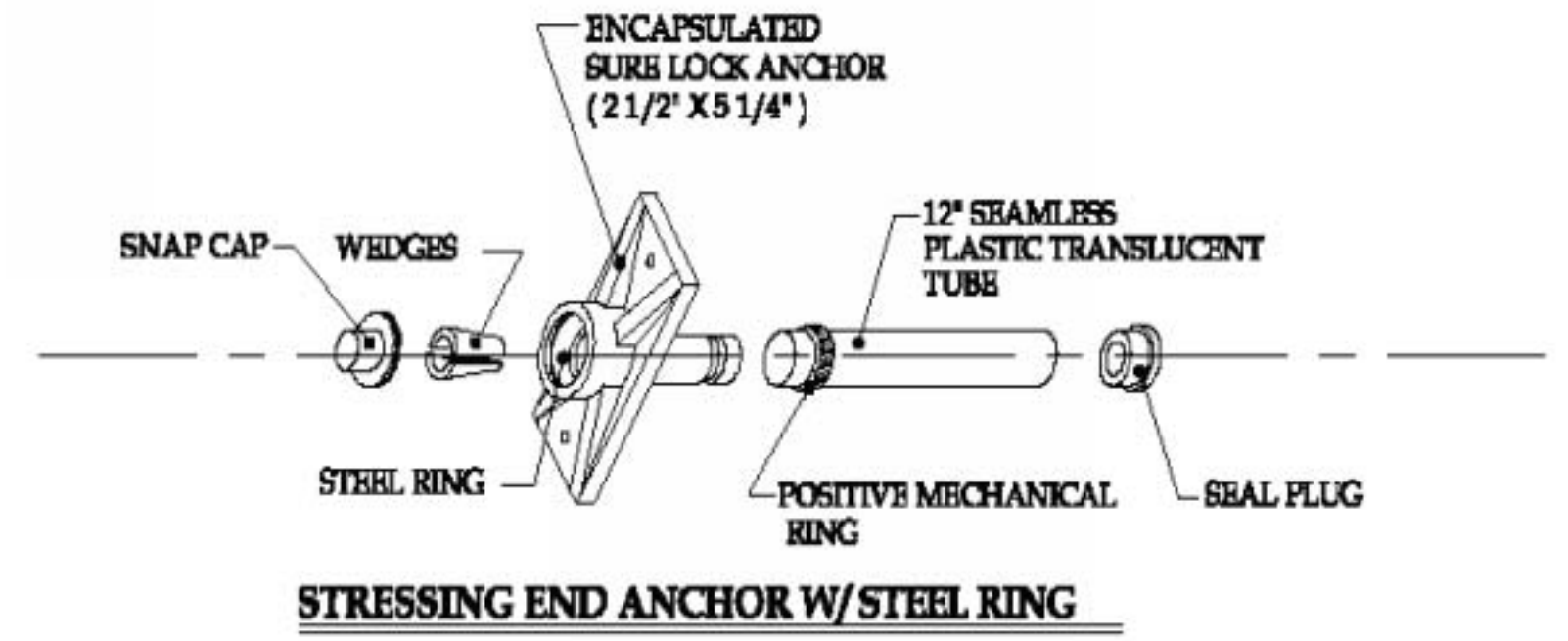
BID DOCUMENTS

# BERKELEY PARK TENNIS COURTS

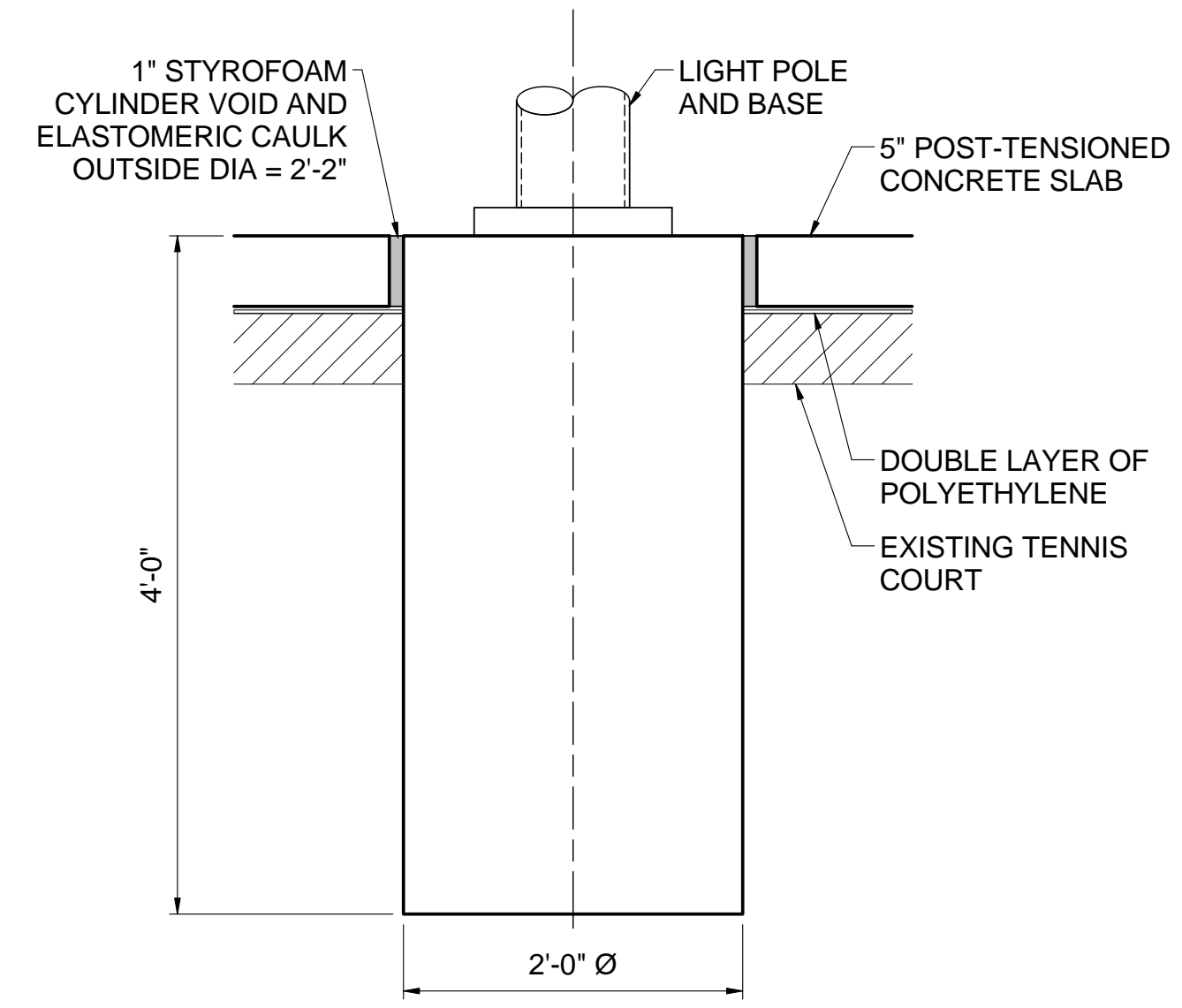


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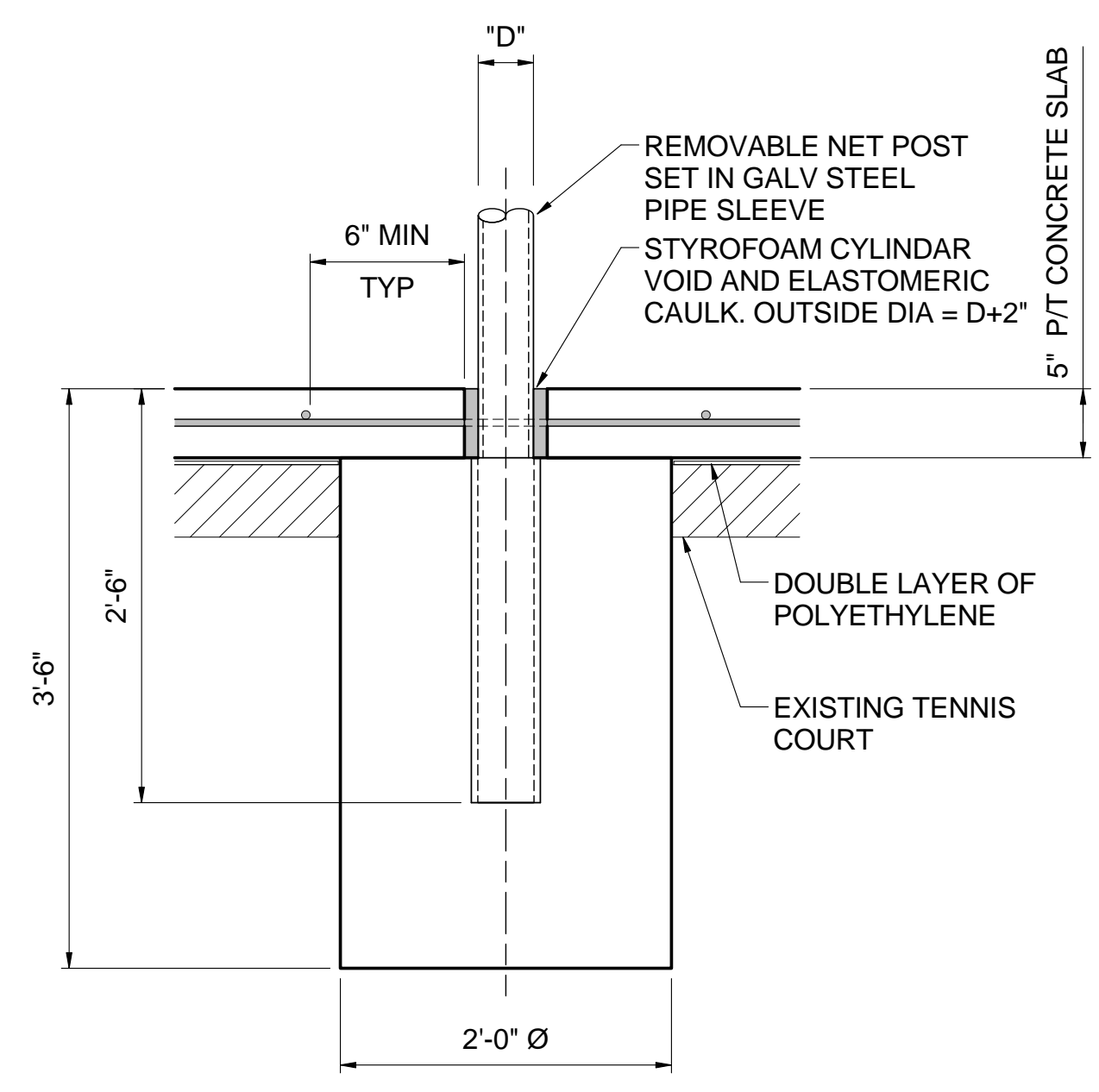
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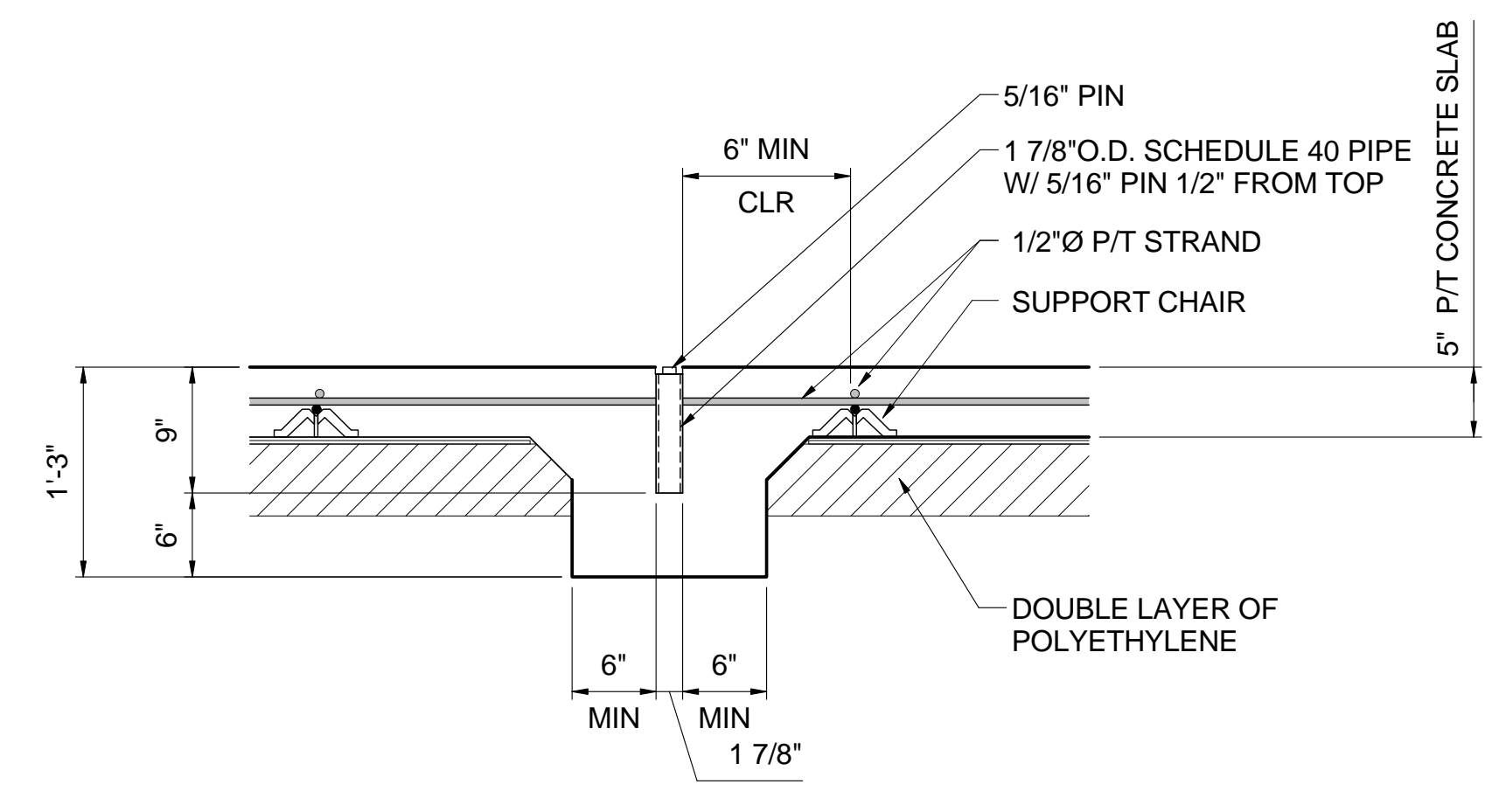
**A** TYPICAL PERIMETER SLAB EDGE WITH INTEGRAL GRADE BEAM  
1" = 1'-0"



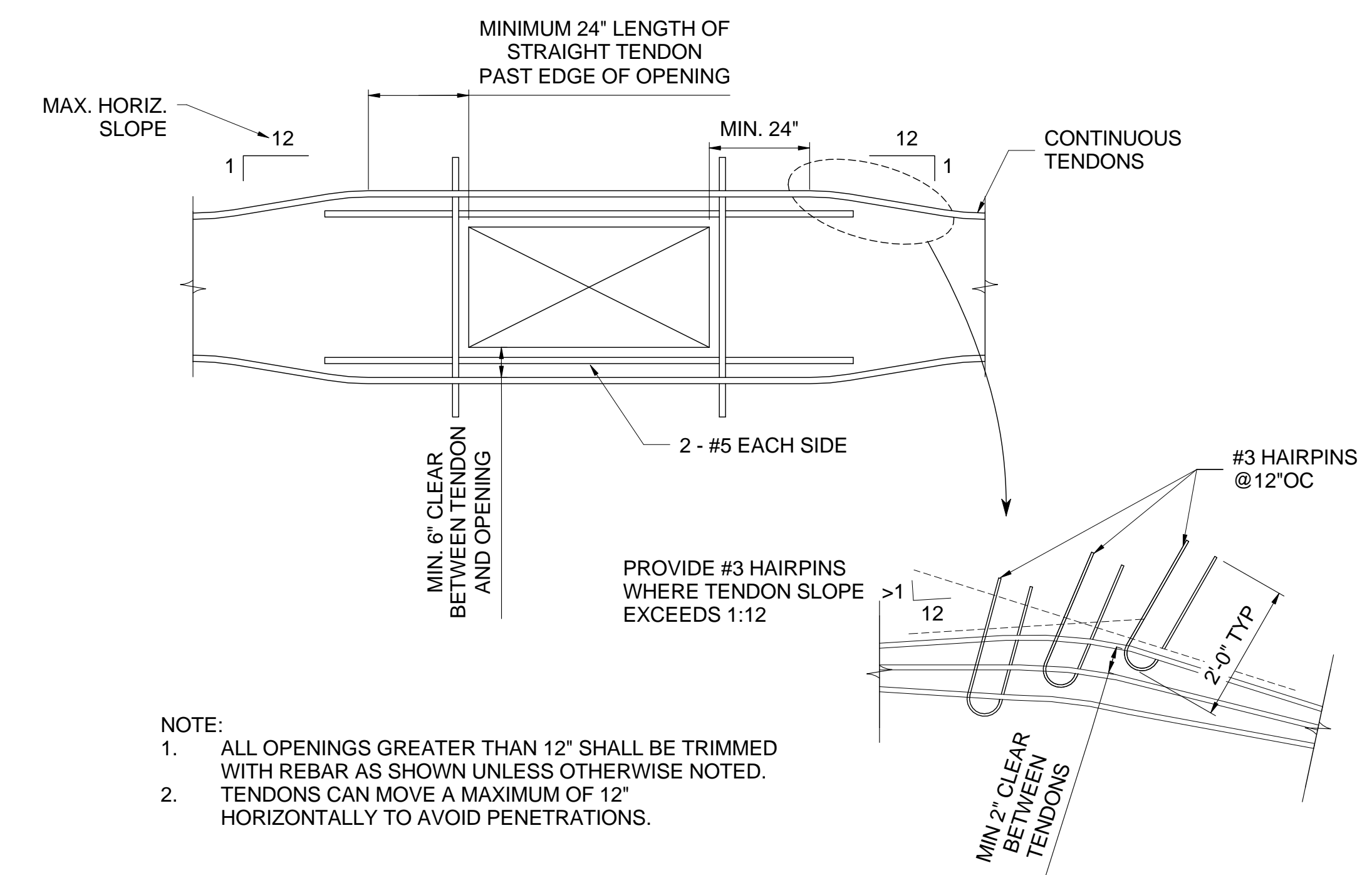
**B** TYPICAL LIGHT POLE FOUNDATION  
1" = 1'-0"



**C** REMOVABLE NET POST FOUNDATION  
1" = 1'-0"



**D** TYPICAL NET STRAP TIE  
1" = 1'-0"



- NOTE:
- ALL OPENINGS GREATER THAN 12" SHALL BE TRIMMED WITH REBAR AS SHOWN UNLESS OTHERWISE NOTED.
  - TENDONS CAN MOVE A MAXIMUM OF 12" HORIZONTALLY TO AVOID PENETRATIONS.

**E** SLAB OPENING REINFORCING/ HAIRPIN GUIDELINES  
1" = 1'-0"

REV.	COMMENT	DATE

SEAL:



DATE: MARCH 29, 2016  
JOB NO.: BERKELEY PARK  
DRAWN BY: RJK  
CHECKED BY: JUM

DRAWING TITLE:  
**TENNIS COURT SLAB DETAILS**

SHEET NO.:

**S103**

SCALE: 1" = 1'-0"

3/29/2016 2:12:32 PM

BID DOCUMENTS



GENERAL NOTES	
1.	ALL JUNCTION BOXES, DEVICES, RECEPTACLES, ETC. SHALL BE CLEARLY LABELED WITH THE PANEL AND CIRCUIT INFORMATION. REFER TO THE SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING LABELING.
2.	REFER TO THE ARCHITECTURAL PLANS FOR THE EXACT LOCATION OF ELECTRICAL DEVICES.
3.	ALL ELECTRICAL WORK TO MEET 2017 CODE.

POWER LEGEND	
SYMBOL	DESCRIPTION
	DISTRIBUTION EQUIPMENT; SWITCHGEAR, PANELBOARDS
	BRANCH CIRCUIT PANEL TRANSFORMER
	FUSED DISCONNECT SWITCH (NON-FUSED WHEN FUSING NOT REQUIRED)
	COMBINATION STARTER/DISCONNECT SW.
	MAGNETIC STARTER OR CONTACTOR
	METER
	MOTOR OUTLET AND CONNECTION
	OVERHEAD SERVICE ENTRANCE
	INDICATES MECHANICAL EQUIPMENT
	INDICATES KITCHEN EQUIPMENT, RISER, OR ROOM NUMBER
	AUTOMATIC TRANSFER SWITCH
	RECESSED CLOCK RECEPTACLE
	HOOD OUTLET AND CONNECTION
	DISPOSER RECEPTACLE AND CONNECTION
	SURFACE RACEWAY
	PUSHBUTTON STATION
	POWER POLE
	SURGE PROTECTION DEVICE
	VARIABLE FREQUENCY DRIVE
	CONNECTION TO FIRE/SMOKE DAMPER
	GROUNDING BUS BAR
	GROUND ROD
	GROUNDING TEST WELL

CIRCUITRY LEGEND		
FLOOR	WALL	CEILING

SITE LIGHTING LEGEND	
SYMBOL	DESCRIPTION
	LUMINAIRE IN GROUND AIMED
	LUMINAIRE IN GROUND
	WALL PACK
	SHOE BOX LUMINAIRE
	HOCKEY PUCK LUMINAIRE
	FLOOD LIGHT
	POST TOP LUMINAIRE
	BOLLARD

LINE TYPE LEGEND	
SYMBOL	DESCRIPTION
	ITEMS SHOWN HEAVY AND SOLID ARE NEW.
	ITEMS SHOWN LIGHT AND DENOTED (E) ARE EXISTING TO REMAIN.
	ITEMS SHOWN DASHED ARE EXISTING TO BE REMOVED UNLESS OTHERWISE NOTED.
	ITEMS SHOWN DASHED AND DENOTED (RL) ARE EXISTING TO BE RELOCATED.
	ITEMS SHOWN DARK AND/OR DENOTED (RL) ARE RELOCATED DEVICES FROM DEMOLITION UNLESS OTHERWISE NOTED.

CIRCUITRY LEGEND	
SYMBOL	DESCRIPTION
	UPPER-CASE LETTER(S) ADJACENT TO LUMINAIRE INDICATES LUMINAIRE TYPE (IF APPLICABLE)
	LOWER-CASE LETTER(S) ADJACENT TO LUMINAIRE INDICATES SWITCHING LEG
	NUMBER ADJACENT TO LUMINAIRE INDICATES CIRCUITRY INFORMATION
	NUMBER ADJACENT TO DEVICE INDICATES CIRCUITRY INFORMATION
	CIRCUIT RUN; UNDERGROUND OR IN FLOOR
	CIRCUIT RUN
	CIRCUIT RISERS; UP, DOWN
	HOME RUN; ARROWS INDICATE NUMBER OF CIRCUITS
	PANEL AND DEVICE CIRCUIT NUMBER

CIRCUITRY LEGEND	
SYMBOL	DESCRIPTION
	SHADED FIXTURE INDICATES EMERGENCY. FULLY SHADED INDICATES ENTIRE LUMINAIRE ON EMERGENCY. HALF SHADED INDICATES HALF OF LUMINAIRE ON EMERGENCY. NL - INDICATES NIGHT LIGHT
	LUMINAIRE SURFACE MOUNTED ON CEILING
	LUMINAIRE RECESSED IN CEILING
	WALL MOUNTED LUMINAIRE
	SUSPENDED PENDANT LUMINAIRE
	TRACK LIGHTING SYSTEM, LENGTH, BENDS, AND HEADS AS INDICATED
	TRACK LIGHTING SYSTEM REMOTE TRANSFORMER
	EXIT LIGHTS; MOUNTING FACES AND ARROWS AS INDICATED
	EMERGENCY LIGHTING UNIT
	COMBINATION EXIT SIGN/EMERGENCY LIGHTING UNIT
	TIME CLOCK
	PHOTOCELL

SWITCHING LEGEND	
SYMBOL	DESCRIPTION
	SINGLE POLE SWITCH; SUBSCRIPTS INDICATE SWITCHING LEG
	DOUBLE POLE SWITCH
	THREE WAY SWITCHING
	FOUR WAY SWITCHING
	SWITCH WITH PILOT LIGHT
	KEY OPERATED SWITCH
	LOW VOLTAGE SWITCH
	THERMAL OVERLOAD SWITCH
	GANG MOUNTED SWITCHING
	COMBINATION SWITCH AND DUPLEX RECEPTACLE
	DIMMER SWITCH
	GFI REMOTE RESET SWITCH
	OCCUPANCY SENSOR (WALL MOUNTED) SUBSCRIPT INDICATES TYPE: IR - INFRARED TECHNOLOGY US - ULTRASONIC TECHNOLOGY DT - DUAL TECHNOLOGY 2 - DUAL LEVEL CONTROL
	OCCUPANCY SENSOR (CEILING MOUNTED) SUBSCRIPT INDICATES TYPE: IR - INFRARED TECHNOLOGY US - ULTRASONIC TECHNOLOGY DT - DUAL TECHNOLOGY 2 - DUAL LEVEL CONTROL
	POWER PACK FOR OCCUPANCY SENSOR
	PUSHBUTTON ACCESS FOR LIGHT CONTROL

ONE-LINE LEGEND	
SYMBOL	DESCRIPTION
	FUSED DISCONNECT SW., DIAGRAMMATIC
	INDICATES 60A, 3-POLE DISCONNECT WITH 60A FRN TYPE FUSES
	GFI FUSED DISCONNECT SWITCH
	CIRCUIT BREAKER, DIAGRAMMATIC
	CIRCUIT BREAKER WITH KIRK KEY INTERLOCK
	CIRCUIT BREAKER WITH GROUND FAULT INTERRUPTER PROTECTION
	INDICATES 1000A FRAME BREAKER WITH 800A TRIP UNIT
	CIRCUIT BREAKER WITH SHUNT TRIP
	TRANSFORMER
	FUSED DISCONNECT SWITCH (NON-FUSED WHEN FUSING NOT REQUIRED)
	COMBINATION STARTER/DISCONNECT SW.
	MAGNETIC STARTER OR CONTACTOR
	METER
	METER WITH INTEGRAL CT CABINET
	MOTOR OUTLET AND CONNECTION
	ELECTRICAL GROUND
	PANEL BOARD OR LOAD CENTER
	CURRENT TRANSFORMER (CT)
	AUTOMATIC TRANSFER SWITCH (ATS)
	ENGINE GENERATOR
	FEEDER NUMBER
	SURGE PROTECTIVE DEVICE

ABBREVIATIONS LEGEND	
SYMBOL	DESCRIPTION
	INDICATES DETAIL OR DESIGN NOTE
A	AMPERES
AC	ABOVE COUNTER
AFCI	ARC FAULT CURRENT INTERRUPTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	AMPERE INTERRUPTING CURRENT
ATS	AUTOMATIC TRANSFER SWITCH
AL	ALUMINUM
AWG	AMERICAN WIRE GAGE
BC	BELOW COUNTER
CB	CIRCUIT BREAKER
C	CONDUIT
CU	COPPER
E	EXISTING
EC	ELECTRICAL CONTRACTOR
EM	EMERGENCY
EMC	ELECTRICAL METALLIC CONDUIT
EPO	EMERGENCY POWER OFF
ETR	EMERGENCY TRANSFER RELAY
EWC	ELECTRIC WATER COOLER
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
GC	GENERAL CONTRACTOR
GFI	GROUND-FAULT CIRCUIT-INTERRUPTER
GND	GROUND
GRC	GALVANIZED RIGID CONDUIT
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
HZ	HERTZ
IDF	INTERMEDIATE DISTRIBUTION FRAME
IMC	INTERMEDIATE METALLIC CONDUIT
Isc	SHORT CIRCUIT CURRENT
Kcmil	1000 CIRCULAR MILS
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KW	KILOWATTS
KWH	KILOWATT HOURS
IG	ISOLATED GROUND
mA	MILLIAMPS
MAX	MAXIMUM
MIC	MICROPHONE
MIN	MINIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDC	MAIN DISTRIBUTION CENTER
MDF	MAIN DISTRIBUTION FRAME
MLO	MAIN LUGS ONLY
N	NEW
NEC	NATIONAL ELECTRIC CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
PF	POWER FACTOR
RL	RELOCATE
RMS	ROOT MEAN SQUARE
SPD	SURGE PROTECTIVE DEVICE
ST	SHUNT TRIP
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TP	TAMPER PROOF
TYP	TYPICAL
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
UC	UNDER CABINET
UL	UNDERWRITERS LABORATORY
UNO	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
VFD	VARIABLE FREQUENCY DRIVE
V	VOLT
WAP	WIRELESS ACCESS POINT
WP	WEATHER PROTECTED
W/	WITH
W/O	WITHOUT
XFMR	TRANSFORMER

# BERKELEY PARK TENNIS COURTS



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3025 S. Parker Road, Suite 1100  
Aurora, CO 80014-2950  
303.696.2602 fax 303.696.0812  
www.ssgroupinc.com

SSG Project Number: 16013.00

REV.	COMMENT	DATE

SEAL:



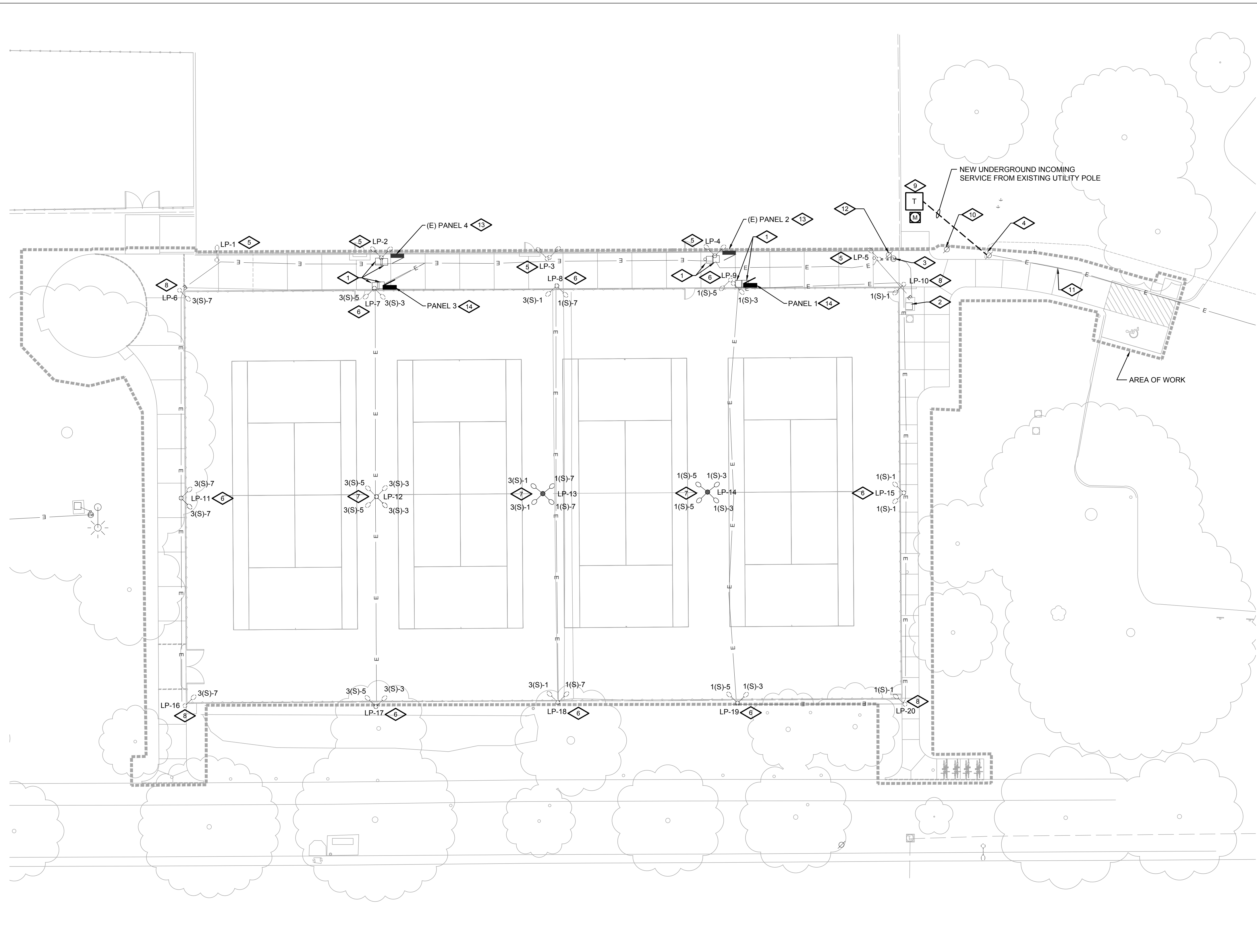
DATE: **June 29, 2017**  
JOB NO.: **SSG 16013**  
DRAWN BY: **KGW**  
CHECKED BY: **KAT**

DRAWING TITLE:  
**COVER SHEET**

SHEET NO.:  
**E000**

BID DOCUMENTS





**1 ELECTRICAL SITE PLAN**  
SCALE: 1/16" = 1' - 0"

**GENERAL NOTES**

1. PROVIDE ALL DEMOLITION WORK AS REQUIRED TO ACCOMMODATE THE NEW WORK AS INDICATED ON THE ELECTRICAL PLANS. FIELD VERIFY EXISTING CONDITIONS. PROVIDE ANY ADDITIONAL WORK NECESSARY AS REQUIRED TO PRESERVE EXISTING DEVICES AND BRANCH CIRCUIT COMPONENTS TO REMAIN. REFER TO THE ARCHITECTURAL PLANS FOR DEMOLITION SCOPE OF WORK AND VISIT THE SITE PRIOR TO BID TO DETERMINE THE ELECTRICAL SCOPE OF WORK REQUIRED.
2. PROVIDE NEUTRAL AND GROUND CONDUCTORS THROUGHOUT ALL LIGHTING BRANCH CIRCUITS INCLUDING ALL SWITCH OR LIGHTING CONTROL DEVICE LOCATIONS IN ACCORDANCE WITH NEC.
3. PROVIDE NEW DEVICES WHERE REQUIRED AND PROVIDE ALL WORK REQUIRED TO RELOCATE EXISTING DEVICES TO BE RE-USED. COORDINATE REQUIREMENTS WITH BUILDING OWNER FOR ANY SYSTEM DISRUPTION, REMOVAL, SALVAGE AND RE-USE OF EXISTING DEVICES. WORK SHOWN IS FOR GENERAL INFORMATION ONLY. RETURN ALL UNUSED DEVICES AND LUMINAIRES THAT ARE IN GOOD WORKING CONDITION TO THE OWNER/TENANT.
4. REFER TO ARCHITECTURAL SET FOR COMPLETE EQUIPMENT LAYOUT DRAWINGS.
5. PROVIDE SET OF ALL KEYS AND ALL SPECIALTY TOOLS REQUIRED TO OPEN ALL ELECTRICAL EQUIPMENT TO OWNER.
6. ALL RECEPTACLES LOCATED OUTDOORS SHALL BE GFCI (OR SERVED BY A GFI CIRCUIT BREAKER) PER NEC 210.8(B) AND 408.9(B). ALL EXTERIOR RECEPTACLES SHALL BE WEATHER PROOF PER NEC 406.9 AND ENCLOSED IN A HEAVY DUTY WEATHERPROOF 'WHILE IN USE' ENCLOSURE.
7. E. C. TO FIELD VERIFY BRANCH CIRCUIT LENGTHS AND ADJUST CONDUCTOR SIZES FOR VOLTAGE DROP AS REQUIRED.
8. PROVIDE ALL SITE LIGHTING CONDUCTORS WITH MINIMUM (2) #10 CU & #10 CU GND IN EXISTING CONDUIT.
9. ALL LIGHTING CONTROLS, TIMECLOCKS, AND CONTACTORS TO MATCH EXISTING CONDITIONS LOCATED IN EXISTING NORTH PANEL 2. (CONTROLS SHALL BE IECC COMPLIANT). FIELD VERIFY ALL REQUIREMENTS.
10. ALL ELECTRICAL COMPONENTS TO BE MOUNTED ON NEW UNISTRUT ADJACENT TO LIGHT POLES; ALL COMPONENTS SHALL NOT EXTEND INTO THE WALKWAY (TYP). CONTRACTOR TO SUBMIT SHOP DRAWING OF UNISTRUT DESIGN FOR APPROVAL TO PROJECT MANAGER, PROJECT MANAGER TO APPROVE FINAL LOCATION.
11. RE-USE ALL EXISTING CONDUIT AS MUCH AS POSSIBLE. EXISTING CONDUIT ROUTES SHOWN ON PLAN ARE FOR DESIGN INTENT ONLY AND MAY NOT BE ACCURATE. FIELD VERIFY ROUTING OF ALL EXISTING CONDUITS AVAILABLE FOR USE AND NOTE ON AS-BUILT DRAWINGS.
12. DESIGNATIONS NEXT TO LIGHT POLE:  
EXISTING LIGHT POLE LIGHT TAG - LP-X, SEE SHEET E601  
PANEL CIRCUIT NUMBERS - EXAMPLES  
1(S)-5, SOUTH PANEL 1 CIRCUIT 5  
3(N)-7, SOUTH PANEL 3 CIRCUIT 7

**KEYED NOTES**

1. EXISTING ELECTRICAL PULLBOX TO BE REMOVED.
2. EXISTING IRRIGATION CONTROLLER.
3. EXISTING ELECTRICAL METER AND SERVICE ENTRANCE TO BE RELOCATED. ALLEY TO BE RE-GRADED. RELOCATE EXISTING SERVICE ENTRANCE TO NEW LOCATION AS REQUIRED.
4. EXISTING XCEL ENERGY POWER POLE WITH OVER HEAD UTILITIES. EXISTING POLE TO BE REPLACED WITH NEW POLE BY XCEL ENERGY. XCEL ENERGY TO EXTEND OVERHEAD UTILITY SERVICE DOWN POLE AND TRANSITION TO UNDERGROUND SERVICE OVER TO NEW PAD MOUNTED TRANSFORMER. E. C. TO COORDINATE ALL WORK WITH XCEL ENERGY.
5. EXISTING NORTH COURT POLE MOUNTED LUMINAIRE.
6. REPLACE EXISTING TWO ARM POLE MOUNTED LUMINAIRE WITH 2 NEW ARM MOUNTED LED LUMINAIRE. REPLACE ALL EXISTING WIRING FROM NEW LED LUMINAIRE BACK TO NEW PANEL IN EXISTING CONDUIT.
7. CONTRACTOR TO CUT EXISTING ARM ATTACHMENT AT FLAT PLATE LUMINAIRE AND INSTALL ADJUSTABLE TILT CAST ALUMINUM KNUCKLE ARM MOUNT WITH SLIPFITTER AND TENON ADAPTER ONTO EXISTING ARM. THE NEW LUMINAIRE WILL ATTACH ONTO THE ADJUSTABLE TILT CAST ALUMINUM KNUCKLE ARM MOUNT. E. C. TO CONFIRM TENON ADAPTER SIZE REQUIREMENTS WITH EXISTING MOUNTING ARM. REPLACE ALL EXISTING WIRING FROM NEW LED LUMINAIRE BACK TO NEW PANEL IN EXISTING CONDUIT. RESET AND RELOCATE AS REQUIRED EXISTING POLE AND LIGHTS TO ACCOMMODATE NEW TENNIS COURT STRIPING. INTERCEPT AND EXTEND EXISTING BRANCH CIRCUITS TO NEW LOCATION AND RE-CONNECT LUMINAIRE PROVIDE ALL DEVICES FOR A COMPLETE AND OPERATIONAL SYSTEM. POLES SHALL NOT INTERFERE WITH NEW POST TENSIONED CONCRETE SLAB. E. C. TO FIELD ADJUST AND AIM LUMINAIRES TO MAXIMIZE THE ILLUMINATION OF THE COURT.
8. REPLACE EXISTING SINGLE ARM POLE MOUNTED LUMINAIRE WITH NEW SINGLE ARM LED LUMINAIRE. REPLACE ALL EXISTING WIRING FROM NEW LED LUMINAIRE BACK TO NEW PANEL IN EXISTING CONDUIT.
9. NEW LOCATION OF NEW XCEL ENERGY PAD MOUNTED TRANSFORMER, SERVICE ENTRANCE PEDESTAL, AND UTILITY METER. E. C. SHALL FIELD VERIFY THE LOCATION OF THE TRANSFORMER WITH THE UTILITY CO. PROPOSED LOCATIONS ARE SHOWN FOR REFERENCE ONLY AND FINAL LOCATION SHALL BE DETERMINED ON SITE BY THE XCEL ENERGY UTILITY CO. INFORM ENGINEER IMMEDIATELY OF ANY CHANGE OF TRANSFORMER LOCATION. E. C. TO COORDINATE ALL WORK WITH XCEL ENERGY.
10. LOCATION OF EXISTING POLE MOUNTED TRANSFORMER. XCEL ENERGY TO REMOVE EXISTING UTILITY POLE AND POLE MOUNTED TRANSFORMER. E. C. TO COORDINATE ALL WORK WITH XCEL ENERGY.
11. EXISTING OVERHEAD ELECTRICAL LINE.
12. EXISTING XCEL ENERGY POWER POLE WITH OVER HEAD UTILITIES. XCEL ENERGY TO REMOVE EXISTING UTILITY POLE AND SERVICE ENTRANCE MAST. E. C. TO COORDINATE ALL WORK WITH XCEL ENERGY.
13. ALLEY TO BE RE-GRADED. ALL EXISTING NORTH COURT DISCONNECTS, PANELS, CONNECTIONS, UNISTRUT, GROUNDING, RECEPTACLES, TIMECLOCKS, ETC. SHALL BE RAISED TO ACCOMMODATE AND CLEAR NEW GRADING AS REQUIRED. ELECTRICAL CONTRACTOR SHALL RELOCATE ALL DEVICES BACK AGAINST FENCE. ELECTRICAL CONTRACTOR SHALL INTERCEPT AND EXTEND ALL CONDUITS, CIRCUITS, AND CONNECTIONS AS REQUIRED FOR A COMPLETE AND OPERATIONAL INSTALLATION.
14. INSTALL ALL DISCONNECTS, PANELS, CONNECTIONS, UNISTRUT, GROUNDING, RECEPTACLES, TIMECLOCKS, ETC. SHALL BE RAISED TO ACCOMMODATE AND CLEAR NEW GRADING AS REQUIRED. ELECTRICAL CONTRACTOR SHALL LOCATE ALL DEVICES BACK AGAINST FENCE. ELECTRICAL CONTRACTOR SHALL INTERCEPT AND EXTEND ALL CONDUITS, CIRCUITS, AND CONNECTIONS AS REQUIRED FOR A COMPLETE AND OPERATIONAL INSTALLATION.

**BERKELEY PARK TENNIS COURTS**



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SSG Project Number: 16013.00

REV.	COMMENT	DATE

SEAL:



DATE: **June 29, 2017**  
JOB NO.: **SSG 16013**  
DRAWN BY: **KGW**  
CHECKED BY: **KAT**

DRAWING TITLE:  
**ELECTRICAL  
SITE PLAN**

SHEET NO.:  
**E100**

BID DOCUMENTS



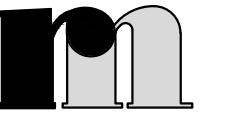




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SSG Project Number: 16013.00

FED FROM: NEW METER MAIN DISCONNECT VOLTAGE: 240/120 AIC: 10000 ENCLOSURE: NEMA 3R  
 PANEL: 1 (SOUTH) PHASE: 1  
 BUS AMPACITY: 200A NEUTRAL: 100% GROUND: STD  
 WIRE: 3 MAIN: 200A MCB MOUNTING: SURFACE

CKT NO	CKT DESCRIPTION	LOAD		CKT BREAKER			CKT BREAKER			LOAD		CKT DESCRIPTION	CKT NO
		VA	TYPE	P	A	NOTE	NOTE	A	P	TYPE	VA		
1	LIGHTS SE COURTS	1332	L	1	20						SPARE	2	
3	LIGHTS SE COURTS	1332	L	1	20						SPARE	4	
5	LIGHTS SE COURTS	1332	L	1	20						BUSSED SPACE	6	
7	LIGHTS SE COURTS	1332	L	1	20						BUSSED SPACE	8	
9	CONTROLS	500	S	1	20						BUSSED SPACE	10	
11	RECEPTACLE	180	R	1	20						BUSSED SPACE	12	
13	IRRIGATION CLOCK	250	S	1	20						BUSSED SPACE	14	
15	SPARE			1	20						BUSSED SPACE	16	
17	PANEL 3			2	100						BUSSED SPACE	18	
19	PANEL 3			/	/						BUSSED SPACE	20	

LOAD	PHASE	KVA									
		L	R	H	M	MLRG	CL	K	S	N	D
PANEL 3	A	2664	0	0	0	0	0	0	250	0	0
SUBFEED	B	2664	180	0	0	0	0	0	0	0	0

LOAD TYPE	CONNECTED (KVA)			DEMAND FACTOR			DEMAND (KVA)			NOTES:
	A	B	TOTAL	A	B	TOTAL	A	B	TOTAL	
LIGHTING (L)	5.3	5.3	10.7	1.25	6.7	6.7	13.3			
RECEPTACLE (R)	0.0	0.4	0.4	1.00	0.0	0.4	0.4			
REC (>10000VA) (R)	0.0	0.0	0.0	0.50	0.0	0.0	0.0			
HEATER (H)	0.0	0.0	0.0	1.00	0.0	0.0	0.0			
LARGEST MOTOR (M)	0.0	0.0	0.0	1.25	0.0	0.0	0.0			
REMAIN MOTOR (M)	0.0	0.0	0.0	1.00	0.0	0.0	0.0			
CONTINUOUS LOAD (CL)	0.0	0.0	0.0	1.25	0.0	0.0	0.0			
KITCHEN LOADS (K)	0.0	0.0	0.0	1.00	0.0	0.0	0.0			
SPECIFIC LOADS (S)	1.0	0.0	1.0	1.00	1.0	0.0	1.0			
NONCOINCIDENTAL (N)	0.0	0.0	0.0	0.00	0.0	0.0	0.0			
DWELLING (D)	0.0	0.0	0.0	0.65	0.0	0.0	0.0			
TOTAL DEMAND (KVA)				7.7	7.0	14.7				
TOTAL (A/PH)				63.8	58.5	61.2				

FED FROM: NEW METER MAIN DISCONNECT VOLTAGE: 240/120 AIC: 10000 ENCLOSURE: NEMA 3R  
 PANEL: (E) 2 (NORTH) PHASE: 1  
 BUS AMPACITY: 200A NEUTRAL: 100% GROUND: STD  
 WIRE: 3 MAIN: 200A MCB MOUNTING: SURFACE

CKT NO	CKT DESCRIPTION	LOAD		CKT BREAKER			CKT BREAKER			LOAD		CKT DESCRIPTION	CKT NO
		VA	TYPE	P	A	NOTE	NOTE	A	P	TYPE	VA		
1	CONTROLS (E)	500	S	1	20	1	1	30	2	L	2100	LIGHTS NE (E)	2
3	RECEPTACLE (E)	180	R	1	20	1	1	/	/	L	2100	LIGHTS NE (E)	4
5	LIGHTS NE (E)	2100	L	2	30	1	1	30	2	L	2100	LIGHTS NE (E)	6
7	LIGHTS NE (E)	2100	L	/	/	1	1	/	/	L	2100	LIGHTS NE (E)	8
9	PANEL 4 (E)			2	100	1	1	30	2	L	2100	LIGHTS NE (E)	10
11	PANEL 4 (E)			/	/	1	1	/	/	L	2100	LIGHTS NE (E)	12
13	BUSSED SPACE (E)			-	-	1	1	-	-			BUSSED SPACE (E)	14
15	BUSSED SPACE (E)			-	-	1	1	-	-			BUSSED SPACE (E)	16
17	BUSSED SPACE (E)			-	-	1	1	-	-			BUSSED SPACE (E)	18
19	BUSSED SPACE (E)			-	-	1	1	-	-			BUSSED SPACE (E)	20

LOAD	PHASE	KVA									
		L	R	H	M	MLRG	CL	K	S	N	D
PANEL 4 SUBFEED	A	8400	180	0	0	0	0	0	0	0	0
SEE NOTE 1	B	8400	0	0	0	0	0	0	250	0	0

LOAD TYPE	CONNECTED (KVA)			DEMAND FACTOR			DEMAND (KVA)			NOTES:	
	A	B	TOTAL	A	B	TOTAL	A	B	TOTAL		
LIGHTING (L)	16.8	16.8	33.6	1.25	21.0	21.0	42.0			#1 - EXISTING (E) PANELBOARD, CIRCUIT BREAKERS, AND LOADS FROM FIELD SURVEY. EXISTING CIRCUIT BREAKER WITH NO NEW WORK ANTICIPATED. SHOWN FOR REFERENCE ONLY.	
RECEPTACLE (R)	0.2	0.2	0.4	1.00	0.2	0.2	0.4				
REC (>10000VA) (R)	0.0	0.0	0.0	0.50	0.0	0.0	0.0				
HEATER (H)	0.0	0.0	0.0	1.00	0.0	0.0	0.0				
LARGEST MOTOR (M)	0.0	0.0	0.0	1.25	0.0	0.0	0.0				
REMAIN MOTOR (M)	0.0	0.0	0.0	1.00	0.0	0.0	0.0				
CONTINUOUS LOAD (CL)	0.0	0.0	0.0	1.25	0.0	0.0	0.0				
KITCHEN LOADS (K)	0.0	0.0	0.0	1.00	0.0	0.0	0.0				
SPECIFIC LOADS (S)	0.5	0.3	0.8	1.00	0.5	0.3	0.8				
NONCOINCIDENTAL (N)	0.0	0.0	0.0	0.00	0.0	0.0	0.0				
DWELLING (D)	0.0	0.0	0.0	0.65	0.0	0.0	0.0				
TOTAL DEMAND (KVA)				21.7	21.4	43.1					
TOTAL (A/PH)				180.7	178.6	179.6					

FED FROM: PANEL 1 VOLTAGE: 240/120 AIC: 10000 ENCLOSURE: NEMA 3R  
 PANEL: 3 (SOUTH) PHASE: 1  
 BUS AMPACITY: 100A NEUTRAL: 100% GROUND: STD  
 WIRE: 3 MAIN: 100A MCB MOUNTING: SURFACE

CKT NO	CKT DESCRIPTION	LOAD		CKT BREAKER			CKT BREAKER			LOAD		CKT DESCRIPTION	CKT NO
		VA	TYPE	P	A	NOTE	NOTE	A	P	TYPE	VA		
1	LIGHTS SW COURTS	1332	L	1	20						BUSSED SPACE	2	
3	LIGHTS SW COURTS	1332	L	1	20						BUSSED SPACE	4	
5	LIGHTS SW COURTS	1332	L	1	20						BUSSED SPACE	6	
7	LIGHTS SW COURTS	1332	L	1	20						BUSSED SPACE	8	
9	CONTROLS	250	S	1	20						BUSSED SPACE	10	
11	RECEPTACLE	180	R	1	20						BUSSED SPACE	12	
13	SPARE			1	20						BUSSED SPACE	14	
15	SPARE			1	20						BUSSED SPACE	16	
17	SPARE			1	20						BUSSED SPACE	18	
19	SPARE			1	20						BUSSED SPACE	20	

LOAD TYPE	CONNECTED (KVA)			DEMAND FACTOR			DEMAND (KVA)			NOTES:
	A	B	TOTAL	A	B	TOTAL	A	B	TOTAL	
LIGHTING (L)	2.7	2.7	5.3	1.25	3.3	3.3	6.7			#1 - EXISTING (E) PANELBOARD, CIRCUIT BREAKERS, AND LOADS FROM FIELD SURVEY. EXISTING CIRCUIT BREAKER WITH NO NEW WORK ANTICIPATED. SHOWN FOR REFERENCE ONLY.
RECEPTACLE (R)	0.0	0.2	0.2	1.00	0.0	0.2	0.2			
REC (>10000VA) (R)	0.0	0.0	0.0	0.50	0.0	0.0	0.0			
HEATER (H)	0.0	0.0	0.0	1.00	0.0	0.0	0.0			
LARGEST MOTOR (M)	0.0	0.0	0.0	1.25	0.0	0.0	0.0			
REMAIN MOTOR (M)	0.0	0.0	0.0	1.00	0.0	0.0	0.0			
CONTINUOUS LOAD (CL)	0.0	0.0	0.0	1.25	0.0	0.0	0.0			
KITCHEN LOADS (K)	0.0	0.0	0.0	1.00	0.0	0.0	0.0			
SPECIFIC LOADS (S)	0.3	0.0	0.3	1.00	0.3	0.0	0.3			
NONCOINCIDENTAL (N)	0.0	0.0	0.0	0.00	0.0	0.0	0.0			
DWELLING (D)	0.0	0.0	0.0	0.65	0.0	0.0	0.0			
TOTAL DEMAND (KVA)				3.6	3.5	7.1				
TOTAL (A/PH)				29.8	29.3	29.5				

FED FROM: PANEL 2 VOLTAGE: 240/120 AIC: 10000 ENCLOSURE: NEMA 3R  
 PANEL: (E) 4 (NORTH) PHASE: 1  
 BUS AMPACITY: 100A NEUTRAL: 100% GROUND: STD  
 WIRE: 3 MAIN: 100A MCB MOUNTING: SURFACE

CKT NO	CKT DESCRIPTION	LOAD		CKT BREAKER			CKT BREAKER			LOAD		CKT DESCRIPTION	CKT NO
		VA	TYPE	P	A	NOTE	NOTE	A	P	TYPE	VA		
1	RECEPTACLE (E)	180	R	1	20	1	1	-	-			BUSSED SPACE (E)	2
3	LIGHTS NW (E)	2100	L	2	30	1	1	-	-			BUSSED SPACE (E)	4
5	LIGHTS NW (E)	2100	L	/	/	1	1	-	-			BUSSED SPACE (E)	6
7	LIGHTS NW (E)	2100	L	2	30	1	1	-	-			BUSSED SPACE (E)	8
9	LIGHTS NW (E)	2100	L	/	/	1	1	-	-			BUSSED SPACE (E)	10
11	LIGHTS NW (E)	2100	L	2	30	1	1	-	-			BUSSED SPACE (E)	12
13	LIGHTS NW (E)	2100	L	/	/	1	1	-	-			BUSSED SPACE (E)	14
15	LIGHTS NW (E)	2100	L	2	30	1	1	-	-			BUSSED SPACE (E)	16
17	LIGHTS NW (E)	2100	L	/	/	1	1	-	-			BUSSED SPACE (E)	18
19	CONTROLS (E)	250	S	1	15	1	1	-	-			BUSSED SPACE (E)	20

LOAD TYPE	CONNECTED (KVA)			DEMAND FACTOR			DEMAND (KVA)			NOTES:	
	A	B	TOTAL	A	B	TOTAL	A	B	TOTAL		
LIGHTING (L)	8.4	8.4	16.8	1.25	10.5	10.5	21.0			#1 - EXISTING (E) PANELBOARD, CIRCUIT BREAKERS, AND LOADS FROM FIELD SURVEY. EXISTING CIRCUIT BREAKER WITH NO NEW WORK ANTICIPATED. SHOWN FOR REFERENCE ONLY.	
RECEPTACLE (R)	0.2	0.0	0.2	1.00	0.2	0.0	0.2				
REC (>10000VA) (R)	0.0	0.0	0.0	0.50	0.0	0.0	0.0				
HEATER (H)	0.0	0.0	0.0	1.00	0.0	0.0	0.0				
LARGEST MOTOR (M)	0.0	0.0	0.0	1.25	0.0	0.0	0.0				
REMAIN MOTOR (M)	0.0	0.0	0.0	1.00	0.0	0.0	0.0				
CONTINUOUS LOAD (CL)	0.0	0.0	0.0	1.25	0.0	0.0	0.0				
KITCHEN LOADS (K)	0.0	0.0	0.0	1.00	0.0	0.0	0.0				
SPECIFIC LOADS (S)	0.0	0.3	0.3	1.00	0.0	0.3	0.3				
NONCOINCIDENTAL (N)	0.0	0.0	0.0	0.00	0.0	0.0	0.0				
DWELLING (D)	0.0	0.0	0.0	0.65	0.0	0.0	0.0				
TOTAL DEMAND (KVA)				10.7	10.8	21.4					
TOTAL (A/PH)				89.0	89.6	89.3					

REV.	COMMENT	DATE

SEAL:



DATE: **June 29, 2017**  
 JOB NO.: **SSG 16013**  
 DRAWN BY: **KGW**  
 CHECKED BY: **KAT**

DRAWING TITLE:  
 PANEL SCHEDULES

SHEET NO.:  
**E600**

BID DOCUMENTS

EXISTING LIGHT POLE SCHEDULE		
LIGHT	REFURBISH	NOTES
LP-1	NO	RESET TO NORTH COURT ELEVATION
LP-2	NO	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO NORTH COURT ELEVATION - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
LP-3	NO	RESET TO NORTH COURT ELEVATION
LP-4	NO	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO NORTH COURT ELEVATION - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
LP-5	NO	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO NORTH COURT ELEVATION - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
* LP-6	YES	RESET TO PROPOSED FINISH SURFACE
* LP-7	YES	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO PROPOSED FINISH SURFACE - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
* LP-8	YES	RESET TO PROPOSED FINISH SURFACE
* LP-9	YES	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO PROPOSED FINISH SURFACE - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
* LP-10	YES	RESET TO PROPOSED FINISH SURFACE
* LP-11	YES	RESET TO PROPOSED FINISH SURFACE
* LP-12	YES	RESET TO PROPOSED FINISH SURFACE
* LP-13	YES	RESET TO PROPOSED FINISH SURFACE
* LP-14	YES	RESET TO PROPOSED FINISH SURFACE
* LP-15	YES	RESET TO PROPOSED FINISH SURFACE
* LP-16	YES	RESET TO PROPOSED FINISH SURFACE
* LP-17	YES	RESET TO PROPOSED FINISH SURFACE
* LP-18	YES	RESET TO PROPOSED FINISH SURFACE
* LP-19	YES	RESET TO PROPOSED FINISH SURFACE
* LP-20	YES	RESET TO PROPOSED FINISH SURFACE

\* LED FIXTURE TO BE RETROFIT MOUNTING ARMS TO EXISTING POLES AS BASE BID.

**ELECTRICAL / LIGHTING NOTES**

- EXISTING LIGHT POLE BASES TO BE MODIFIED AS NEEDED TO ADJUST HEIGHT DICTATED BY NEW CONCRETE SURFACE.
- PULL NEW CONDUCTORS FROM LIGHTS TO CONTROLLERS AND REPLACE CONTROLLERS WITH NEW SIEMENS BRAND COMPONENTS INSTALLED IN NEW NEMA 4 HINGED AND LOCKING JUNCTION BOXES.
- LIGHT POSTS TO BE REFURBISHED AND PAINTED BLACK  
FERROUS METALS ESP-1  
1ST COAT PIGMENTED PRIMER-PITT TECH DTM  
INDUSTRIAL ENAMEL 90-712  
2ND COAT GLOSS ACRYLIC ENAMAL- PITT TECH DTM  
INDUSTRIAL ENAMEL 90-375  
3RD COAT GLOSS ACRYLIC ENAMAL- PITT TECH DTM  
INDUSTRIAL ENAMEL 90-375
- REMOVE AND REPLACE EXISTING LIGHTING COMPONENTS INCLUDING POSTS, LIGHTING PANELS, DISCONNECTS AND CONTROLLERS USING SIEMENS ELECTRICAL COMPONENTS AND TORK 103 SERIES TIME CLOCK WITH CAPACITOR BACKUP; RETURN ALL EXISTING ELECTRICAL CONTROL COMPONENTS TO PARKS AND REC MAINTENANCE; RUN TIMERS IN THE CONTROL BOXES AREA NOT TO BE REPLACED.
- ALL ELECTRICAL WORK TO BE COORDINATED WITH PROJECT MANAGER AND DENVER UTILITIES.
- ALL ELECTRICAL WORK TO MEET CURRENT ELECTRICAL CODE REQUIREMENTS.

# BERKELEY PARK TENNIS COURTS



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SSG Project Number: 16013.00

BERKELEY PARK LUMINAIRE SCHEDULE										
KEY	LAMPS			DESCRIPTION	FINISH	MOUNTING	MANUFACTURER	CATALOG NUMBER	VOLTAGE	INPUT WATTS
	QTY	TYPE	TEMP							
		LED	4000 KELVIN	ADJUSTABLE TILT WITH CAST ALUMINUM KNUCKLE ARM MOUNT WITH SLIPFITTER AND TENON ADAPTER. ARM POLE MOUNTED LUMINAIRE REPLACEMENT LED HEAD W/ 6 LIGHT SQUARES, 4000K TEMPERATURE, TYPE T4FT THROW, 4000K LUMENS, COLOR BLACK, MOUNTED ON EXISTING POLES, SLIPFITTER MOUNT. PROVIDE NOMINAL POWER LUMENS (1A). SEE ADDITIONAL NOTES BELOW	BLACK	POLE	EATON GAN GALLEON LED	GAN-AF-06-LED-U-T4FT-BK-ADJS- * SA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon * SA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon	120	333

- NOTES:**
- CONTRACTOR TO CUT EXISTING ARM ATTACHMENT AT FLAT PLATE LUMINAIRE CONNECTION AND INSTALL TENON MOUNT. THE NEW LUMINAIRE WILL ATTACH ONTO THE EXISTING POLE VIA THE ADJUSTABLE KNUCKLE ARM MOUNT AND TENON ADAPTER.
  - CONTRACTOR TO CONFIRM EXISTING VOLTAGE OF CURRENT LIGHTING PRIOR TO ORDERING NEW FIXTURES AND ATTACHMENTS.
  - ALL INSTALLATION TO FOLLOW MANUFACTURE SPECIFICATIONS AND RECOMMENDATIONS.
  - E.C. TO CONFIRM TENON MOUNTING REQUIREMENTS WITH EXISTING POLE CONDITIONS.

REV.	COMMENT	DATE

SEAL:



DATE: **June 29, 2017**  
JOB NO.: **SSG 16013**  
DRAWN BY: KGW  
CHECKED BY: KAT

DRAWING TITLE:  
LUMINAIRE  
SCHEDULES

SHEET NO.:  
**E601**

BID DOCUMENTS



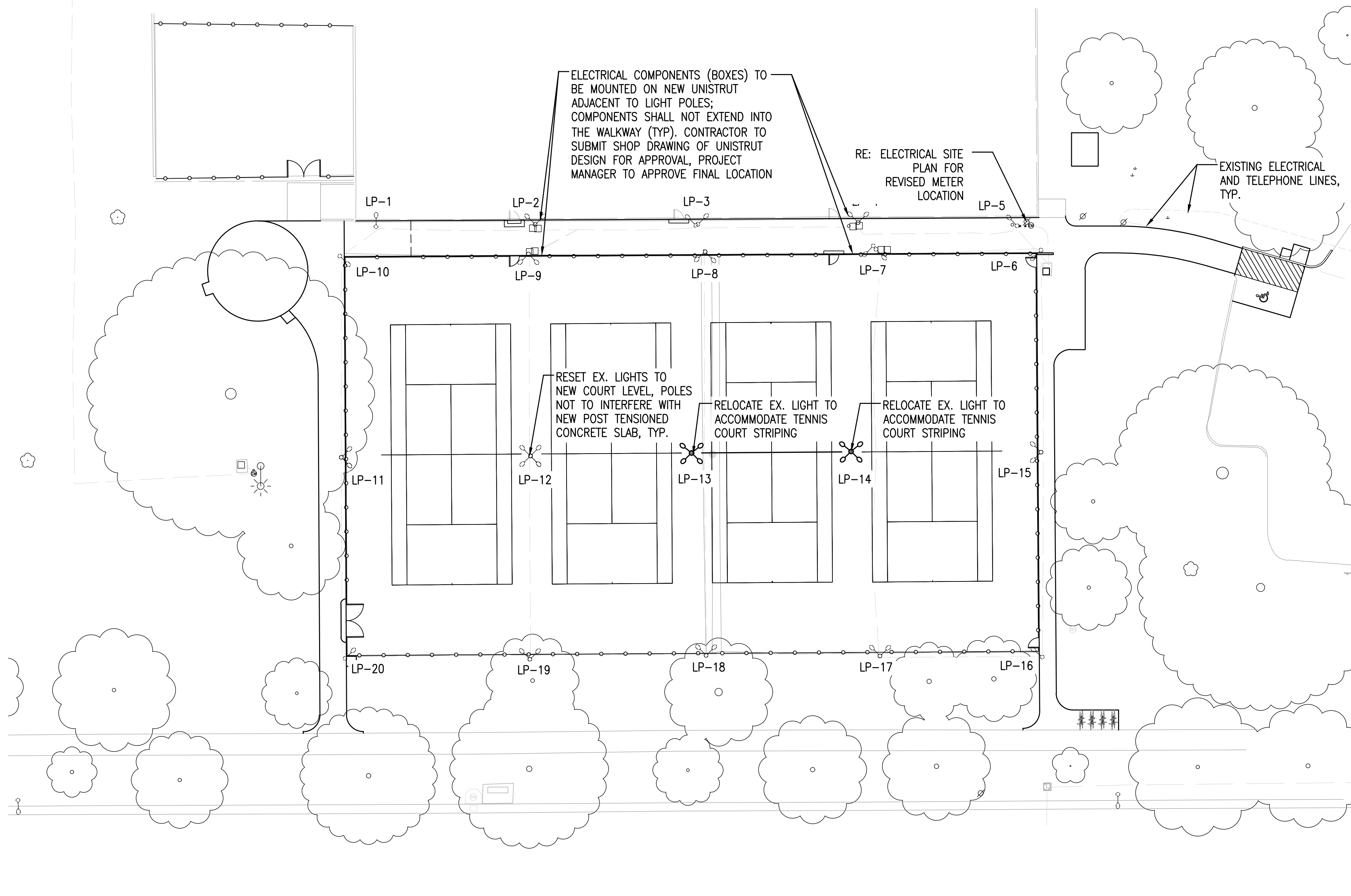
# BERKELEY PARK TENNIS COURTS



Denver Parks & Recreation  
201 West Colfax Avenue  
Denver, CO 80202  
720.913.0616



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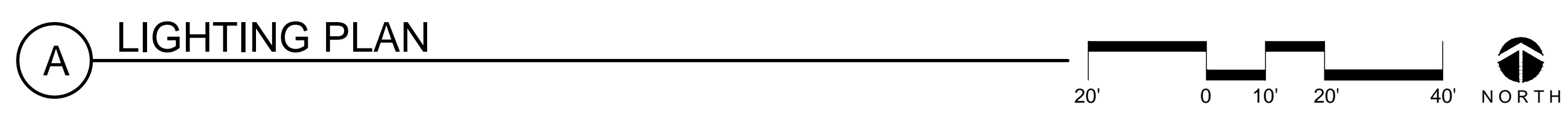
EXISTING LIGHT POLE SCHEDULE		
LIGHT	REFURBISH	NOTES
LP-1	NO	RESET TO NORTH COURT ELEVATION
LP-2	NO	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO NORTH COURT ELEVATION - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
LP-3	NO	RESET TO NORTH COURT ELEVATION
LP-4	NO	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO NORTH COURT ELEVATION - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
LP-5	NO	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO NORTH COURT ELEVATION - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
*LP-6	YES	RESET TO PROPOSED FINISH SURFACE
*LP-7	YES	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO PROPOSED FINISH SURFACE - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
*LP-8	YES	RESET TO PROPOSED FINISH SURFACE
*LP-9	YES	RESET LIGHT AND ELECTRICAL PANEL/SWITCH GEAR TO PROPOSED FINISH SURFACE - MEET CURRENT ELECTRICAL CODE REQUIREMENTS
*LP-10	YES	RESET TO PROPOSED FINISH SURFACE
*LP-11	YES	RESET TO PROPOSED FINISH SURFACE
*LP-12	YES	RESET TO PROPOSED FINISH SURFACE
*LP-13	YES	RESET TO PROPOSED FINISH SURFACE
*LP-14	YES	RESET TO PROPOSED FINISH SURFACE
*LP-15	YES	RESET TO PROPOSED FINISH SURFACE
*LP-16	YES	RESET TO PROPOSED FINISH SURFACE
*LP-17	YES	RESET TO PROPOSED FINISH SURFACE
*LP-18	YES	RESET TO PROPOSED FINISH SURFACE
*LP-19	YES	RESET TO PROPOSED FINISH SURFACE
*LP-20	YES	RESET TO PROPOSED FINISH SURFACE

LED FIXTURE: HOLOPHANE (MGLD 9 5K AX M L X X US) MONGOOSE LED W/ 9 COBS, 5000K TEMPERATURE, 1050 MA DRIVE CURRENT, TYPE M LENS (MEDIUM), LOW TILT

\*LED FIXTURE TO BE RETROFIT MOUNTING ARMS TO EXISTING POLES AS BASE BID.

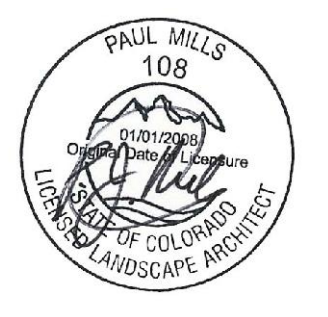
- ELECTRICAL/LIGHTING NOTES:**
- EXISTING LIGHT POLE BASES TO BE MODIFIED AS NEEDED TO ADJUST HEIGHT DICTATED BY NEW CONCRETE SURFACE.
  - PULL NEW CONDUCTORS FROM LIGHTS TO CONTROLLERS AND REPLACE CONTROLLERS WITH NEW SIEMENS BRAND COMPONENTS INSTALLED IN NEW NEMA 4 HINGED AND LOCKING JUNCTION BOXES.
  - LIGHT POSTS TO BE REFURBISHED AND PAINTED BLACK  
FERROUS METALS ESP-1  
1ST COAT PIGMENTED PRIMER-PITT TECH DTM INDUSTRIAL ENAMEL 90-712  
2ND COAT GLOSS ACRYLIC ENAMEL- PITT TECH DTM INDUSTRIAL ENAMEL 90-375  
3RD COAT GLOSS ACRYLIC ENAMEL- PITT TECH DTM INDUSTRIAL ENAMEL 90-375
  - REMOVE AND REPLACE EXISTING LIGHTING COMPONENTS INCLUDING POSTS, LIGHTING PANELS, DISCONNECTS AND CONTROLLERS USING SIEMENS ELECTRICAL COMPONENTS AND TORK 103 SERIES TIME CLOCK WITH CAPACITOR BACKUP; RETURN ALL EXISTING ELECTRICAL CONTROL COMPONENTS TO PARKS AND REC MAINTENANCE; RUN TIMERS IN THE CONTROL BOXES AREA NOT TO BE REPLACED.
  - ALL ELECTRICAL WORK TO BE COORDINATED WITH PROJECT MANAGER AND DENVER UTILITIES.
  - ALL ELECTRICAL WORK TO MEET CURRENT ELECTRICAL CODE REQUIREMENTS.

- INSTALLATION NOTES:**
- CONTRACTOR TO INSTALL NEW FIXTURE TO MATCH NORTH COURT MODIFICATIONS. CONTACT PROJECT MANAGER FOR MORE INFORMATION.
  - CONTRACTOR TO CONFIRM EXISTING VOLTAGE OF CURRENT LIGHTING PRIOR TO ORDERING NEW FIXTURES AND ATTACHMENTS.
  - ALL INSTALLATION TO FOLLOW MANUFACTURE SPECIFICATIONS AND RECOMMENDATIONS.



REV.	COMMENT	DATE

SEAL:



DATE: June 29, 2017  
JOB NO.: -  
DRAWN BY: JB  
CHECKED BY: PM

DRAWING TITLE:  
**Lighting Plan**

SHEET NO.:  
**LL101**

BID DOCUMENTS

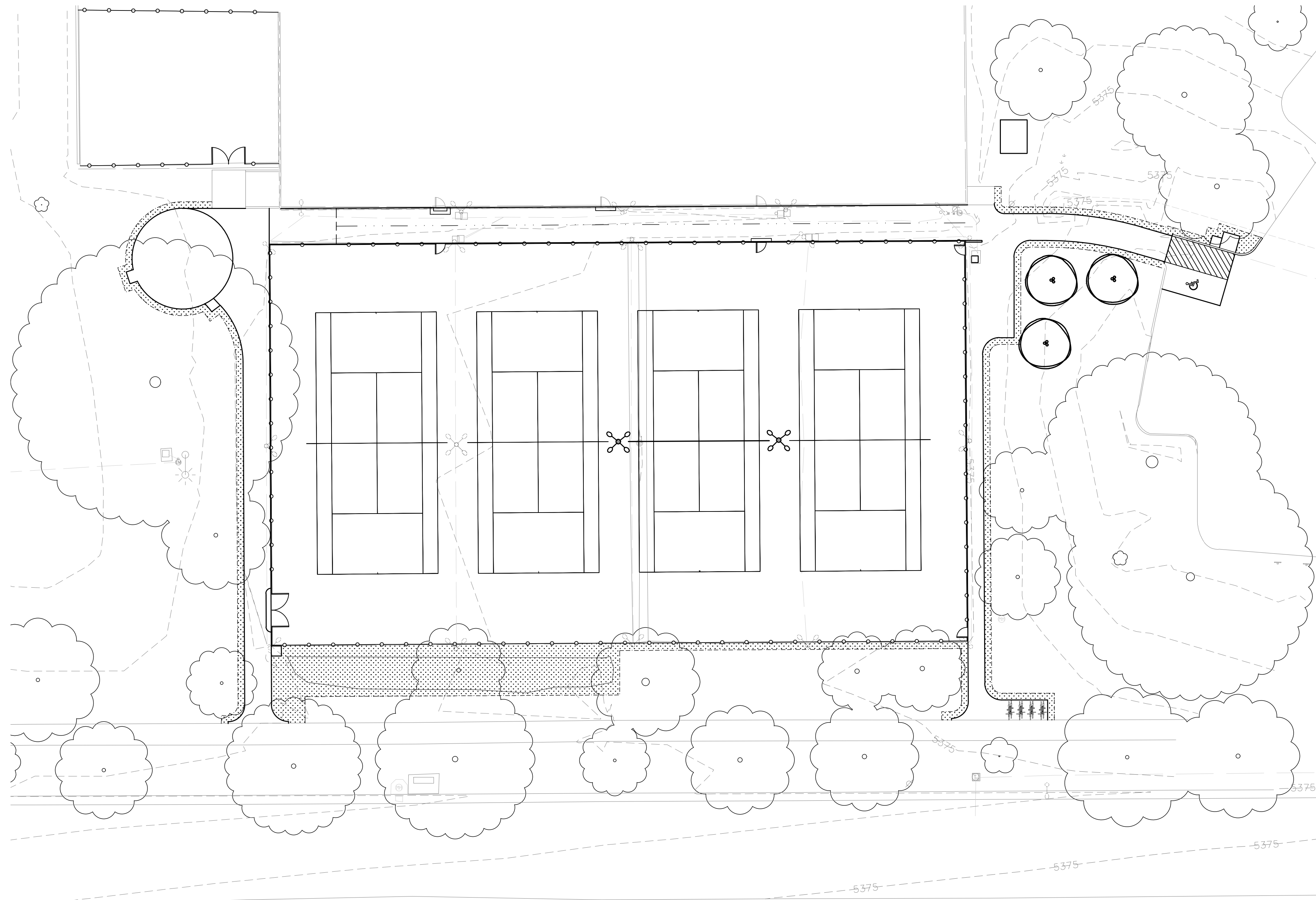
# BERKELEY PARK TENNIS COURTS





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**LANDSCAPE LEGEND:**

-  EXISTING TREE
-  SOD GRASS

**LANDSCAPE SCHEDULE**

QTY	SYMBOL	BOTANIC NAME	COMMON NAME	SIZE
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ORNAMENTAL TREES				
3		MALUS 'SPRING SNOW'	SPRING SNOW CRABAPPLE	1.5" CAL.

**LANDSCAPE NOTES:**

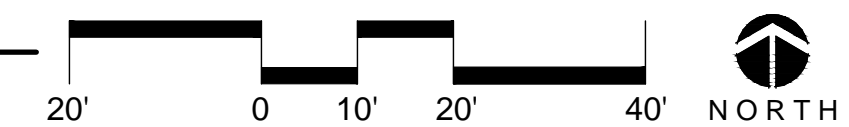
1. ALL WORK SHALL CONFORM TO LOCAL CITY CODES. CONTRACTOR SHALL VERIFY LOCATION OF ALL UNDERGROUND UTILITIES, LINES AND STRUCTURES PRIOR TO EXCAVATION OR TRENCHING. DAMAGE TO THESE UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER OR LANDSCAPE ARCHITECT.
2. PLANT MATERIAL SHALL BE INSTALLED IMMEDIATELY UPON DELIVERY TO SITE, IF THIS IS NOT POSSIBLE, PLANT MATERIAL SHALL BE WATERED TO PREVENT DEHYDRATION.
3. CONTRACTOR TO GUARANTEE ALL PLANT MATERIAL FOR ONE YEAR FROM SUBSTANTIAL COMPLETION - SEE GENERAL CONDITIONS TITLE 18.
4. IRRIGATION ADJUSTMENTS SHALL BE PERFORMED IN THE FIELD BY THE CONTRACTOR AND FOLLOW ALL DENVER PARKS AND RECREATION STANDARDS.
5. CONTRACTOR IS SOLELY RESPONSIBLE FOR WATERING PLANT MATERIAL PRIOR TO SUBSTANTIAL COMPLETION AND COORDINATION WITH CITY STAFF IF IRRIGATION SYSTEM IS TO BE USED. CONTRACTOR TO PROVIDE PROJECT MANAGER WITH RECOMMENDED WATERING SCHEDULE AFTER SUBSTANTIAL COMPLETION.
6. ALL TURF AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESTORED.
7. ELECTRICAL WORK, I.E., MOVING METER, ETC. WILL DISRUPT POWER TO IRRIGATION CONTROLLER.

REV.	COMMENT	DATE

SEAL:



**A LANDSCAPE PLAN**



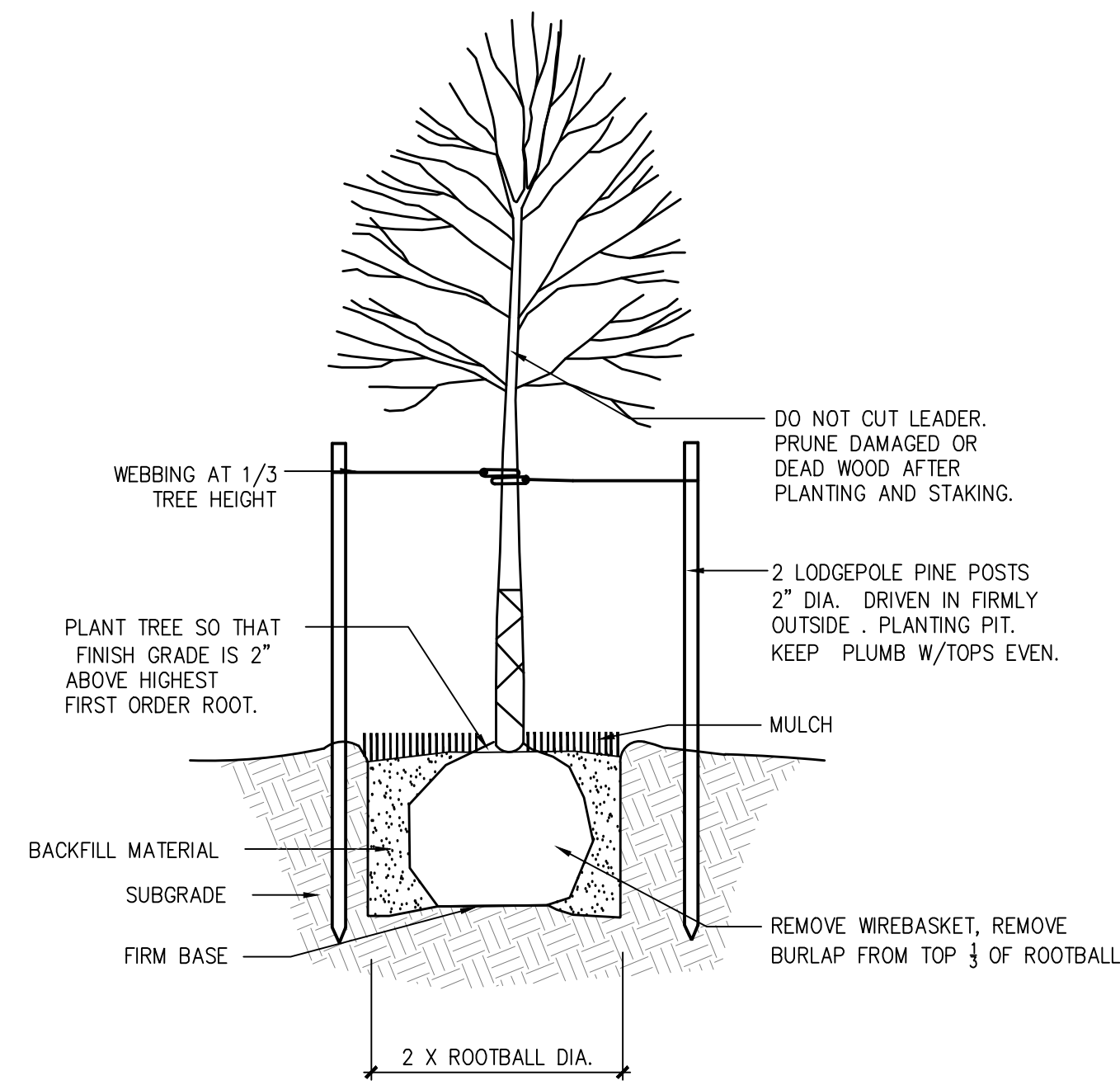
DATE: June 29, 2017  
JOB NO.: -  
DRAWN BY: JB  
CHECKED BY: PM

DRAWING TITLE:  
**Landscape Plan**

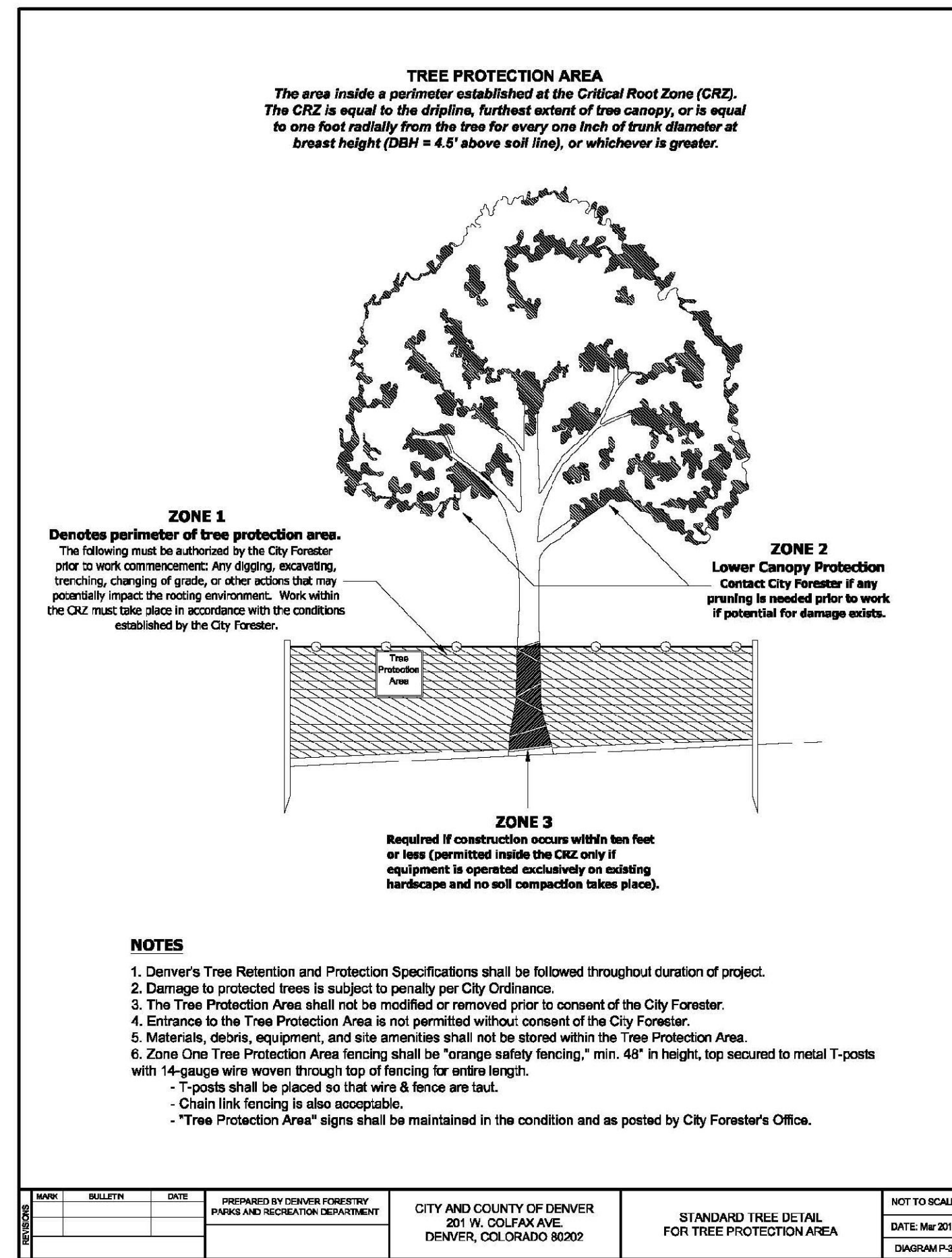
SHEET NO.:  
**LP101**

BID DOCUMENTS





**A** DECIDUOUS TREE PLANTING  
SCALE: N.T.S.

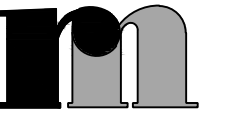


**B** TREE PROTECTION  
SCALE: N.T.S.

# BERKELEY PARK TENNIS COURTS



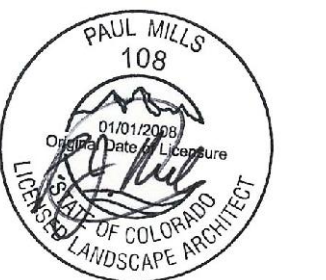
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REV.	COMMENT	DATE

SEAL:

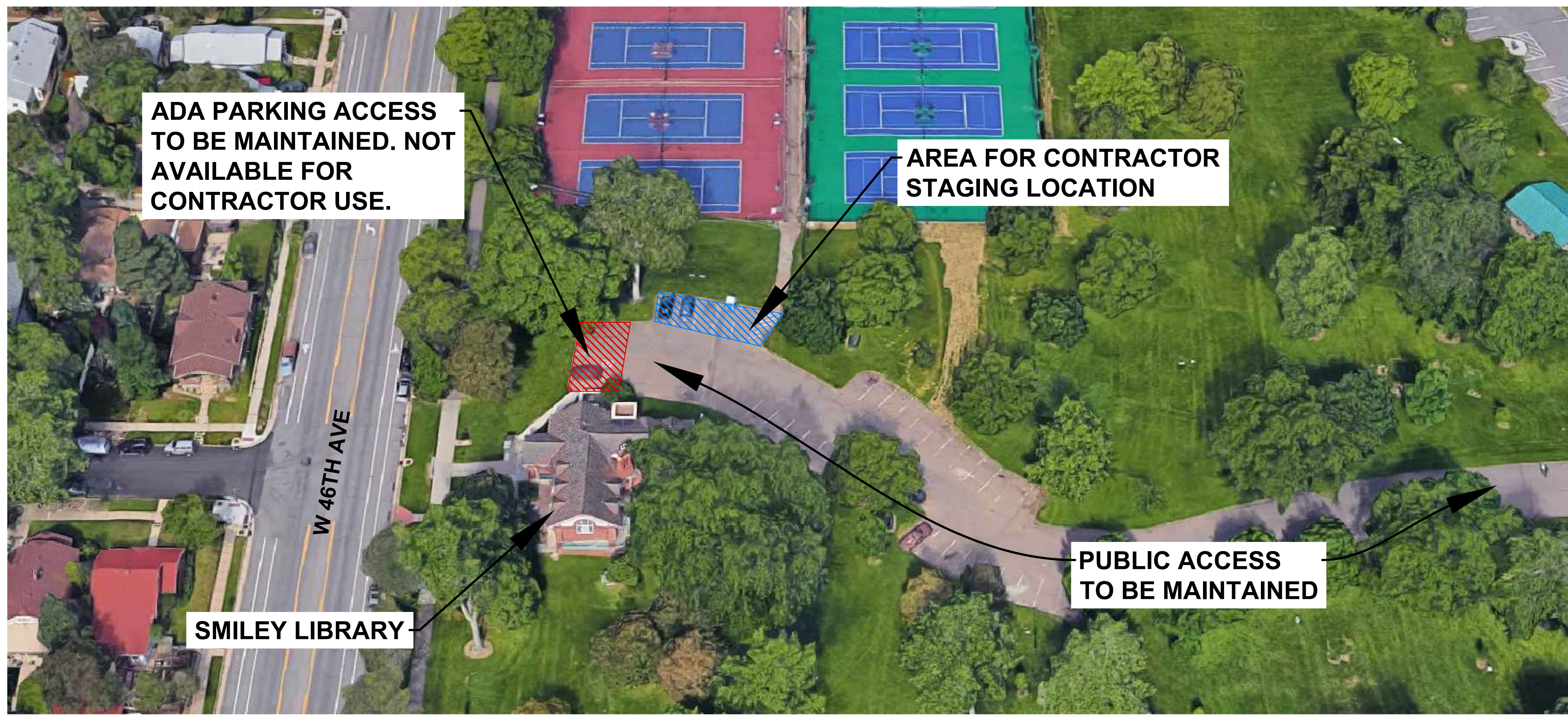


DATE: June 29, 2017  
JOB NO.: -  
DRAWN BY: JB  
CHECKED BY: PM

DRAWING TITLE:  
**Landscape Details**

SHEET NO.:  
**LP501**

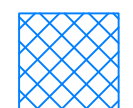





**NOTES:**

1. THIS PLAN IS PROVIDED AS A GENERAL REFERENCE ONLY.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL MEASURES NECESSARY TO SAFELY PERFORM THE WORK WITH REGARD FOR PUBLIC SAFETY.
3. BERKELEY PARK AND SMILEY LIBRARY SHALL REMAIN ACCESSIBLE TO THE PUBLIC THROUGHOUT THE WORK.
4. CONTRACTOR SHALL PROVIDE A PLAN FOR TRAFFIC CONTROL WITH REGARDS TO HOW CONSTRUCTION TRAFFIC SAFELY WILL PASS THROUGH BERKELEY PARK TO ACCESS THE PROJECT AREA.

**LEGEND:**

-  CONTRACTOR STAGING LOCATION
-  EXISTING ADA PARKING. AREA IS UNAVAILABLE FOR STAGING, STORAGE, OR OTHER PROLONGED USES.