



Don Horton, Executive Director  
799 SW Columbia Street  
Bend, OR 97702  
tel: 541.706.6100 fax: 541.388.5429  
[www.bendparksandrec.org](http://www.bendparksandrec.org)

# BID DOCUMENTS

For

## Pacific Crest Athletic Field Development

PROJECT NUMBER #103

BIDS DUE: April 25, 2019

2:00 P.M. AT THE BEND PARK AND RECREATION DISTRICT OFFICE  
799 SW COLUMBIA STREET, BEND, OREGON 97702

PROJECT MANAGER

IAN ISAACSON, 541-706-6154

CONSTRUCTION MANAGER

JASON POWELL, 541-706-6158

CONTRACT ADMINISTRATOR

DAVID L. CROWTHER, 541-706-6102

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Bend Park and Recreation District  
Pacific Crest Athletic Field Development Project

3/28/2019

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**Attachments**

Geotechnical investigation report prepared by Carlson Geotechnical, dated 3/19/2019.

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**DOCUMENT 000101 - PROJECT TITLE PAGE**

1.1 PROJECT MANUAL

- A. Pacific Crest Athletic Field Development Project.
- B. Owner: Bend Park and Recreation District.
- C. Bend, OR.
- D. Owner Project No. 103.
- E. Engineer: BECON Civil Engineering & Land Surveying.
- F. 549 SW Mill View Way, Suite 100.
- G. Bend, OR 97702.
- H. Phone: 541-633-3140.
- I. Web Site: [www.beconeng.com](http://www.beconeng.com).
- J. Issued: 3/28/2019.

END OF DOCUMENT 00 0101

## **DOCUMENT 000115 - LIST OF DRAWING SHEETS**

### **1.1 LIST OF DRAWINGS**

**A. List of Drawings:** Drawings consist of the following Contract Drawings and other drawings of type indicated:

1. C1.0, PACIFIC CREST ATHLETIC FIELDS, COVER SHEET.
2. C2.0, PACIFIC CREST ATHLETIC FIELDS, EXISTING CONDITIONS.
3. C2.1, PACIFIC CREST ATHLETIC FIELDS, EROSION/SEDIMENT CONTROL & DEMO PLAN.
4. C3.0, PACIFIC CREST ATHLETIC FIELDS, SITE & UTILITY PLAN.
5. C3.1, PACIFIC CREST ATHLETIC FIELDS, ROW PERMIT.
6. C4.0, PACIFIC CREST ATHLETIC FIELDS, GRADING & DRAINAGE PLAN (EAST).
7. C4.1, PACIFIC CREST ATHLETIC FIELDS, GRADING & DRAINAGE PLAN (WEST).
8. C5.0, PACIFIC CREST ATHLETIC FIELDS, DETAILS.
9. C5.1, PACIFIC CREST ATHLETIC FIELDS, DETAILS.
10. C5.2, PACIFIC CREST ATHLETIC FIELDS, DETAILS.
11. C5.3, PACIFIC CREST ATHLETIC FIELDS, DETAILS.
12. L1.0, PACIFIC CREST ATHLETIC FIELDS, SITE AMENITY PLAN.
13. L1.1, PACIFIC CREST ATHLETIC FIELDS, SITE AMENITY PLAN.
14. L1.2, PACIFIC CREST ATHLETIC FIELDS, SITE AMENITY PLAN DETAILS.
15. L2.0, PACIFIC CREST ATHLETIC FIELDS, LANDSCAPE PLAN.
16. L2.1, PACIFIC CREST ATHLETIC FIELDS, LANDSCAPE PLAN.
17. L2.2, PACIFIC CREST ATHLETIC FIELDS, LANDSCAPE DETAILS.
18. L2.3, PACIFIC CREST ATHLETIC FIELDS, LANDSCAPE DETAILS.
19. L3.0, PACIFIC CREST ATHLETIC FIELDS, IRRIGATION PLAN.
20. L3.1, PACIFIC CREST ATHLETIC FIELDS, IRRIGATION PLAN.

21. L3.2, PACIFIC CREST ATHLETIC FIELDS, IRRIGATION DETAILS.
22. L3.3, PACIFIC CREST ATHLETIC FIELDS, IRRIGATION DETAILS.
23. L4.0, PACIFIC CREST ATHLETIC FIELDS, ATHLETIC FIELD IRRIGATION PLAN.
24. L4.1, PACIFIC CREST ATHLETIC FIELDS, ATHLETIC FIELD IRRIGATION PLAN.
25. L4.2, PACIFIC CREST ATHLETIC FIELDS, ATHLETIC FIELD DRAINAGE PLAN.
26. L4.3, PACIFIC CREST ATHLETIC FIELDS, ATHLETIC FIELD DRAINAGE PLAN.
27. L4.4, PACIFIC CREST ATHLETIC FIELDS, ATHLETIC FIELD DETAILS.

END OF DOCUMENT 00 0115

## DOCUMENT 001116 - INVITATION TO BID

### 1.1 PROJECT INFORMATION

- A. Notice to Bidders: Bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.

1. Regulatory Requirements:

- a. Each Bid must contain a certification declaring the bidder's residency status, as defined in ORS 279A.120. In determining the lowest responsive Bid, the District shall, in accordance with OAR 137-046-0310, add a percentage increase to the Bid of a nonresident bidder equal to the percentage, if any, of the preference given to the bidder in the state in which the bidder resides.
- b. The successful bidder must comply with the Oregon Public Contracting Code (ORS 279A, 279B, and 279C) and the District's public contracting rules, as all are amended from time to time, in the performance of the work.
- c. The project is a public works project subject to the state prevailing wage rates under ORS 279C.800 to 279C.870. No bid will be received or considered unless the bid contains a statement that the bidder will comply with ORS 279C.838, 279C.840. The wage rates will be found at [http://www.oregon.gov/boli/WHD/PWR/Pages/pwr\\_state.aspx](http://www.oregon.gov/boli/WHD/PWR/Pages/pwr_state.aspx) and the January 1, 2019 PWR Book.
- d. No bid shall be received or considered unless the bidder is licensed by the Oregon Construction Contractors Board, or by the Oregon Landscape Contractors Board, as applicable, as required by ORS 671.530.
- e. The District may reject any bid not in compliance with all prescribed public bidding procedures and requirements and may reject for good cause all bids upon a finding of the District that it is in the public interest to do so.
- f. This work does not require the work of a licensed asbestos abatement contractor.

- B. Project Identification: Pacific Crest Athletic Field Development Project.

1. Project Location: 19150 Skyliners Road, Bend, OR.

- C. Owner: Bend Park and Recreation District, 799 SW Columbia St, Bend OR 97702.

1. Owner's Representative: Jason Powell, Construction Manager, 541-706-6158.

- D. Engineer: BECON Civil Engineering & Land Surveying.

- E. Project Description: Project consists of the construction of turf athletic fields, asphalt paving, concrete paving and stairs, aggregate pathways, fences and gates, irrigation and landscape and other work to complete the project as described in the drawings and specifications.
- F. Construction Contract: Bids will be received for the following Work:
  - 1. General Contract (all trades).

## 1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
  - 1. Bid Date: 4/25/2019.
  - 2. Bid Time: 2:00 p.m., local time, at which time and place bidding will be closed.
  - 3. Location: Bend Park and Recreation District Administration Office, Room A, 799 SW Columbia St, Bend OR 97702.
- B. Bids will be thereafter publicly opened and read aloud. No bids will be received after closing.
- C. Each bidder is required to submit a First-Tier Subcontractors Disclosure Form, as required by ORS 279C.370, in a separate envelope within two (2) hours of the bid closing time. The District will reject a bid if the bidder fails to submit the required disclosure form by this deadline.
- D. The bid proposal ("Bid") shall be submitted in a sealed envelope and marked: Pacific Crest Athletic Field Development Project.

## 1.3 BID SECURITY

- A. Bid security shall be submitted with each bid in the amount of (5%) five percent of the bid amount.

## 1.4 PREBID INQUIRIES

- A. Technical questions regarding the project, or requests for clarification or change, should be directed to Jason Powell, at 541-706-6158 and must be received at least five (5) days prior to Bid Date and Time. Procurement Substitution requests must be received at least seven (7) day prior to the Bid Date and Time.

## 1.5 PREBID CONFERENCE

- A. A prebid conference for all bidders will be held at 19150 Skyliners Road, Bend, OR on 4/11/2019 at 10:00 a.m., local time. Prospective bidders are required to attend.

1.6 DOCUMENTS

A. Online Procurement and Contracting Documents:

1. Plans, specifications, addenda, and notifications of bid results for this project may be viewed, printed or ordered on line from Premier Builders Exchange at <http://www.premierbx.com>, then click on Public Works Projects. Bidders are responsible for checking this web site for the issuance of any addenda prior to submitting a bid. "Prime" bidders should register with Premier Builders Exchange as a planholder to bid this project. Register at [plansonfile.com](http://plansonfile.com). If you have questions contact Premier Builders Exchange at 541-389-0123, Fax 541-389-1549 or email at [admin@plansonfile.com](mailto:admin@plansonfile.com). If the prime bidder/general contractor does not register with the plan center, the general contractor will still be held responsible for all addenda's/changes to the documents and will be considered non-responsive if their bid does not reflect those addenda/changes.

1.7 TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. Bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time. Work is subject to liquidated damages.

1.8 BIDDER'S QUALIFICATIONS

- A. Prequalification prior to submission of a Bid is not required.
- B. The successful bidder shall file with the District, at the time of execution of the Contract, a Performance Bond and a Payment Bond, each of not less than the Contract price. A Certificate of Insurance will also be provided at this time with amounts called for in the bid documents and naming the District as an additional insured with respects to the project.

END OF DOCUMENT 00 1116

## **DOCUMENT 002113 - INSTRUCTIONS TO BIDDERS**

### **1.1 GENERAL DESCRIPTION OF PROJECT.**

- A. A general description of the work to be performed is contained in the Invitation to Bid ("ITB"). The scope is indicated in the applicable parts of the contract documents and project specifications.

### **1.2 BID DOCUMENTS.**

- A. The bid proposal documents ("Bid Documents") include all the documents and referenced documents listed in the Division 00, Procurement and Contracting Documents, Table of Contents, as well as; First Tier Subcontractor Form, Bid Bond, Performance Bond, Payment Bond, General Conditions to the Contract, and any addenda issued prior to receipt of bids. All requirements and obligations of the Bid Documents are hereby incorporated by reference into the Contract and are binding on the successful bidder upon award of the Contract. Bidder assumes full responsibility for errors, omissions or misinterpretations resulting from the use of incomplete sets of Bid Documents. Bid Documents are provided to bidder only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

### **1.3 FORM OF BIDS; SUBMISSION.**

- A. The following minimum requirements as to the form and manner of submitting bids must be strictly observed; variance from these requirements will result in rejection of the bid as unresponsive.
  - 1. Each bid must be submitted on forms furnished by the District.
  - 2. Each bidder must sign its bid.
  - 3. Bid security, in the required form and amount, must accompany each bid.
  - 4. Each blank in the Bid must be filled in unless an alternative is provided. Each separate bid item must be bid on, unless the Bid form clearly indicates otherwise.
  - 5. Each bid must be submitted in a separate sealed envelope, marked as specified in this ITB so as to indicate its contents and allow identification of the bidder without opening, and in the hands of David L. Crowther at the time and place specified for bid opening.
  - 6. A Bid shall contain no modifications, deletions, exceptions, reservations or conditions, which in any way conflict with or purport to alter any provision contained in the Bid Documents shall be deemed non-responsive. Any such bids shall be rejected pursuant to OAR 137-049-0440.

1.4 PREPARATION OF BIDS.

- A. The bid form must be used without alteration. All blank spaces in the Bid form must be filled in, in ink, or typed, in both words and figures where required. No changes shall be made in phraseology of the forms. Amounts stated in words shall govern in cases of discrepancy between the amount stated in words and the amount stated in numerals.
- B. The bidder shall sign his/her bid in the blank space provided. Bids made by corporations or partnerships shall contain names and addresses of the principal officers or partners. If a corporation makes the Bid, it must be signed by one of the corporation's principal officers. If made by a partnership or limited liability company, it must be signed by one of the partners or members, clearly indicating that he/she is signing as a partner or member of the firm. In the case of a Bid made by a joint venture, each of the joint ventures must sign the Bid in his/her personal capacity.

1.5 SUBMISSION OF BIDS.

- A. All Bids must be submitted at the time and place and in the manner prescribed in the ITB. If the Bid is submitted by mail, the sealed envelope containing the Bid must be enclosed in a separate envelope plainly addressed for mailing to conformance with instructions in the ITB.

1.6 MODIFICATIONS OR WITHDRAWAL OF BID.

- A. Bids may be withdrawn prior to the scheduled time for the opening of the Bids either by telephone, written request or in person. No Bid may be withdrawn after the time scheduled for the opening of Bids. Bids may be modified only as allowed by OAR 137-049-0320.

1.7 BID SECURITY.

- A. Each bid must be accompanied by a bid security of five percent (5%) of the amount bid. (For the purpose of this provision, the amount of the bid shall be the base bid, only.) The bid security must be payable to the District in lawful money of the United States, in the form of a cashier's check, certified check, or an irrevocable letter of credit issued by an insured institution as defined in ORS 706.008. In the alternative, the bid security may be in the form of a bid bond executed by a surety company authorized to do business in the State of Oregon and acceptable to the District. The District may retain the bid security of any bidder for the entire duration of the period in which the bid is irrevocable and open for acceptance.
- B. Should the District award the Contract to the bidder, and should the bidder refuse or be unable to execute the Contract and promptly return it with any required performance bond, payment bond and any required proof of insurance, the District shall be entitled to the total amount of the bid security as liquidated damages and not as a penalty.



1.8 CONDITIONS OF WORK.

- A. Each bidder must inform him/herself of the conditions relating to the execution of the work, and make him/herself thoroughly familiar with all the Contract documents. Failure to do so will not relieve the successful bidder of his/her obligations to enter into a Contract and complete the contemplated work in strict accordance with the Contract documents.
- B. Before submitting a Bid, each bidder personally shall inspect the site of the proposed work to arrive at a clear understanding of the conditions under which the work is to be done. By submitting a Bid, the bidder represents and warrants that the bidder has compared the site with the Bid Documents and has satisfied him/herself as to the actual conditions of the site, existing construction, subsurface conditions, the actual elevations, and any other conditions affecting the carrying out of his/her work.
- C. Each bidder must inform him/herself on all statutes and regulations, both Federal and State, relevant to the execution of the work, the employment of labor, protection of public health, access to the work and similar requirements.

1.9 AWARD OF CONTRACT.

- A. The District will award the contract to the lowest responsive and responsible bidder, whose bid will best serve the interests of the District and is in compliance with applicable law. The District reserves the right to accept or reject any or all Bids, and to waive minor informalities and errors in such Bids, each in accordance with Oregon law. The lowest bidder is determined by the aggregate amount of the base bid and any or all alternates that may be accepted or rejected by the District in any order. A responsive bidder shall mean a bidder who has submitted a bid which conforms, in all material respects to the solicitation documents. A responsible bidder shall mean a bidder who has the capability, in all respects, to perform fully the Contract requirements, and the integrity and reliability which will ensure good-faith performance. Responsibility will be determined in accordance with the standards set forth in ORS 279C.375 and OAR 137-049-0390. The District will document its determination of the successful bidder's responsibility of the Responsibility Determination Form substantially as set forth in ORS 279C.375(3)(c).

1.10 PERFORMANCE BOND AND PAYMENT BONDS; INSURANCE.

- A. The successful bidder shall file with the District, at the time of execution of the Contract, a Performance Bond and a Payment Bond, each of not less than the Contract price, on the forms furnished by the District. The Surety Company furnishing this bond shall have a sound financial standing and a record of service satisfactory to the District, and shall be authorized to do business in the State of Oregon. Alternatively, the Contractor may file cash, or a certified or cashier's check made payable to District in lieu of all or a portion of the Performance Bond. In addition, the successful bidder shall submit certificates evidencing insurance coverage required by the Contract.

1.11 PUBLIC WORKS BOND

- A. The successful contractor and all subcontractors must have a public works bond filed with Oregon Construction Contractors Board before starting work on the project, unless exempt.

1.12 PAY FOR LABOR OR SERVICES

- A. If the Contractor fails to pay for labor or services, the agency can pay and withhold these amounts from payments due the contractor. Daily, weekly, weekend and holiday overtime will be paid as required in ORS 279C.540. Contractor must give a written schedule to employees showing the number of hours per day and days per week the employee may be required to work. Contractor must promptly pay for any medical services they have agreed to pay on behalf of their employees.

1.13 CERTIFIED PAYROLL

- A. Contractors and subcontractors on public works projects are required to prepare weekly certified payroll reports and submit them to the public agency by the fifth business day of the following month. Contractors may submit originals or copies and these are public records and must be made available on request. Redact social security numbers if included on report. Contractors may submit their own report as long as it contains all the same information as the WH-38 form. Contractors must complete the statement of certification and attach it to the payroll. BOLI does not require employers to change their regularly scheduled pay date to coincide with the weekly reports; however, US DOL does require weekly payroll. If a prime contractor does not file certified payroll as required (at least once per month), the public agency must withhold 25% of amounts due the prime contractor, in addition to any other required retainage.

1.14 REQUEST FOR CLARIFICATION OR CHANGE; SOLICITATION PROTESTS; PROTEST OF AWARD.

A. Clarification

- 1. Prior to the deadline provided in the ITB for submitting a request for change or protest, a bidder may request clarification of any provision of the Bid Documents. Requests for clarification shall be submitted to the person identified in the ITB. Any clarification to a bidder, whether orally or in writing, does not change the Bid Documents, and is not binding on the District, unless the District amends the Bid Documents by written addendum.

B. Request for Change

- 1. A bidder may request in writing a change to the Specifications or Contract terms and conditions as provide in the ITB. All requests for change shall be directed to the person identified in the ITB, and must comply with OAR 137-049-0260(2).

C. Solicitation Protest

1. A bidder may protest the Specifications or Contract terms and conditions by delivering a written protest on those matters to the District seven (7) days prior to the bid date and time. All protests of Specifications or Contract terms and conditions must be in writing, and must comply with OAR 137-049-0260(3).

D. Right to Protest Award

1. A bidder may submit to the District a written protest of the District's intent to award within seven (7) days after the District's issuance of the notice of intent to award the Contract. A bidder may submit a protest of the award only as allowed by, and only in compliance with, OAR 137-049-0450(4).

1.15 PERMITS AND LICENSES.

- A. The Contractor will have or obtain any and all permits and licenses required by Deschutes County, the District, the City of Bend and the State of Oregon, pertaining to the project.

1.16 ADDENDA.

- A. Changes to the Bid Documents, whether in response to requests for clarification or change or a solicitation protest, or to issue supplemental instructions, may only be made by written addenda. The District will e-mail notice of any addenda to the plan center as identified in the bid documents and it is the responsibility of bidders to check the bid site. All addenda so issued shall become part of the Bid Documents. No other oral or written statements to bidders shall be binding on the District unless reduced to written addendum.

1.17 PRE-BID INQUIRIES.

- A. Bidders with non-technical, pre-bid inquiries may contact David L. Crowther, Business Manager at (541) 706-6102.
- B. Bidders with technical, pre-bid inquiries may contact Jason Powell, Construction Manager at (541) 706-6158.

END OF DOCUMENT 00 2113

## **DOCUMENT 002513 - PREBID MEETINGS**

### **1.1 PREBID MEETING**

**A. Owner will conduct a Prebid meeting as indicated below:**

1. Meeting Date: 4/11/2019.
2. Meeting Time: 10:00 a.m., local time.
3. Location: On-Site, 19150 Skyliners Road, Bend, OR.

**B. Attendance:**

1. Prime Bidders: Attendance at Prebid meeting is mandatory.
2. Subcontractors: Attendance at Prebid meeting is recommended.
3. Notice: Bids will only be accepted from prime bidders represented on Prebid Meeting sign-in sheet.

**C. Bidder Questions: Submit written questions to be addressed at Prebid meeting minimum of two (2) business days prior to meeting.**

**D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:**

**1. Procurement and Contracting Requirements:**

- a. Invitation to Bid.
- b. Instructions to Bidders.
- c. Bidder Qualifications.
- d. Bonding.
- e. Insurance.
- f. Bid Security.
- g. Bid Form and Attachments.
- h. Bid Submittal Requirements.
- i. Notice of Award.

**2. Communication during Bidding Period:**

- a. Obtaining documents.
- b. Bidder's Requests for Information.
- c. Bidder's Substitution Request/Prior Approval Request.
- d. Addenda.

**3. Contracting Requirements:**

- a. Agreement.
- b. The General Conditions.
- c. Other Owner requirements.

**4. Construction Documents:**

- a. Scopes of Work.
  - b. Temporary Facilities.
  - c. Use of Site.
  - d. Work Restrictions.
  - e. Substitutions following award.
- 5. Separate Contracts:
  - a. Work by Owner.
  - b. Work of Other Contracts.
- 6. Schedule:
  - a. Project Schedule.
  - b. Contract Time.
  - c. Liquidated Damages.
  - d. Other Bidder Questions.
- 7. Risk Management:
  - a. Site safety during construction
  - b. Site safety during non-construction hours
  - c. Equipment security
- E. Bidder Sign in Sheet: The prebid sign in sheet will be made available within two (2) business days following the meeting to all bidders via the bid posting location listed in the ITB.

END OF DOCUMENT 00 2513

## **DOCUMENT 002600 - PROCUREMENT SUBSTITUTION PROCEDURES**

### **1.1 DEFINITIONS**

- A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.
- B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 01 2500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

### **1.2 QUALITY ASSURANCE**

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

### **1.3 PROCUREMENT SUBSTITUTIONS**

- A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied; otherwise requests will be returned without action:
  - 1. Extensive revisions to the Contract Documents are not required.
  - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
  - 3. The request is fully documented and properly submitted.

### **1.4 SUBMITTALS**

- A. Procurement Substitution Request: Submit to Owner. Procurement Substitution Request must be made in writing and in compliance with the following requirements:
  - 1. Requests for substitution of materials and equipment will be considered if received no later than (7) seven days prior to date of bid opening.

2. Submittal Format: Submit electronic PDF copies of each Procurement Substitution Request, using CSI Substitution Request Form 1.5C.
  - a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
  - b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
    - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
    - 2) Copies of current, independent third-party test data of salient product or system characteristics.
    - 3) Samples where applicable or when requested by Owner.
    - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES.
    - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
  - c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
  - d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.
- B. Owner's Action:
  1. Owner may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Owner will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.
- C. Owner's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 00 2600

## **DOCUMENT 003132 - GEOTECHNICAL DATA**

### **1.1 GEOTECHNICAL DATA**

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions.
- B. A geotechnical investigation report for Project, prepared by Carlson Geotechnical, dated 3/19/2019, is available for viewing as appended to this Document.
- C. Related Requirements:
  - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.

END OF DOCUMENT 00 3132



**DOCUMENT 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)**

**1.1 BID INFORMATION**

- A. Bidder: \_\_\_\_\_.
- B. Project Name: Pacific Crest Athletic Field Development Project.
- C. Project Location: 19150 Skyliners Road, Bend, OR.
- D. Owner: Bend Park and Recreation District.
- E. Owner Project Number: 103.
- F. Engineer: BECON Civil Engineering & Land Surveying.

**1.2 CERTIFICATIONS AND BASE BID**

- A. The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Bid are those named herein; that this Bid is, in all respects, fair and without fraud; and it is made without collusion with any official of Bend Park and Recreation District, Bend, Oregon, hereinafter called District; and that this Bid is made without any connection or collusion with any person making another Bid on this Contract.
- B. The Bidder further declares that he/she has carefully examined the project site and the Contract documents; is satisfied as to the quantities involved, including materials and equipment, and conditions of work involved; and that this Bid is made according to the provisions and under the terms of the Contract documents, which documents are hereby made a part of this Bid. Bidder acknowledges that bidder has read and understands the terms and conditions of the Bid Document, and accepts and agrees to be bound by the terms and conditions of the Bid Documents.
- C. The Bidder agrees that all of the applicable provisions of Oregon law relating to public contracts (ORS Chapter 279A, 279B & 279C) and the District's public contracting rules are, by this reference, incorporated in and made a part of this Bid. Bidder hereby states that Bidder agrees to be bound by and comply with the provisions of ORS 279C.838, 279C.840 or 40 U.S.C. 3141 to 3148. Workers will be paid the applicable prevailing wage rates. If the project is subject to both the state prevailing wage rate law and the federal Davis Bacon Act, the workers will be paid the higher of the applicable state or federal rate.
- D. The Bidder certifies that Bidder has not discriminated and will not discriminate against minority, women or emerging small business enterprises in obtaining required subcontractors.
- E. [Circle one.] Bidder (is) (is not) a resident of the State of Oregon. If Bidder is a resident of another state, specify state of residency: \_\_\_\_\_

- 1.3 BASE BID: Having become completely familiar with the local conditions and legal requirements affecting the cost of the work at the place where the work is to be executed, and having carefully examined the site conditions as they currently exist, and having carefully examined the Bid Documents, together with any addenda to such Bid Documents as listed hereafter, the undersigned hereby proposes and agrees to provide all labor, materials, equipment, transportation, supervision, and other facilities and services as necessary and/or required to execute all of the work described in the Bid Documents for the lump sum consideration or unit price amounts in the enclosed Bid Schedule. The Bidder agrees that the lump sum or unit prices represent a true measure of the labor and materials required to perform the work, including all allowance for overhead and profit for each type and unit of work called for in these documents

A. TOTAL BASE BID \$ \_\_\_\_\_

1. Base bid (written in words):  
\_\_\_\_\_

- B. ALTERNATE BIDS: If there are any "Additive" and "Deductive" alternates described and quoted below they will be reviewed and accepted or rejected at the Bend Park and Recreation District's sole discretion and option. Accepted alternates will be identified in the Contract.

1. Alternate Bid No. 1: Substitute Sod for Seed in all Seed Mix 1 Areas

Add \$ \_\_\_\_\_ Deduct \$ \_\_\_\_\_

1.4 BID GUARANTEE

- A. The Bidder agrees that if this Bid is accepted, Bidder will, within ten (10) days after notification of acceptance, execute a contract with the District in the form of Contract attached to the Invitation to Bid; and will, at the time of execution of the Contract, deliver to the District the Performance Bond and Payment Bond required herein; and will, to the extent of this Bid, furnish all materials necessary to complete the work in the manner, in the time, and according to the methods as specified in the Contract documents and required by the District.
- B. The Bidder agrees to commence work upon the issuance of a "Notice to Proceed" by the District and fully complete the project according to the times specifically set forth in the Contract documents. Bidder further agrees to pay liquidated damages as set forth in the Contract documents for failure to complete within the specified time.
- C. It is agreed that if the Bidder is awarded the Contract for the work herein proposed and shall fail or refuse to execute the Contract and furnish the specified Performance Bond and Payment Bond within ten (10) days after receipt of Notice of Award of the Bid, the District shall retain the bid security deposited herewith according to the conditions of the Invitation to Bid and Information for Bidders as liquidated damages and not as a penalty; and it is agreed that the said sum is a fair measure of the amount of damage the District will sustain in case the Bidder shall fail or refuse to enter into the Contract for the said work and to furnish the Performance and Payment Bonds as specified in the Contract documents.

- D. This Bid shall be irrevocable and open for acceptance for a period of sixty (60) days from the date of closing of bids. If notified in writing by the District of the acceptance of this Bid within sixty (60) days of the bid closing date, subject to such other period as may be specified in the Bid Document, the Bidder shall execute the Contract between the District and Bidder no later than ten (10) calendar days after the District's acceptance of the Bid.

#### 1.5 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:
1. Addendum No. 1, dated \_\_\_\_\_.
  2. Addendum No. 2, dated \_\_\_\_\_.
  3. Addendum No. 3, dated \_\_\_\_\_.
  4. Addendum No. 4, dated \_\_\_\_\_.
  5. Addendum No. 5, dated \_\_\_\_\_.

#### 1.6 BID SUPPLEMENTS

- A. The following supplements are a part of this Bid Form and are attached hereto.
1. Bid Form Supplement - Unit Prices.
  2. Bid Form Supplement - Bid Security Form.
  3. Bid Form Supplement – Schedule of Values.

#### 1.7 CONTRACTOR'S LICENSE

- A. Oregon Construction Contractors Board Registry Number: \_\_\_\_\_

#### 1.8 BUSINESS REGISTRY

- A. Oregon Business register number: \_\_\_\_\_

#### 1.9 SUBMISSION OF BID

- A. The name of the Bidder who is submitting this Bid is:
1. Firm Name: \_\_\_\_\_
  2. Printed Name of Individual: \_\_\_\_\_
  3. Telephone Number: \_\_\_\_\_
  4. Facsimile Number: \_\_\_\_\_

5. Email Address: \_\_\_\_\_

6. Address: \_\_\_\_\_

B. All communications concerning this Bid and with the Contract will be sent to Bidder at the above address, fax number or e-mail address.

C. The names of the principal officers of the corporation submitting this Bid, or of the partners or members of the partnership or limited liability company submitting this Bid, or of all persons interested in this Bid as principals, are as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### 1.10 SIGNATURE

A. (IF SOLE PROPRIETOR, PARTNERSHIP OR LIMITED LIABILITY COMPANY)

IN WITNESS HERETO, the undersigned has set his/her (its) hand this \_\_\_\_\_ day of \_\_\_\_\_, 2019.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Title

B. (IF CORPORATION)

IN WITNESS WHEREOF, the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this \_\_\_\_\_ day of \_\_\_\_\_, 2019.

Name of Corporation: \_\_\_\_\_

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

Title: \_\_\_\_\_

END OF DOCUMENT 00 4113

**DOCUMENT 004313 - BID BOND**

Bond # \_\_\_\_\_

KNOWN ALL MEN BY THESE PRESENTS, that \_\_\_\_\_,  
hereinafter called the Principal, and \_\_\_\_\_, a  
corporation duly organized under the laws of the State of \_\_\_\_\_, having  
its principal place of business at \_\_\_\_\_, in the State of  
\_\_\_\_\_, and authorized to do business in the State of Oregon, as Surety, are held  
and firmly bound unto the

\_\_\_\_\_, hereinafter called the  
Obligee, in the penal sum of \_\_\_\_\_  
DOLLARS (\$ \_\_\_\_\_), for the payment of which, well and truly to be made, we  
bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and  
severally, firmly by these presents.

The condition of this Bond is that, whereas, the Principal herein is herewith submitting his/her or  
its bid for the Pacific Crest Athletic Field Development Project, said bid proposal, by reference  
thereto, being hereby made a part hereof.

NOW, THEREFORE, if the said bid proposal submitted by the said Principal be accepted, and  
the Contract be awarded to said Principal, and if the said Principal shall execute the proposed  
Contract as required by the bidding and Contract documents with the time fixed by said  
documents, then this obligation shall be void, otherwise to remain in full force and effect.  
Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 2019.

SURETY:

CONTRACTOR:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

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

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

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_

END OF DOCUMENT 00 4313

**DOCUMENT 00 4336 - FIRST TIER SUBCONTRACTOR FORM**

**1.1 INSTRUCTIONS FOR FIRST-TIER SUBCONTRACTOR DISCLOSURE**

- A. Bidders are required to disclose information about first-tier subcontractors who will be furnishing labor, or labor and materials, on the Project when the contract value for a Public Improvement is greater than \$100,000 (see ORS 279C.370). Specifically, when the contract amount of a first-tier subcontractor furnishing labor or materials would be greater than or equal to: (i) 5% of the project bid, but at least \$15,000, whichever is greater, or (ii) \$350,000 regardless of the percentage of the total project bid, the bidder must disclose the following information about that subcontract either in its bid submission, or within two (2) hours after bid closing:
  - 1. The subcontractor's name
  - 2. The category of work that the subcontractor would be performing
  - 3. The dollar value of the subcontract.
- B. If the bidder will not be using any subcontractors that are subject to the above disclosure requirements, the bidder is required to indicate "NONE" on the accompanying form.
- C. The following first-tier subcontractor disclosure form must be utilized. THE DISTRICT WILL REJECT A BID IF YOU FAIL TO SUBMIT THE DISCLOSURE FORM WITH THE REQUIRED INFORMATION BY THE STATED DEADLINE (see OAR 137-049-0360).

**FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM**  
**(ORS 279C.370)**

Prime Contractor Name: \_\_\_\_\_

PROJECT NAME: Pacific Crest Athletic Field Development Project

BID CLOSING: Date: \_\_\_\_\_ Time: \_\_\_\_\_ ☐ AM ☐ PM

REQUIRED DISCLOSURE DEADLINE: Date: \_\_\_\_\_ Time: \_\_\_\_\_ ☐ AM ☐ PM

**INSTRUCTIONS:**

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two (2) working hours after the advertised bid closing time.

Unless otherwise stated in the solicitation, this document shall not be submitted by facsimile. It is the responsibility of bidders to submit this disclosure form and any additional sheets, with the project name clearly marked, at the location indicated by the specified disclosure deadline. See Invitation to Bid.

List below the name of each subcontractor that will be furnishing labor or will be furnishing labor and materials and that is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED).

Name	Dollar Value	Category of Work
(1)		
(2)		
(3)		
(4)		
(5)		
(6)		
(7)		

**Failure to submit this form by the disclosure deadline will result in a nonresponsive bid. A nonresponsive bid will not be considered for award.**

Form submitted by (bidder name): \_\_\_\_\_

Contact name: \_\_\_\_\_

Phone No.: \_\_\_\_\_

END OF DOCUMENT 00 4336

## **DOCUMENT 004393 - BID SUBMITTAL CHECKLIST**

### **1.1 BID INFORMATION**

- A. Bidder: \_\_\_\_\_.
- B. Project Name: Pacific Crest Athletic Field Development Project.
- C. Project Location: 19150 Skyliners Road, Bend, OR.
- D. Owner: Bend Park and Recreation District.
- E. Owner Project Number: 103.
- F. Engineer: BECON Civil Engineering & Land Surveying.

### **1.2 BIDDER'S CHECKLIST**

- A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.
- B. Attach this completed checklist to the outside of the Submittal envelope.
  - 1. Used the Bid Form provided in the Project Manual.
  - 2. Prepared the Bid Form as required by the Instructions to Bidders.
  - 3. Indicated on the Bid Form the Addenda received.
  - 4. Attached to the Bid Form: Schedule of Values Form.
  - 5. Attached to the Bid Form: First Tier Subcontractor Form (can be submitted within (2) two hours of the stated bid time).
  - 6. Attached to the Bid Form: Bid Bond OR a certified check for the amount required.
  - 7. Bid envelope shows name and address of the Bidder.
  - 8. Bid envelope shows the Bidder's Contractor's License Number.
  - 9. Bid envelope shows name of Project being bid.
  - 10. Bid envelope shows time and day of Bid Opening.
  - 11. Verified that the Bidder can provide executed Performance Bond and Labor and Material Bond.
  - 12. Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.

END OF DOCUMENT 00 4393



## DOCUMENT 005100 - NOTICE OF AWARD

### 1.1 BID INFORMATION

- A. Bidder: **<Insert successful bidder name>**.
- B. Bidder's Address: **<Insert street address, city, state, zip, and telephone>**.
- C. Project Name: Pacific Crest Athletic Field Development Project.
- D. Project Location: 19150 Skyliners Road, Bend, OR.
- E. Owner: Bend Park and Recreation District.
- F. Owner Project Number: #103.
- G. Engineer: BECON Civil Engineering & Land Surveying.

### 1.2 NOTICE OF AWARD OF CONTRACT

- A. Notice: The above Bidder is hereby notified that their bid, dated **<Insert date>**, for the above Contract has been considered and the Bidder is hereby **[noticed of intent to award] [awarded]** a contract for **<Insert brief description of Work or sections of Work awarded>**.
- B. Alternates Accepted: The following alternates have been accepted by Owner and have been incorporated in the Contract Sum:
  - 1. Alternate No. 1: **<Insert alternate title>**.
- C. Contract Sum: The Contract Sum is **<Insert written amount>** dollars (\$**<Insert numeric amount>**).

### 1.3 EXECUTION OF CONTRACT

- A. Contract Documents: Copies of the Contract Documents will be made available to the Bidder immediately following the Notice of Award. The Bidder must comply with the following conditions precedent within 10 ten days of the above date of issuance of the Notice of Award:
  - 1. Deliver to Owner two (2) sets of executed copies of the Contract Documents.
  - 2. Deliver with the executed Contract Documents Payment and Performance Bonds and Certificates of Insurance required by the Contract Documents.
  - 3. Deliver to Owner a schedule of Construction showing milestones, anticipated start dates, finish date, and other pertinent information related to schedule.
  - 4. Deliver to Owner a List of subcontractors with names, addresses, and phone numbers of key personnel.

5. Deliver to Owner the names and contact information of the Contractors proposed Construction Manager and onsite Construction Superintendent, as well as other key personnel within the Contractors organization.
- B. Compliance: Failure to comply with conditions of this Notice within the time specified will entitle Owner to consider the Bidder in default, annul this Notice, and declare the Bidder's Bid security forfeited.
  1. Within 10 ten days after the Bidder complies with the conditions of this Notice, Owner will return to the Bidder one fully executed copy of the Contract Documents.

#### 1.4 NOTIFICATION

- A. This Notice is issued by:
  1. Owner: Bend Park and Recreation District.
  2. Authorized Signature: \_\_\_\_\_
  3. Signed By: **<Insert Name>**
  4. Title: **<Insert Title>**

END OF DOCUMENT 00 5100

## **DOCUMENT 006000 - FORMS**

### **1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS**

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
  - 1. The Contract for Construction is included in the Bid Documents
  - 2. The General Conditions are included in the Bid Documents.
  - 3. Owner's document(s) bound following this Document.

### **1.2 ADMINISTRATIVE FORMS**

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects;
  - 1. <http://www.aia.org/contractdocs/purchase/index.htm>;
  - 2. [docspurchases@aia.org](mailto:docspurchases@aia.org);
  - 3. (800) 942-7732.
- C. Preconstruction Forms:
  - 1. Form of Performance Bond and Labor and Material Bond: Owners forms included in the Bid Documents
  - 2. Form of Certificate of Insurance: Supplemental Attachment for ACORD Certificate of Insurance 25-S."
- D. Information and Modification Forms:
  - 1. Performance Bond: 00 6113 "Owners form included in the Bid Documents".
  - 2. Payment Bond: 00 6114 "Owners form included in the Bid Documents".
  - 3. Form for Requests for Information (RFIs): 00 6319 "Owners form included in the Bid Documents".
  - 4. Form of Request for Proposal: 00 6353 "Owners form included in the Bid Documents".
  - 5. Form for Change Order Request: 00 6357 "Owners form included in the Bid Documents".
  - 6. Form for Change Order: 00 6363 "Owners form included in the Bid Documents".
- E. Payment Forms:
  - 1. Payment Application: 00 6365 "Owners form included in the Bid documents", Application and Certification for Payment and Continuation Sheet.

END OF DOCUMENT 00 6000

**SECTION 00 6113 - PERFORMANCE BOND**

Bond # \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called  
(Corporation, Partnership or Individual)

Principal and \_\_\_\_\_ hereinafter called  
(Name of Surety)

Surety, are held and firmly bound unto

\_\_\_\_\_  
Bend Park and Recreation District

(Name of Owner)

\_\_\_\_\_  
799 SW Columbia St, Bend OR 97702

(Address of Owner)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_  
DOLLARS (\$\_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made,  
we bind ourselves, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a  
certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2019, a  
copy of which is hereto attached and made a part hereof for the:

Pacific Crest Athletic Field Development Project

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the  
undertakings, covenants, terms, conditions, and agreements of said Contract during the original  
term thereof which may be granted by the OWNER, with or without notice to the Surety and  
during the one-year guaranty period, and if the Principal shall satisfy all claims and demands  
incurred under such Contract, and shall fully indemnify and save harmless the OWNER from all  
costs and damages which the OWNER may suffer by reason of the Principal's failure to do so,  
and shall reimburse and repay the OWNER all outlay and expense which the OWNER may  
incur in making good any default, then this obligation shall be void; otherwise to remain in full  
force and effect.

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 the  
WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in  
any way affect its obligation on this BOND, and it does hereby waive notice of any such change,

extension of time, alteration or addition to the terms of the Contract or to the WORK or the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ (number) counterparts, each one of which shall be deemed an original, this \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

(SEAL)

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_  
(Principal)

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

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_  
(Surety)

ATTEST:

\_\_\_\_\_  
(Surety) Secretary

(SEAL)

\_\_\_\_\_  
(Witness as to Surety)

\_\_\_\_\_  
(Address)

\_\_\_\_\_

By: \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)

\_\_\_\_\_

**Name of agent, phone number & address:** \_\_\_\_\_

\_\_\_\_\_

END OF SECTION 00 6113

**SECTION 00 6114 - PAYMENT BOND**

Bond # \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called  
(Corporation, Partnership or Individual)

Principal and \_\_\_\_\_ hereinafter called  
(Name of Surety)

Surety, are held and firmly bound unto

\_\_\_\_\_  
Bend Park and Recreation District

(Name of Owner)

\_\_\_\_\_  
799 SW Columbia St, Bend OR 97702

(Address of Owner)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_  
DOLLARS (\$ \_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made,  
we bind ourselves, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a  
certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2019, a  
copy of which is hereto attached and made a part hereof for the:

Pacific Crest Athletic Field Development Project

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms,  
subcontractors, and corporations furnishing materials for or performing labor in the prosecution  
of the WORK provided for in such Contract, and any authorized modification thereof, including  
all amounts due for materials lubricants, oil, gasoline, coal and coke, repairs of machinery,  
equipment and tools, consumed or used in connection with the construction of such WORK, and  
all insurance premiums on said WORK, and for all labor performed in such WORK whether by a  
subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force  
and effect.

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 the  
WORK to be performed there under of the SPECIFICATIONS accompanying the same shall in  
any way affect its obligation on this BOND, and it does hereby waive notice of any such change,  
extension of time, alteration or addition to the terms of the Contract or to the WORK or to the  
SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ (number) counterparts, each one of which shall be deemed an original, this \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

(SEAL)

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_  
(Principal)

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

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_  
(Surety)

ATTEST:

\_\_\_\_\_  
(Surety) Secretary

(SEAL)

\_\_\_\_\_  
(Witness as to Surety)

\_\_\_\_\_  
(Address)

\_\_\_\_\_

By: \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)

\_\_\_\_\_

**Name of agent, phone number & address:** \_\_\_\_\_

\_\_\_\_\_

END OF SECTION 00 6114

**DOCUMENT 00 6273 - SCHEDULE OF VALUES**

Itemized Bid Form

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

Date: \_\_\_\_\_

**Pacific Crest Athletic Field Development Project**

**General Conditions**

Project Management & Labor (includes all customary business costs)

Mobilization

Temporary Facilities

Temporary Barriers and Enclosures

Tools and Equipment

Construction Survey

Bonding / Insurance

**Total General Conditions**

**Demolition**

Demolition

**Total Demolition**

**Site Furnishings**

Installation of Site Furnishings

**Total Site Furnishings**

**Exterior Power**

Electrical Enclosure and Power

Pedestals

**Total Exterior Power**

**Earthwork**

Site Clearing and Grubbing

Grading

Excavation and Fill

Erosion and Sediment Control

**Total Earthwork**

**Exterior Improvements**

Base Courses

AC paving

Striping and Signage

Concrete Paving

Curbs and Gutters

Concrete Stairs and Railings

Aggregate Surfacing

Fencing and Gates

Goal Fence Nets



Seasonal Restroom Enclosure  
Installation  
Boulder Terracing  
Irrigation  
Landscaping

**Total Exterior Improvements**

**Utilities**

Water Distribution & Piping  
Storm Drainage & Piping  
Electrical Utilities

**Total Utilities**

**Total Base Bid Price**

**Alternate**

Substitute and install Sod in lieu  
of Seed in all Seed Mix 1 Areas

**Total Alternate**

**Total Bid Price with Alternate**

END OF DOCUMENT 00 6273



799 SW Columbia St, Bend, OR 97702  
541-389-7275

## Request for Information (RFI)

Project Name: \_\_\_\_\_  
Date: \_\_\_\_\_  
RFI No. \_\_\_\_\_  
From: \_\_\_\_\_  
To: \_\_\_\_\_

Question:

Response:

Copy To:

- |                          |                                     |
|--------------------------|-------------------------------------|
| <input type="checkbox"/> | Owner                               |
| <input type="checkbox"/> | Construction Site / Project Manager |
| <input type="checkbox"/> | Civil Engineering Consultants       |
| <input type="checkbox"/> | Architectural Consultants           |
| <input type="checkbox"/> | Mechanical Engineering Consultant   |
| <input type="checkbox"/> | Electrical Engineering Consultant   |

- |                          |                   |
|--------------------------|-------------------|
| <input type="checkbox"/> | Surveyor          |
| <input type="checkbox"/> | Others (Specify): |
|                          |                   |
|                          |                   |
|                          |                   |
|                          |                   |



799 SW Columbia St, Bend, OR 97702  
541-389-7275

## Proposal Request

Project Name: \_\_\_\_\_  
Date: \_\_\_\_\_  
Contractor(s) \_\_\_\_\_  
Proposal Request No. \_\_\_\_\_  
Original Contract Date: \_\_\_\_\_

Please submit an itemized quotation for changes in the Contract sum and/or Time incidental to proposed modifications to the Contract Documents described herein.

**THIS IS NOT A CHANGE ORDER NOR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED HEREIN:**

---

Description: (written description of the work)

All other specifications and Contract requirements remain in effect.

---

Attachments: (List attached documents that support description)

Owner: Bend Park and Recreation District

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

Date: \_\_\_\_\_

# Bend Park & Recreation

## DISTRICT

799 SW Columbia St, Bend, OR 97702  
541-389-7275

## Change Order Request (COR)

Project Name: \_\_\_\_\_

Date: \_\_\_\_\_

Contractor(s) \_\_\_\_\_

COR No. \_\_\_\_\_

Original Contract Date: \_\_\_\_\_

This is not a change order nor a direction to proceed with the work described herein

(Written Description of the work)

All other specifications and contract requirements remain in effect

Item	Description	Qty	Unit Cost	Total
	<b>Total Cost:</b>			

The contract time will be changed by: \_\_\_\_\_ (Days)

Contractor: \_\_\_\_\_

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

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

---

*for BPRD use only*

ACCEPTED:

REJECTED: \_\_\_\_\_

ACCEPTED AS NOTED:

**Note:**



**Bend Park &  
Recreation**  
DISTRICT

799 SW Columbia St, Bend, OR 97702  
541-389-7275

## Change Order

Project Name: \_\_\_\_\_  
Project Code: \_\_\_\_\_  
Date: \_\_\_\_\_  
Contractor(s): \_\_\_\_\_  
Change Order No. \_\_\_\_\_  
Original Contract Date: \_\_\_\_\_

You are directed to make the following changes to the Contract:

(Reason for this Change Order)

Item	Description	Qty	Unit Cost	Total
<b>Total Cost:</b>				

Original Contract sum was:	\$0.00
Net amount of previous change orders:	\$0.00
Total original contract amount plus or minus change orders:	\$0.00
Total amount of this change order	\$0.00
The new contract amount including this change order will be:	<b>\$0.00</b>

The Contract time will be changed by: \_\_\_\_\_ (Days)

The date of completion as of the date of this change order is:

Owner:

Bend Park and Recreation District

Contractor:

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

Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

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

Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

## APPLICATION AND CERTIFICATION FOR PAYMENT

PAGE ONE OF

PAGES



PROJECT:

**TO OWNER:**

Bend Park and Recreation District  
799 SW Columbia St.  
Bend, OR 97702

**FROM CONTRACTOR:****APPLICATION NO:****PERIOD TO:****PROJECT NO:****Distribution to:**☐

OWNER

☐

CONTRACTOR

**CONTRACT DATE:**

### CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.  
Continuation Sheet is attached.

- |  |    |       |
|--|----|-------|
| 1. ORIGINAL CONTRACT SUM   | \$ | _____ |
| 2. Net change by Change Orders   | \$ | _____ |
| 3. CONTRACT SUM TO DATE (Line 1 ± 2)   | \$ | _____ |
| 4. TOTAL COMPLETED & STORED TO<br>DATE (Column F on Continuation Sheet)      | \$ | _____ |
| 5. RETAINAGE:  |    |       |
| Total (Column I of Continuation Sheet)                                       | \$ | _____ |
| 6. TOTAL EARNED LESS RETAINAGE<br>(Line 4 Less Line 5 Total)                 | \$ | _____ |
| 7. LESS PREVIOUS CERTIFICATES FOR<br>PAYMENT (Line 6 from prior Certificate) | \$ | _____ |
| 8. CURRENT PAYMENT DUE   | \$ | _____ |
| 9. BALANCE TO FINISH, INCLUDING RETAINAGE<br>(Line 3 less Line 6)            | \$ | _____ |

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS		
NET CHANGES by Change Order		

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

**CONTRACTOR:**

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

### OWNER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Owner certifies that to the best of the Owner's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the Current Payment Due.

**PROJECT MANAGER:**

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

**OWNER:**

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



## **DOCUMENT 00 7100 - CONTRACT FOR CONSTRUCTION**

This Contract is made as of **<Insert Date>**

Between the District:

Bend Park and Recreation District  
799 SW Columbia Street  
Bend, Oregon 97702

And the Contractor:

**<Insert Contractors Name>**  
**<Insert Contractors Address>**  
**<Insert City, State, Zip>**  
**<Insert Contractors Oregon CCB #>**

For the following Project:

Pacific Crest Athletic Field Development Project  
19150 Skyliners Road  
Bend, Oregon

### **The District and the Contractor agree as follows:**

#### **1.1 SCOPE OF WORK.**

- A. Contractor will provide all tools, equipment, apparatus, facilities, labor, material, water, heat, utilities, transportation, and other services necessary for proper execution and completion of the work described below ("Work"), whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work. Contractor shall provide the work described below in a good and workmanlike manner, and in accordance with the terms and conditions of this Contract, federal, state, or local law or ordinance and applicable District rules and policies:
- B. Work includes: The construction of turf athletic fields, asphalt paving, concrete paving and stairs, aggregate pathways, fences and gates, irrigation and landscape and other work to complete the project as described in the drawings and specifications.

#### **1.2 CONTRACT DOCUMENTS.**

- A. The Contract Documents consist of this Contract for Construction with General Conditions, and any exhibits, attachments, or documents specifically incorporated by reference including the following: Invitation to Bid, Instructions to Bidders, Schedule, Performance and Payment Bonds and Certificate of Insurance

#### **1.3 CONTRACT PRICE.**

- A. The District will pay the Contractor the following amount(s) ("Contract Price"). **\$<Insert Dollars> <Insert cost in words>**

#### **1.4 PAYMENT TERMS.**



- A. District will pay the Contract Price as follows: Progress Payments will be made according to the General Conditions Article 29.

1.5 CONTRACT TIME.

- A. Contractor will commence and complete the Work as follows: Contractor will commence work when a Notice to Proceed is issued and project will be completed by November 1, 2019.

1.6 CONTRACTOR'S REPRESENTATIONS AND WARRANTIES

- A. Contractor represents and warrants to Bend Park and Recreation District that:
  - 1. Contractor has the power and authority to enter into and perform this contract.
  - 2. This Contract, when executed and delivered, is a valid and binding obligation of Contractor, enforceable in accordance with its terms.
  - 3. Contractor (to the best of Contractor's knowledge, after due inquiry), for a period of no fewer than six calendar years preceding the date of this Contract, faithfully has complied with:
    - a. All tax laws of this state, including but not limited to ORS 305.620 and ORS chapters 316, 317, and 318;
    - b. Any tax provisions imposed by a political subdivision of this state that applied to Contractor, to Contractor's property, operations, receipts, or income, or to Contractor's performance of or compensation for any work performed by Contractor;
    - c. Any tax provisions imposed by a political subdivision of this state that applied to Contractor, or to goods, services, or property, whether tangible or intangible, provided by Contractor; and
    - d. Any rules, regulations, charter provisions, or ordinances that implemented or enforced any of the foregoing tax laws or provisions.
  - 4. Any Goods/Items/Equipment/Components/Hardware/Software/Intellectual Property Rights, etc. delivered to/granted to Bend Park and Recreation District under this Contract, and Contractor's Services rendered in the performance of Contractor's obligations under this Contract, shall be provided to Bend Park and Recreation District free and clear of any and all restrictions on or conditions of use, transfer, modification, or assignment, and shall be free and clear of any and all liens, claims, mortgages, security interests, liabilities, charges, and encumbrances of any kind.

1.7 CONTRACTOR'S COMPLIANCE WITH TAX LAWS

- A. Contractor must, throughout the duration of this Contract and any extensions, comply with all tax laws of this state and all applicable tax laws of any political subdivision of this state. For the purposes of this Section, "tax laws" includes all the provisions described in subsection 1.6, A., 3. a. through d. of this Contract.
- B. Any violation of subsection A of this section shall constitute a material breach of this Contract. Further, any violation of Contractor's warranty, in subsection 1.6, A., 3 of this

Contract, that Contractor has complied with the tax laws of this state and the applicable tax laws of any political subdivision of this state also shall constitute a material breach of this Contract. Any violation shall entitle Bend Park and Recreation District to terminate this Contract, to pursue and recover any and all damages that arise from the breach and the termination of this Contract, and to pursue any or all of the remedies available under this Contract, at law, or in equity, including but not limited to:

1. Termination of this Contract, in whole or in part;
2. Exercise of the right of setoff, and withholding of amounts otherwise due and owing to Contractor, in an amount equal to District's setoff right, without penalty; and
3. Initiation of an action or proceeding for damages, specific performance, declaratory or injunctive relief. Bend Park and Recreation District shall be entitled to recover any and all damages suffered as the result of Contractor's breach of this Contract, including but not limited to direct, indirect, incidental and consequential damages, costs of cure, and costs incurred in securing replacement Services/ replacement Goods/ a replacement contractor.

These remedies are cumulative to the extent the remedies are not inconsistent, and Bend Park and Recreation District may pursue any remedy or remedies singly, collectively, successively, or in any order whatsoever.

#### 1.8 LIQUIDATED DAMAGES

- A. Should the Contractor fail to complete performance of the Work within the time allowed herein, the harm that will be caused by such delay will be impossible or very difficult to accurately determine. Therefore the District and the Contractor agree that the Contractor will pay the District \$500.00 per day as agreed liquidated damages for the delay, not as a penalty, but as a reasonable forecast of just compensation for loss and expenses for each and every calendar day or fraction thereof elapsing between the specified substantial completion date and the date the work is actually substantially completed by the Contractor.

#### 1.9 SIGNATURE

- A. This Contract signed by both parties, together with the Contract Documents, constitutes the final written expression of all of the terms of this agreement and is the complete and exclusive statement of those terms. Any and all representations, promises, warranties, or statements by the Contractor or the Contractor's agents that differ in any way from the terms of this written agreement will be given no force and effect.

#### **CONTRACTOR**

\_\_\_\_\_  
Contractor Firm Name

\_\_\_\_\_  
Signature

#### **DISTRICT**

\_\_\_\_\_  
Bend Park and Recreation District  
Owner

\_\_\_\_\_  
Signature

\_\_\_\_\_  
By/Title

\_\_\_\_\_  
Don P. Horton, Executive Director  
By/Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

END OF SECTION 00 7100

**DOCUMENT 00 7200 - CONTRACT FOR CONSTRUCTION GENERAL CONDITIONS**

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### **GENERAL CONDITIONS**

The Contractor's services under this Contract will be subject to the provisions of these General Conditions, and both parties agree to comply therewith, as they may be modified by special conditions (if any) identified in the Contract as one of the Contract Documents.

#### **ARTICLE 1 Definitions**

For the purposes of this Contract, the following terms will have the meanings hereinafter set forth. Capitalized terms not otherwise defined herein will have the meanings given to the terms in the agreement signed by the parties.

**1.1** "Architect/Engineer" means the person, firm, or corporation that prepared the drawings and specifications, or acts as a consultant to the District during the project, whether it be an architect or engineer.

**1.2** "Contract" means the agreement signed by the parties thereto, these General Conditions, and all other documents and exhibits listed as "Contract Documents" in the agreement signed by the parties.

**1.3** The term "contract change order" means a document prepared by the District or the Architect/Engineer, as directed and approved by the District as a change to the Contract incorporating approved the Contractor's proposals for changes in the Work. Contract change orders will be numbered consecutively in chronological order and will refer to the field change order(s) covered.

**1.4** "Contractor" means the person, firm, or corporation responsible for the execution of the work contracted for by the District.

**1.5** "Contract Sum" means the amount payable to the Contractor under the Contract.

**1.6** The term "days," unless expressly stated otherwise, means calendar days.

**1.7** The term "drawings of record" means those annotated drawings submitted by the Contractor during progress of construction to the District or the Architect/Engineer, illustrating how various elements of the work were actually installed.

**1.8** The term "field change order" means an order issued to the Contractor, by the Architect/Engineer or the District's Construction Representative, to carry out minor revisions in the Work. The Contractor's field superintendent will be authorized to supply quotations for the

Work directly to the Architect/Engineer or the District's Construction Representative. Such field change orders will be numbered consecutively, in chronological order.

**1.9** The Architect/Engineer and the District use the term "or approved equal" to indicate that the material or product to be supplied or installed must be equal to that specified and as approved.

**1.10** "District" means Bend Park and Recreation District.

**1.11** "District Request for Proposal (District RFP)" means a request by the District for a proposal on contemplated changes in the Work. Such District RFPs will be numbered consecutively, in chronological order.

**1.12** "District's Construction Representative (DCR)" means the District's agent, designated by District. The DCR coordinates the activities of the Architect/Engineer, the Contractor, the District's consultants, and all aspects of the project.

**1.13** "Project" means all construction of which the Work may be a part or the whole. The Project may contain work by the District or by separate contract.

**1.14** The term "punch list" means a list, prepared by the Architect/Engineer and/or the District, of the Contractor's uncompleted or uncorrected work.

**1.15** The term "separate contract" means a contract between the District and a contractor, other than the Contractor under this Contract, for the construction or furnishing of a portion of the Project.

**1.16** The term "subcontractor" means, without limitation, any firm, corporation, or person working directly or indirectly for the Contractor that furnishes or performs a portion of the work, labor, or material, according to the drawings and/or specifications.

**1.17** The term "substantial completion" means the completion of the work to the extent that the District may have uninterrupted occupancy and use of the facility or specified portion thereof for the purpose for which intended.

**1.18** "Work," unless otherwise specified, indicates all items to be furnished, performed and paid for by the Contractor and its subcontractors, and includes all materials, tools, methods, labor, overtime labor, standby labor, equipment services, transportation, power, fuel, water, and other items and facilities of every kind necessary for the complete job and to the entire performance of this Contract.

**1.19** The term "Work in place" means work, which has been installed in accordance with the drawings and specifications, but does not include equipment or material that has been delivered to the job site and not yet installed.

## **ARTICLE 2 General Provisions**

**2.1** The Contract will be deemed to have been made in, and will be construed under, the laws of the State of Oregon.

**2.2** The Contractor will direct all communications to the designated DCR

**2.3** The Contractor will perform services under this Contract in a skillful and competent manner in accordance with good practice standards of the construction industry. The Contractor will be responsible to the District for errors or omissions in construction and failure to perform this Contract, and will correct or remove any defective work.

**2.4** The Contractor's Work will comply with all applicable laws, regulations, ordinances, building codes, and requirements of federal, state and local government authorities and agencies having jurisdiction over the facility to be constructed, including those of the utility companies, and will give all notices and obtain all licenses and permits required.

**2.5** The Contractor will comply with construction procedures contained in the Contract Documents.

**2.6** Written notice will be deemed to have been duly given (i) if delivered in person to the individual or member of the firm or entity or to an officer of the corporation for whom it was intended, (ii) if sent by facsimile, with transmission confirmation received to the fax number provided in the Contract or (iii) if delivered at, or sent by registered or certified mail to, the person's address set forth in the Contract.

**2.7** Time limits stated in this Contract are of the essence.

**2.8** The Contractor will maintain an efficient and accurate accounting system for all work in connection with this Contract. The Contractor's accounts and records covering these charges and all invoices, payments, correspondence, memoranda, and other writings, on account of this Contract, will, at all reasonable times during the term of this Contract, and for two (2) years thereafter, be open to inspection and copying by the District or its authorized representatives.

**2.9** The Contractor will pay for additional sets of drawings and specifications requested by the Contractor, over and above the bid and contract sets furnished by the Architect/Engineer. Payments are to be made directly to the blue printer or to the party furnishing the drawings and specifications.

**2.10** Upon acceptance of this Contract, the Contractor will execute and deliver separate Performance and Payment Bonds, each in an amount equal to the total Contract Sum, and fully executed by a Surety Company authorized to do business in the State of Oregon and approved by the District. In the event of any increases in the total Contract Sum, the Contractor will increase the Performance and Payment Bonds so that each equals the new total Contract Sum. The Contractor will pay the costs of all Bonds.

**2.11** The Contractor will immediately remove any liens, claims, or encumbrances which, because of any act or default of the Contractor, or of the Contractor's subcontractors of any tier, or material suppliers, are made against the District or the Project; and to defend, indemnify, and save the District harmless against and from all resulting loss and expenses, including attorney's fees.

**2.12** In carrying out any of the provisions hereof or in exercising any authority granted by the Contract, there will be no personal liability imposed upon any public official or employee of the District.

**2.13** In the event any provision of this Contract is void, invalid, or unenforceable under the laws of the State of Oregon; the balance of the Contract will remain in effect and binding on the parties hereto.

**2.14** The Contractor will perform all work under this Contract as an independent contractor and will not be considered an agent of the District, nor will contractor's subcontractors or employees be sub-agents of the District.

**2.15** This Contract is not intended to entitle the Contractor to any benefits generally granted to the District's employees. Without limitation, but by way of illustration, the benefits which are not intended to be extended by this Contract to the Contractor are vacation, holiday and sick leave,

other leave with pay, tenure, medical and dental coverage, life and disability insurance, overtime, Social Security, Workers' Compensation, unemployment compensation, or retirement benefits (except insofar as benefits are otherwise required by law if the Contractor is presently a member of the Public Employees Retirement System).

**2.16** The Contractor is an independent contractor for purposes of the Oregon Workers' Compensation law (ORS Chapter 656) and is solely liable for any Worker's Compensation coverage under this Contract. If the Contractor has the assistance of other persons in the performance of this Contract, the Contractor will qualify and remain qualified for the term of this Contract as required by ORS 656.407 or as a contributing assistance of any other person, Contractor will execute a Joint Declaration with District's Workers' Compensation carrier absolving District of any and all liability from Workers' Compensation provided in ORS 656.029(2).

### **ARTICLE 3 Intent of the Contract Documents**

**3.1** The intent of the Contract Documents is to include all of the Work for the Contract Sum and within the Contract Time. The drawings and specifications are to be considered complementary, and all work necessary for the execution of the Work if shown on the drawings and not described in the specifications, and all work described in the specifications and not shown on the drawings, or any work which is obviously necessary to complete the Work within the limits established by the drawings and specifications, will be considered part of the Contract, and will be executed by the Contractor in the same manner and with the same quality of material as other portions of the Contract without extra compensation.

**3.2** Unless expressly stipulated otherwise, the Contractor will provide and pay for all services, labor, overtime labor, standby labor, methods, materials, equipment, transportation, power, fuel, water, and all other facilities and services, including operating costs incurred in checking out equipment, and all other items and facilities of every kind necessary to complete the intent of the Contract for the Contract Sum within the Contract Time.

**3.3** Words describing material or work which have a well-known technical or trade meaning unless otherwise specifically defined in the contract, will be construed in accordance with such well-known meaning, recognized by architects, engineers and tradesmen.

**3.4** The Contract and each of the Contract Documents are complementary, and they will be interpreted so that what is called for by one will be as binding as if called for by all. Should Contractor observe any conflicts within the Contract Documents, the Contractor will bring them to the District's attention for decision and revision as soon as possible after originally observed. In the event of duplications or conflicts within the Contract Documents after the Contract has been executed, the most expensive method of work, materials and equipment will be construed as the requirement, provided, however, that the District will receive a credit for all costs saved accruing to the District in the event the least expensive method of work is directed by the District. A duplication of work is not intended by the Contract Documents and any duplication specified will not become a basis for extra cost to the District.

**3.5** The Contractor will secure written instructions from the DCR before proceeding with Work affected by omissions or discrepancies in the Contract Documents.

### **ARTICLE 4 Substitutions**

**4.1** Throughout the specifications, manufacturer's name and catalog number may specify types of material in order to establish standards of quality and performance and not for the purpose of limiting competition. Unless specifically specified otherwise, the Contractor may



assume the phrase "or approved equal" except that the burden is upon Contractor to prove such equality. If the Contractor elects to prove such equality, the Contractor must request the Architect/Engineer and the District's approval in writing to substantiate equality, with supporting data and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty, and cost. Such supporting data will include the basic specifications of the specified item(s), and the specifications, characteristics and other information concerning the proposed substitution demonstrating its equality to the specified items(s), and the effect of the substitution on the schedule and cost, if any.

**4.2** After award of the Contract, proposed substitutions will be considered only if the District receives the advantage of lesser cost with no decrease in quality, or earlier completion date, or both. In any event, a request for substitution will be made sufficiently in advance of Project needs to permit sufficient time for evaluation by the Architect/Engineer and the District without jeopardizing the construction schedule.

**4.3** In the event that the District approves a substitution, the Contractor will assume all risk and costs for redesign and adjustment of the Work affected by the substitution and its effect on adjoining Work, and any delays occasioned by its use.

#### **ARTICLE 5 Architect/Engineer's Status**

**5.1** The Architect/Engineer is the interpreter of the drawings and specifications.

**5.2** It is not incumbent upon the Architect/Engineer or the District to notify the Contractor when to begin, cease or resume work, nor to give early notice of rejection of faulty work, nor in any way to superintend so as to relieve the Contractor of any responsibility or of any consequences for neglect or carelessness by the Contractor or its subordinates.

#### **ARTICLE 6 Contractor's Superintendent**

**6.1** The Contractor will provide the services of a competent on-site representative, as approved in writing by the District, from the commencement of construction to final completion and acceptance of the Work. The Contractor's on-site representative will represent the Contractor at the Work, and all directions, instructions, or notices given to the on-site representative by the District or the Architect/Engineer will be as binding as if given to the Contractor.

**6.2** The Contractor's on-site representative will be in charge of the Work at all times and will have authority and ability to furnish estimates and to approve field change orders, manage and control assigned projects, including overseeing field operations, site safety, productivity, schedule, quality of work, trade contractor and supplier coordination, and any and all other duties necessary to accomplish the Work. The Contractor will provide on-site representative with such assistants as are necessary to properly communicate, execute and coordinate all phases of the Work.

**6.3** The Contractor's project manager, construction superintendent, assistant construction superintendent, if any, and trade foremen, as required, will not be removed from the Work under this Contract without the prior written approval of the District.

#### **ARTICLE 7 Subcontractors**

**7.1** The Contractor, upon notification of selection as apparent successful bidder, and prior to award of the Contract, will submit to the District, for approval, a list of proposed subcontractors and suppliers for each of the major items of the Work. The District reserves the right to reasonably reject any subcontractor or supplier that has not been qualified by the District in

writing prior to award of the Contract, without additional cost to the District. Where the District rejects any subcontractor or supplier that has been prequalified by the District in writing, the Contract Sum will be adjusted by contract change order pursuant to provisions of this Contract for pricing additional or deleted work. The Contractor will advise the District of the Contractor's selection of approved subcontractors and suppliers prior to commencement of the Work by the subcontractors and suppliers.

**7.2** To the extent the specifications have been divided into separate headings or sections to cover the principal trades or sub-trades represented in the Work, it is done for convenience. This arrangement will not limit the Contractor in the extent of the Work included in each of the various subcontracts, nor will the use of the term "subcontractor" relieve the Contractor of responsibility for seeing that all of the Work of the Contract is performed properly, whether or not specifically called for in a particular section.

**7.3** All contracts concerning the Work entered into by the Contractor with subcontractors will include the terms and conditions governing the Contractor. No provisions of this Contract or of any contract between the Contractor and subcontractors will be construed as an agreement between the District and subcontractors. The Contractor will be as fully responsible to the District for the acts and omissions of a subcontractor, of the persons employed by a subcontractor, or of firms and/or subcontractors engaged by a subcontractor, as the Contractor is for the acts or omissions of its own employees.

## **ARTICLE 8 Separate Contracts**

**8.1** The District reserves the right to let separate contracts in connection with the Work. The Contractor will afford such other firms, contractors, or subcontractors adequate opportunity for the introduction and storage of their material and the execution of their work, and will properly connect and coordinate its work with such other firms, contractors, or subcontractors.

**8.2** The Contractor will cooperate with other firms, contractors, or subcontractors on the Work and with the District so that all portions of the Work may be completed in the least possible time within normal working hours. The Contractor will furnish other firms, contractors, or subcontractors, whose work is fitted into the Contractor's, detail and erection drawings giving full information regarding the fabrication and assembly of the Contractor's work. When possible, drawings will show checked field measurements.

**8.3** Should the Contractor cause damage to any separate firm, contractor, or subcontractor on the Work, the Contractor will use its best efforts to negotiate a settlement with such firm, contractor or subcontractor. The Contractor will defend, indemnify and save the District harmless from any and all claims, losses, liability, or actions arising therefrom, even if the Contractor was not negligent in causing the damage.

## **ARTICLE 9 Allocation of Risk**

**9.1** All reports giving the results of soil investigations or borings conducted by the District may be examined at the District's offices. Any investigations or borings were carried out and retained for design purposes only, and are not considered adequate for construction. Prior to submitting any bids, the Contractor is required to acquaint him/herself with the site and all other conditions relevant to the Work, and make all investigations essential to a full understanding of the difficulties, which may be encountered in performing the Work.

**9.2** The Contractor represents that prior to submitting its proposal for the Work, the Contractor carefully examined all of the Plans and Specifications, acquainted him/herself with the site and

all other conditions relevant to the Work, and made all investigations essential to a full understanding of the difficulties which may be encountered in performing the Work.

**9.3** The District does not warrant the correctness of any soil investigations or borings, or of any interpretations, deductions or conclusions given in any report relative to subsurface conditions. Soil investigations or borings are not warranties of conditions between soil borings nor are they guaranteed to represent all conditions that may be encountered. The Contractor has made and will make its own deductions and conclusions as to the nature of the materials to be excavated, the difficulties of making and maintaining the required excavation, the difficulties which may arise from subsurface conditions, and of doing any other work affected by the subsurface conditions, and will accept full responsibility therefore.

**9.4** During construction, and until acceptance by the District, the Contractor will be responsible for the premises and for the Work and will bear the risk of loss for all damage thereto, however caused, and regardless of whether any damage is the fault of the Contractor.

#### **ARTICLE 10 Indemnification**

**10.1** To the fullest extent permitted by law, the Contractor will defend, indemnify and hold the District, and its officers, agents and employees, harmless from and against all claims, suites, actions, liabilities, costs, damages, losses and expenses, including but not limited to reasonable attorneys' fees, arising from, related to, or caused by the performance of the Work by the Contractor, or its subcontractors, agents, and employees. However, neither the Contractor nor any attorney engaged by the Contractor will defend the claim in the name of the District nor purport to act as legal representative of the District or any of its divisions without first receiving from the District, authority to act as legal counsel for the District, nor will the Contractor settle a claim on behalf of the District without the written approval of the District. This obligation will survive acceptance of the Work and completion of the Contract.

**10.2** In any and all claims against the District or its agents or employees, these indemnification obligations will not be limited in any way by any limitation in the amount or type of damages, compensation or benefits payable by or for contractors' or workers' compensation acts, disability acts or other employee benefit acts.

**10.3** The Contractor will carry sufficient insurance to defend, indemnify and hold the District harmless as provided in this provision.

#### **ARTICLE 11 Contractor's Insurance**

**11.1** Contractor will procure prior to commencement of Work and maintain for the duration of this Contract, or such longer time as may be provided, insurance against claims for injuries to persons or damages to property that may arise from or in connection with the performance of the Work by Contractor, its agents, representatives, employees and subconsultants as set forth below, except to the extent different coverage or limits requirements are specifically set out in the Contract Documents. The insurance companies will be first-class insurers and underwriters with an *A.M. Best's* financial strength rating of A- or better and financial size category of X or better, and the insurance companies otherwise will be reasonably acceptable to the District.

**.1 Workers' Compensation Insurance:** statutory limits. Contractor shall comply with ORS 656.017, which requires subject employers to provide Oregon workers' compensation coverage for all their subject workers. No Workers' Compensation Insurance has been or will be obtained by Bend Park and Recreation District for Contractor or Contractor's employees and subcontractors. Contractor shall provide and maintain workers' compensation coverage for its employees, officers, agents or partners

as required by applicable workers' compensation laws including employers' liability with limits not less than \$500,000.

Include the Maritime Coverage Endorsement incorporated if watercraft is used in performing the Work and with the U.S. Longshore and Harbor Workers Compensation Act Endorsement incorporated if the Work is performed on or in close proximity to navigable waterways.

**.2 Employer's Liability Insurance:** subject to a waiver of subrogation in favor of the District, with limits of liability of not less than \$1,000,000 per accident, \$1,000,000 disease each employee and \$1,000,000 disease policy limit.

**.3 Commercial General Liability Insurance:** applicable to all premises and operations, including Bodily Injury, Property Damage, Personal Injury, Blanket Contractual Liability, Independent Contractors, Products and Completed Operations, Broad Form Property Damage, and coverage for explosion, collapse, and underground hazards, with limits of liability of not less than \$2,000,000 per occurrence, \$4,000,000 aggregate and \$2,000,000 Products and Completed Operations.

**.4 Business Automobile Liability Insurance:** applicable to any automobile assigned to or used in the performance of the services, whether owned, hired or non-owned, with a limit of liability of not less than \$1,000,000 combined single limit per accident.

**11.2** Contractor will file certificates of insurance acceptable to the District prior to commencement of the Work. The certificates and the insurance policies required under the Contract will contain provisions that coverages afforded under the policies will not be canceled or allowed to expire without renewal until at least 30 days' prior written notice to the District.

**11.3** The Commercial General Liability policy will include coverage for bodily injury, property damage, independent contractors, blanket contractual, personal injury, products and completed operations, broad form property damage (including but not limited to completed operations) and coverage for explosion, collapse and underground hazards. This insurance will include contractual liability to cover the liability assumed by the Contractor under the indemnification provisions of the General Conditions.

**11.4** The Commercial General Liability and Business Automobile Liability policies will name The District and its directors, employees, and agents as additional insureds, using ISO additional insureds endorsement CG 20 10 11 85 or a substitute providing equivalent coverage. All coverage afforded to the additional insureds will 1) be primary and noncontributory as to any insurance or self-insurance retention of the additional insureds; 2) provide the same types and extents of coverages afforded to the primary insureds, and will not be limited to the "vicarious liability" of the additional insureds, but this paragraph will not be interpreted or applied to require coverage of liability of the additional insureds in violation of ORS 30.140; 3) waive all rights of subrogation against the additional insureds; 4) not be limited to "ongoing operations" and 5) be maintained for the same durations as the coverages afforded the primary insureds, including but not limited to the continuation of Products and Completed Operations.

**11.5** Contractor will pay all deductibles on all policies required under the Contract. Contractor's liabilities, including but not limited to Contractor's indemnity obligations, will not be deemed limited in any way to the insurance coverage required herein. Maintenance of insurance coverage is a material requirement of this Contract and Contractor's failure to maintain or renew coverage or to provide evidence of renewal during the term of this Contract, as required or when requested, may be treated as a material breach.

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**11.6** When the construction is to be accomplished within a public or private right-of-way requiring special insurance coverage, the Contractor will conform to the particular requirements and provide the required insurance. The Contractor will include in its liability policy all endorsements that the applicable government authority may require for the protection of the authority, its officers, agents, and employees. The Contractor will provide insurance coverage for special conditions, when required.

**11.7** The Contractor will require all subcontractors (unless otherwise approved by the District) to carry insurance at least equal to that required by this Article.

**ARTICLE 12 Safety**

**12.1** The Contractor will take all necessary precautions for the safety of its employees, the District's employees, and the public, and protection of the Work and of adjoining property, and will comply with all applicable provisions of federal, state and local safety laws and building codes and the District's fire insurance carrier's requirements to prevent accidents, injury to persons, loss of life and damage to property.

**12.2** The Contractor will not permit any structure to be loaded excessively.

**12.3** For work at an existing facility operated by the District, the Contractor will obtain approval, from the District, as to time and duration of activities prior to blasting, welding, torch cutting, building of fires, or making changes in the process water, city water, or fire protection systems.

**12.4** The Contractor will properly erect and maintain all necessary safeguards for the protection of workers, the District, the District's employees, and the public. The Contractor will post danger signs and markers warning against hazards created by features of the construction.

**12.5** Safety and accident reports will be submitted in accordance with federal, state, and local regulations. The Contractor will inform the District of any accidents within three (3) days of occurrence.

**12.6** The District, the DCR, and the Architect/Engineer are not responsible for safety, safety procedures, safety analysis of any condition on the project, or coordinating any safety efforts or programs of any contractor or subcontractor.

**ARTICLE 13 Royalties and Patents**

The Contractor will pay all royalties and license fees. The Contractor will defend all suits or claims for infringement of any patents and will save the District harmless from loss on account thereof except the District will be responsible for all such loss when a particular process or product is specified by it unless the Contractor will have information that a particular process or product infringes a patent, in which event, the Contractor will be responsible for loss on account thereof unless the Contractor promptly provides such information to the District.

**ARTICLE 14 Ownership of Documents**

All drawings, specification computations, sketches, test data, survey results, photographs, renderings, models, electronic data and other material related to the Work prepared by the Contractor, or furnished to the Contractor by the District or the Architect/Engineer, are the property of the District. The Contractor will submit to the District the original and a reproducible copy of all such materials upon the District's request, otherwise upon completion of construction. The Contractor will not use any such materials or copies thereof on other work nor will Contractor divulge information from such materials without the District's prior written approval.

## **ARTICLE 15 Methods of Carrying on the Work**

**15.1** The Contractor will be responsible for construction means, methods, techniques, sequences, procedures, coordination, orderly scheduling, and management of all Work by its employees and subcontractors.

**15.2** The Contractor will confine its equipment, apparatus, materials, and operations of workers and subcontractors within limits allowed by the District and will not unnecessarily encumber the premises. The Contractor will be responsible for all materials and equipment stored by the Contractor or its subcontractors.

**15.3** The Contractor will use the premises only for purposes necessary to the performance of this Contract. The Contractor will not make use of any existing structures on the District's property or any facilities therein without prior approval from the District.

**15.4** Whenever the Contractor will receive materials, equipment, or personal property from any person having a contract with the District for storage, erection, or installation, the Contractor will give to such person, or the District, written receipt for the items delivered and will be responsible for the proper care, storage, or replacement of items received.

**15.5** All manufactured articles, materials, and equipment will be stored, applied, installed, tested, connected, erected, used, cleaned and conditioned by the Contractor as directed by the manufacturer unless otherwise specified.

**15.6** The Contractor will maintain one complete copy of the Contract documents at the job site, with all the District RFPs, change orders, reviewed shop drawings, observation reports and other documents necessary to the prosecution of the Work. All Contract documents will be kept up to date with legible markings.

## **ARTICLE 16 Surveys, Permits and Regulations**

**16.1** This Contract does not constitute a land use permit, nor does acceptance of this Contract by the Contractor constitute approval of any legislative or quasi-judicial action required as a condition precedent to use of the land for the intended purpose.

**16.2** The Contractor will employ a licensed or registered land surveyor who will be responsible for all surveys, measurements and layouts required for the proper execution of the Work.

**16.3** The Contractor will compare and continually check for changing conditions, all dimensions, elevations, lines, grades and other information appearing on the drawings with the work of other contractors and with the actual dimensions, elevation lines grades and site conditions. The Contractor will report in writing to the Architect/Engineer and the District any discrepancies in the prevailing conditions before proceeding with the Work. The Contractor will be responsible for any cost or expense, which results from its failure to so compare and report.

**16.4** The Contractor will furnish, set and maintain grade stakes and temporary markers and will be fully responsible for the accuracy thereof.

**16.5** The Contractor will obtain and pay for all permits, licenses, certificates, inspections and other approvals required, both temporary and permanent. Any such fees will be included in the Contract Sum. Prior to the Contractor's application for a building permit, the Contractor will secure the District's approval of the Project value to be used for permit purposes.

**16.6** When construction crosses highways, railroads, streets, watercourses, or utilities under the jurisdiction of a state, county, city or other public agency, public utility or private entity, the

Contractor will conform to the permits, licenses, regulations and conditions of such authorities. The Contractor is responsible for the knowledge of all underground utilities present on the site.

#### **ARTICLE 17 Materials, Employees and Workmanship**

**17.1** Unless otherwise specified, all materials will be new and both workmanship and materials will be of good quality. All workers and subcontractors will be skilled in their trades. The Contractor will furnish evidence of the skill of its workers and subcontractors upon the request of the District.

**17.2** The Contractor will at all times enforce strict discipline and good order among its employees and all subcontractors, and will not employ or keep on the job any employee or subcontractors' employees whom the District deems undesirable or unfit. If the District requires the Contractor not to employ or keep on the job any employee or subcontractors' employees, the Contractor will promptly comply without any additional costs to the District or any increase in the Contract Sum.

#### **ARTICLE 18 Connecting the Work**

**18.1** The Contractor will do all cutting, fitting, and patching that may be required to make the several parts of the Work come together properly and to fit the Contractor's Work to receive or be received by the work of other firms as shown upon or reasonably implied by the drawings and specifications. After others have finished their work, the Contractor will promptly complete and finish the Work as the District may direct.

**18.2** The Contractor will not endanger, cut, or alter the work of any other firm without the consent of the District.

**18.3** Requirements for additional cutting, fitting, and patching resulting from the Contractor's defective or untimely Work will not be a basis for additional cost to the District.

**18.4** If any part of the Work depends for proper execution or maximum durability upon the work of any other firm, the Contractor or its subcontractor(s) will inspect said work before commencing its own Work and will make known, for approval by the District, any departures from the drawings and specifications. Failure of the Contractor to observe these requirements will bar the Contractor from claiming thereafter that defects in its own Work are due to defects in the work of others, unless the Contractor submits clear and convincing evidence that a thorough inspection of said other work was made before the Contractor's Work went forward and that tests which were reasonable and customary failed to disclose the defects which later appeared.

**18.5** Where it is necessary to connect to existing facilities, the Contractor will not interrupt the District's operations to make such connections, but the Work will be done according to a schedule convenient to, and approved in writing by, the District. Any overtime, necessary for such connections will be at the Contractor's expense.

#### **ARTICLE 19 Protection of Work, Property and Persons**

**19.1** The Contractor will protect the Work, its employees and equipment, the District's property, adjacent property and the public from personal injury, loss, or property damage from any cause whatsoever.

**19.2** The Contractor will be responsible for any injury, loss, or damage to any presently existing improvements on the premises caused by the Contractor or its employees, agents, or subcontractors and in the event of such injury, loss, or damage, the Contractor will promptly

make such repairs or replacements as required by the District without additional cost to the District.

**19.3** The Contractor will provide and erect all planking, bridges, bracing, shoring, sheet piling, lights, and warning signs necessary for the protection of streets, adjacent property and the public. The Contractor will provide scaffolds, tarpaulins, and similar items as required to protect the District's equipment and employees. The Contractor will, if necessary, seal off its Work from the District's work so as not, to interfere with the District's operations.

**19.4** During the progress of the Work, the Contractor will protect all finished Work as soon as same is erected and will maintain such protection until no longer required.

**19.5** The completed Work will include all necessary permanent safety devices, such as machinery guards and similar ordinary safety items required by State and Federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the Work subject to such safety regulations will be fabricated, furnished, and installed in compliance with their requirements. The Contractor will be held responsible for compliance with the requirements included herein.

**19.6** The Contractor will preserve and protect existing vegetation such as trees, lawns and shrubs which may be impacted by the Work and which are not to be removed. The Contractor will consult with the District concerning trees to remain adjacent to the construction area. The Contractor will protect trees from stockpiling, vehicle driving and parking beneath tree canopies, dumping of refuse or chemically injurious materials or liquids, and continual puddling or running water. The Contractor will not remove more than six inches of existing soil or fill more than two inches over existing soil within six feet of trees to be saved. The Contractor will be permitted to remove interfering branches and roots only where absolutely necessary and without injury to trunks, and will employ a qualified tree surgeon to remove branches or roots and to treat cuts.

## **ARTICLE 20 Inspections and Tests**

**20.1** The Contractor will permit and facilitate observation or inspection of the Work by the District, the District's representatives, and governmental authorities having jurisdiction, at all times when the Work is in preparation or progress.

**20.2** The costs for inspections or tests not required by the specifications, but which the District requests, will be borne by the District, except where the Contractor's Work fails any inspection, the Contractor will pay the costs of that inspection. All inspection requests of the District will be complied with.

**20.3** All tests will be performed by a testing agency approved by the District and will be in accordance with the current standards of the American Society for Testing and Materials, unless otherwise specified by the District. The Contractor will furnish the District with two (2) copies of the test procedures used.

**20.4** Acceptance by the District of test data or inspections of any portion of the Work by the District will not relieve the Contractor of its obligation to perform the Work as required by the Contract.

**20.5** Architect/Engineer to demonstrate compliance with the specified requirements. Performance testing will be conducted under the specified design operating conditions or under such simulated operating conditions as recommended or approved by the Architect/Engineer. The Contractor will schedule such testing with the Architect/Engineer at least one (1) week in



advance of the planned date for testing. All costs of performance testing will be borne by the Contractor.

**20.6** Failure of the Architect/Engineer or the District, during the progress of the Work, to discover or reject defective Work or Work not in accordance with the drawings and specifications will not be deemed an acceptance thereof or a waiver of the District's right to proper execution of the Work. No partial or final payment or partial or entire occupancy of the premises by the District will be construed to be an acceptance of Work or materials which are not strictly in accordance with the Contract, or a waiver of the District's rights.

**20.7** If any Work is covered up without approval of the District or the Architect/Engineer, it will be uncovered for examination, and, after examination, the Contractor will perform all re-work required to correct defective work and restore it to the condition called for by the Contract. In such case, the cost of uncovering the Work and of all re-work involved will be borne by the Contractor.

**20.8** If the District or the Architect/Engineer must perform re-inspections due to failure of the Work to comply with requirements of the Contract Documents during final inspection, the District may deduct its costs and the Architect's/Engineer fee for such additional services from the final payment due the Contractor.

**20.9** The Contractor will furnish, without charge, samples of materials or products as requested by the District or the Architect/Engineer, whether or not specifically called for in the Contract. Contractor will not incorporate any such material or product into the Work until after the District or the Architect/Engineer has approved the samples submitted in writing. The samples will be submitted to give the District and the Architect/Engineer ample time for review, selection or approval so as to not delay the Work.

## **ARTICLE 21 Additional or Deleted Work**

**21.1** Within twenty-four (24) hours after receipt of a field change order and within five (5) days after receipt of an District RFP for changes in the Work not covered by agreed-upon "unit Prices," the Contractor will submit to the District a lump sum proposal, itemized by cost code, stating the amount to be added to or deducted from the Contract Sum and the effect, if any, on the schedule by reason of such changes. The amount for additional or deleted Work not covered by "unit prices" will be determined as follows:

**.1** For additional Work to be performed by the Contractor's subcontractors, the Contractor will add an amount equal to each subcontractor's direct costs for labor, materials, equipment rental, and transportation, plus ten percent (10%) thereof to cover all other charges for or in connection with such work. The costs for materials will include taxes, if any. The percentage fee includes, but is not limited to, layout, supervision (field and home office), small tools and related items, general expenses, overhead, and profit of the Contractor and its subcontractors.

**.2** For additional Work to be performed by the Contractor's own forces, the Contractor will add an amount equal to the Contractor's direct costs for labor, materials, equipment rental, and transportation, plus ten percent (10%) thereof to cover all other charges for or in connection with such work. The costs for materials will include taxes, if any. The percentage fee includes, but is not limited to, all charges for layout, supervision (field and home office), small tools and related items, general expenses, overhead, and profit.

**.3** For work to be deleted, the Contractor will deduct an amount equal to the direct cost savings for labor, material, equipment, transportation, and taxes deleted from the work,

plus ten percent (10%), to cover all other savings from, or in connection with, such deleted work. The costs for materials will include taxes if any. The percentage fee includes only those charges for layout, supervision (field and home office), small tools and related items, general expenses, overhead, and profit attributable to the deleted work.

**21.2** No fee or other markup of any kind will be applicable to any premium portion of wages, taxes, or related benefits.

**21.3** If the Contractor's proposal, submitted in response to a field change order or the District RFP, is acceptable to the District, the Architect/Engineer will issue a contract change order consistent with the Contractor's proposal.

**21.4** If the District and the Contractor are unable to agree upon change order terms, or if in the opinion of the District the Work must proceed before an agreement can be negotiated, the District will issue a written order to the Contractor to proceed with the changes, and the Contractor will comply. In such event, the Contractor will keep daily records as to all labor employed concerning the changes. The Contractor's records will itemize costs for labor, materials, equipment rental, and transportation. The Contractor will submit the records for approval by the DCR. If the Contractor fails to keep such records, all Work will be deemed to have been performed at Contractor's own expense. The District and the Contractor will attempt to negotiate fair and reasonable adjustments to the Contract for changes in the Work. The Contractor will submit to the District all evidence in support of the Contractor's proposal. In the absence of an agreement to the contrary, the changed work will be priced in accordance with of this Article 21.

**21.5** When a schedule of unit prices for additions or deletions to the Work is made a part of the Contract, and in the event the District issues a field change order or the District RFP for additional or deleted Work to which unit prices are applicable, no percentage fee or other mark-up will be applied to scheduled unit prices. The District will have the right to establish verification procedures for all Work performed under unit price Contract provisions.

**21.6** In the event of addition and deletion of like items in a field change order or the District RFP, the like item quantity will be summed and the unit prices or the percentage fee will be applied to the total.

**21.7** In no event will the Contractor proceed with changes in the Work without a written order from the District to so proceed. The District will be under no obligation to pay for unauthorized extra, additional or changed Work performed by the Contractor without a written Change Order or written order to proceed executed by the District.

## **ARTICLE 22 Schedule**

**22.1** The Contractor will submit, to the District, a schedule of the Work within ten (10) days after award of the Contract and will maintain the schedule on a current basis until the Work is completed. Time limits set forth in the Contract for substantial completion, final completion, or any other project milestones, will govern, and the schedule must be adjusted to comply. The Contractor will perform the Work in accordance with the schedule as well as within the dates specified in the Contract.

**22.2** Periodically as required by the District, the Contractor will report to the District on the status of the Work on duplicate marked copies of the current schedule. The Contractor will indicate in the status report any Work that is not proceeding according to the current schedule or to modify the schedule. Any modifications to the Contractor's schedule notwithstanding, the

Contractor will remain responsible to complete the Work within the times specified in the Contract.

**22.3** If the Work is not proceeding according to the Schedule and the District does not reasonably believe the Contractor's proposed actions or schedule modifications are sufficient to accomplish completion of the Work within the Contract time, the Contractor will be in default under the Contract. If the Contractor fails to cure such default by submitting proposed actions or schedule modifications, reasonably acceptable to the District, within ten (10) days of receiving written notice of the default, the District may perform such Work as it deems necessary to bring the Work into compliance with the current schedule and to credit the cost thereof against payments due the Contractor. Such action will not constitute the District's waiver of any other claim or claims against the Contractor resulting from the Contractor's failure to perform on schedule or within the time limits set forth in the Contract.

#### **ARTICLE 23 Delays and Extension of Time**

**23.1** If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the District, or by any other firm employed by the District or by changes ordered in the Work, strikes, lockouts, fires, floods, earthquakes, or acts of God, acts of war, or public enemy, inability to obtain materials due to government restrictions, acts of public officials, or by any cause which the District will decide justifies the delay, then the schedule for completion of the Work will be extended for a period equal to the delay so caused. No such delay will be recognized unless it alone increases the overall critical path duration of the schedule in effect at the time of the delay.

**23.2** No schedule extension will be allowed for delay commencing more than five (5) days before claim therefore is made in writing to the District. In case of a continuing delay, only one claim is necessary.

**23.3** No claim for delay will be allowed the Contractor on account of the Architect's/Engineer's or the District's failure to return drawings and shop drawings to the Contractor until ten (10) working days after the District's receipt of a demand for such drawings, and not then, unless such claim is reasonable. Disapproval of drawings by the District will not be a claim for delay.

**23.4** Extension of time of completion by the District, if any, will be the Contractor's sole remedy for delay, no matter how or by whom caused, and the Contractor will not be entitled to any increase in the Contract Sum or to damages or additional compensation as a consequence of such delays, provided however, the Contractor will be entitled to compensation for delays caused by the District's failure to obtain such permits as are the District's responsibility in a timely manner.

**23.5** The Contractor will cause each subcontract or agreement with material suppliers to contain a provision limiting remedies of subcontractors and suppliers for delay to those allowed the Contractor under Paragraph D, above.

#### **ARTICLE 24 Temporary Sign**

The Contractor may, at no cost to the District, provide a suitable temporary sign acceptable to the District advertising the Work and indicating the title of the project and name of the Architect/Engineer and the Contractor. The sign will be no larger than 4 feet by 8 feet. Layout, text and location of such sign will be as approved by the District. No other signs advertising the Work will be permitted.

#### **ARTICLE 25 Temporary Structures and Services**

**25.1 Toilets.** The Contractor will provide suitable toilet facilities at approved locations with proper enclosures for the use of all workers, and will maintain such in a sanitary and operable condition, all in conformity with local regulations.

**25.2 Temporary buildings.** The Contractor will provide such temporary buildings as may be required for the use of its workers and the safe storage of tools and materials. Such structures will be located on the job site with location as approved in advance by the District.

**25.3 Temporary Electric Power.** The Contractor will provide and pay for all temporary light and power required for the Work including all wiring, connections, and accessories, and all power consumed.

**25.4 Temporary Water Supply.** The Contractor will make all necessary arrangements for and provisions of water including temporary piping and hose extensions required for construction purposes. The Contractor will obtain and pay for temporary permits from proper authorities and pay for all water used.

**25.5 Temporary Facilities.** The Contractor will install and operate an adequate number of temporary hoists and furnish and maintain temporary scaffolds, ladders, runways, and the like as required for the proper execution of the Work. As soon as the progress of the Work will permit, the Contractor will erect the permanent stairs, platforms, ramps, catwalks, etc., properly equipped with handrails and other safeguards and will provide wood or paper coverings to protect these and all other permanent parts of the facility from damage or defacement during the Work.

**25.6 Removal of Temporary Structures and Services.** The Contractor will remove temporary structures and services installed by the Contractor upon completion of the Contract or as directed by District. The Contractor will make any repairs or alterations necessitated by such removal at the Contractor's expense.

**25.7 Pestilence Control.** The Contractor will guard against and, if necessary, exterminate rodents, termites, vermin, and other pests. All personnel on the project site will be required to dispose of garbage and refuse in covered metal containers, which the Contractor will furnish and empty regularly.

**25.8 Pollution Control.** The Contractor will comply with requirements of the District and of governmental authorities having jurisdiction, regarding pollution control.

**25.9** The Contractor will not disrupt or interrupt electric, gas, water, steam, or other utilities or services to existing structures without prior notice to the District and then only at a definite time and for a definite duration as approved by the District in writing.

**25.10** If Work is to be performed upon or adjacent to an existing structure, the Work will be executed in such manner as will not interfere with the continued free and comfortable use of the structure, walks and grounds. The Contractor will keep building exits clear of obstructions at all times.

**25.11** The Contractor will provide designated smoking areas, separate from areas where work is actively being performed, for its employees and subcontractors.

## **ARTICLE 26 Security of Equipment and Operable Machinery**

Site-parked mobile equipment, operable machinery, and hazardous parts of the new construction subject to mischief will be kept locked or otherwise made inoperable whenever left unattended.

## **ARTICLE 27 Weather Protection and Heating**

**27.1** The Contractor will provide and maintain weather protection and temporary heating to properly protect all Work from damage. The Contractor will not use any installed or partially installed heating system for temporary heating purposes, unless specifically authorized in writing by the District.

**27.2** When necessary to enclose buildings for construction, the Contractor will provide all permanent and temporary enclosures required and will provide temporary heating by means of adequately ventilated devices to maintain suitable temperatures for the Work of all trades. Temporary heating will be maintained for such periods as required or as directed by the District. When directed by the District, the Contractor will remove all temporary enclosures.

**27.3** If portable ventilating fans are used to dispel moisture, the Contractor will provide the same with adequate safety guards and the area will be broom clean to insure protection of personnel.

**27.4** The Contractor will use only flameproof tarpaulins.

## **ARTICLE 28 Cleaning**

**28.1** The Contractor will at all time keep the premises free from accumulation of waste materials or rubbish caused by employees, subcontractors, or the Work. At the completion of the Work, the Contractor will remove, from the building and site, all rubbish, tools, scaffolding and surplus materials, and will leave the Work broom clean unless otherwise directed. If, in the opinion of the District, the Contractor fails to keep the premises clean, the District may remove waste materials, rubbish, and charge the expense of such removal to the Contractor.

**28.2** The Contractor will thoroughly wash and clean all glass; replace broken glass; clean hardware; remove paint stains, spots, smears, marks, and dirt from all surfaces; clean fixtures; and wash terrazzo tile floors and all exposed concrete so as to present clean work to the District for acceptance.

**28.3** The Contractor will neatly stack construction materials such as concrete forms and scaffolding when not in use. The Contractor will promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids and cleaning solutions from surfaces to prevent marring or other damage.

**28.4** Volatile wastes will be properly stored in covered metal containers and removed daily.

**28.5** Wastes will not be buried or burned on the site, or disposed of into storm drains, sanitary sewers, streams, or waterways. The Contractor will remove and dispose of all wastes from the site in a manner complying with local ordinances and state and federal anti-pollution laws.

**28.6** The Contractor will periodically wet down walls, debris, trucks, chutes, etc. as required minimizing flying dust. The Contractor will provide enclosed chutes for upper floors to selected ground floor collecting or loading areas adjacent to the bottom of chutes will be sprayed or dampened with water to prevent dust.

## **ARTICLE 29 Progress Payments and Final Payments**

**29.1** The District will make progress payments to the Contractor on account of the Contract Sum as follows:

- .1** On or before the twentieth (20th) day of each month, the Contractor will submit a statement indicating the value of labor and materials acceptably incorporated into the Project. All such statements will be paid by the tenth (10th) day of the following month.

.2 There will be a five percent (5%) retainage of all sums due. The retainage will be paid to the Contractor with final payment.

**29.2** Partial payments will not constitute acceptance by the District of the Contractor's Work nor be construed as a waiver of any right or claim by the District in connection with the Work.

**29.3** The Contractor will submit invoices with a detailed cost breakdown.

**29.4** The Contractor will keep the Project, including any structure or the land upon which the Project is erected free and clear of all liens, claims, security interests or encumbrances in favor of any person and arising by reason of having provided labor, materials or equipment relating to the Work. The Contractor will indemnify and hold the District, the Project, and the real property harmless from and against any liens, notices, or claims that may be filed in connection with the Contractor's performance under this Contract or with construction of the Work, including without limitation, damages, costs, or attorney fees arising therefrom.

**29.5** Applications for Payment will include the value of materials or equipment not incorporated in the Work, but delivered and suitably stored at the site or at some other location agreed upon in writing by the parties hereto. The Contractor warrants that title to all equipment and materials will pass to the District upon the District's payment therefore or upon incorporation into the Work, whichever occurs first. The Contractor will prepare and execute all documents necessary to effect and perfect such transfer of title. Title thereto will vest in the District provided, however, the vesting of title will not impose any obligation on the District or relieve the Contractor of its obligations under the Contract.

**29.6** The Contractor will submit an updated schedule with each application for payment.

**29.7** The Contractor will submit certified payroll with each application for payment.

**29.8** Upon receipt of written notice that the Work is ready for final inspection and acceptance, the Architect/Engineer and the District will promptly make such inspection. The District will make final payment to Contractor approximately thirty (30) days after the District's acceptance of the completed Work.

**29.9** Before submitting application for final payment, the Contractor will remove all equipment from the project and complete the Contract closeout procedures.

**29.10** By acceptance of the final payment, the Contractor warrants that it has received payment in full for its performance of the Contract and waives all further claims against the District in connection with the Work. Final payment by the District will be conclusive proof of District's performance of the Contract.

### **ARTICLE 30 District's Right to Withhold Payment**

**30.1** The District will have the right to withhold from payments due the Contractor such sums as necessary, in the District's sole opinion, to protect the District against any loss or damage which may result from negligence or deficient Work by the Contractor; failure by the Contractor to perform its obligations, including failure to maintain satisfactory progress of the Work; or claims against the Contractor or the District relating to Contractor's performance or work. In addition, the District may withhold payments from the Contractor for damages, caused by the Contractor, for which no adjustment is made, or any subcontractors; and where reasonable evidence indicates a claim will be filed against the District or the property.

**30.2** If the Contractor fails to take prompt and adequate action to bring the Work on schedule or to correct deficiencies in the Work, or to perform any other obligations, the District will have

the right to perform such Work or cure any default by the Contractor as the District deems necessary, and to credit the cost thereof against payments due the Contractor.

#### **ARTICLE 31 Premium Time**

**31.1** The District reserves the right to accelerate the schedule from time to time, without cause, upon written direction to the Contractor to so accelerate. If the forces of contractor or any of its subcontractors are required to work overtime as a result of such acceleration, the District will reimburse the Contractor for the premium portion of overtime wages paid plus applicable federal and state payroll taxes and other actual payroll costs attributable to the overtime premium. Reimbursement for such acceleration will not include any overhead or profits of the Contractor or its subcontractors on the premium portion of overtime wages.

**31.2** The Contractor will keep and maintain accurate records of all overtime hours to be reimbursed and will secure the District's approval of such records on a daily basis. Reimbursement will be made based on such approved records by change order as provided herein.

**31.3** This article will have no application to overtime work that the Contractor is required to perform due to its own failure to meet the Contract schedule or, without limitation, due to any other fault of the Contractor.

#### **ARTICLE 32 Claims and Demands**

**32.1** If the Contractor claims that any written instructions issued after the effective date of this Contract, by drawings or otherwise, involve extra costs under the Contract, the Contractor will not be entitled to reimbursement for such extra costs unless the Contractor will so notify the Architect/Engineer and the District in writing before proceeding to execute the Work and within seven (7) days after receipt of such instructions.

**32.2** Claims and demands for any other cause whatsoever, by the Contractor against the District, must be served in writing upon the Architect/Engineer and the District within fourteen (14) days from the occurrence of the cause thereof, except as otherwise expressly provided, or the Contractor will be deemed to have waived such claims or demands.

#### **ARTICLE 33 Taxes**

The Contractor will pay all federal, state, and local taxes, including, but not limited to, excise taxes, sales and use taxes.

#### **ARTICLE 34 District's Right to Occupy**

**34.1** The District has the right to occupy or use, ahead of schedule, all or any substantially completed or partially completed portion of the Work, notwithstanding the time of completion for all of the Work. If occupancy or use increases the cost of the Work (other than for delay or for corrections which are the Contractor's responsibility), the Contractor will be entitled to extra compensation. If such occupancy or use delays completion of the Work, the Contractor will be entitled only to any extension of time. Claims for such extra compensation or extension of time, or notification to the Contractor of the District's intent to so occupy or use, will be made within five (5) days of the event giving rise to the claim for extra compensation or extension of time, or not later than five (5) days prior to the District's intended date of occupancy or use.

**34.2** After the District has taken occupancy of all or any substantially competed portion of the Project, the Contractor will not disrupt the use and occupancy thereof to make corrections in the

Work but will, at the District's discretion, make such corrections at the Contractor's expense outside of the District's normal hours of operation.

### **ARTICLE 35 District's Right to Terminate**

**35.1** If the Contractor fails to commence the Work in accordance with the provisions of the Contract; fails to diligently prosecute the Work to completion in a timely, efficient, workmanlike, skillful and careful manner, and in strict accordance with the provisions of the Contract (including the scheduled completion date and any interim scheduled milestone dates); fails to deploy adequate qualified personnel or equipment to complete the Work on time; fails to perform any of its obligations under the Contract; or fails to make prompt payments to its subcontractors, materialmen, or laborers, the Contractor must cure any such default within seven (7) days after written notice of the default or the District will have the right to (i) terminate the Contract; (ii) take possession of all or any part of the Contractor's materials, equipment, supplies, and other property of any kind used in the performance of the Work and to use such property including engaging the services of other parties therefore. No action taken by the District hereunder will be deemed a waiver of any other right or remedy. If the cost to the District of performing the balance of the Work is more than the balance of the Contract Sum that has not been paid to the Contractor, the Contractor will be liable, and will reimburse the District, for such excess.

**35.2** If the Contractor fails to prosecute the Work properly; or fails to perform any provision of the contract; or does, or omits, anything whereby safety or proper construction may be compromised or whereby damage or injury may result to persons or property, after three (3) days' written notice to the Contractor, the District will have the right to make good all omissions or deficiencies and may deduct the cost therefore from the Contract Sum. No action taken by the District hereunder will affect any other rights or remedies of the District or relieve the Contractor from any consequences or liabilities arising from such acts or omissions.

**35.3** The District may stop or suspend the work, in whole or in part, or terminate the Contract for public interest and without cause by giving seven (7) days' prior written notice of suspension or termination to the Contractor. In such event, the Contract price will be adjusted with respect to the Work completed at the time of termination. The District will pay the Contractor for Work completed according to payment provisions of the Contract and the District will reimburse the Contractor for all costs necessarily incurred in organizing and carrying out the stoppage of the Work and paid directly by the Contractor. The District will not reimburse the Contractor for any continuing contractual commitments to subcontractors, materialmen, or others, or for penalties or damages for canceling such contractual commitments inasmuch as Contractor will make all subcontracts and other commitments subject to this provision.

**35.4** The Contractor and the District recognize that if the Contractor is adjudged bankrupt, or makes a general assignment for the benefit of creditors, or if a receiver is appointed for the benefit of its creditors, or if a receiver is appointed on account of its insolvency, such could impair or frustrate the Contractor's performance of the Contract. Accordingly, the Contractor and the District agree that upon the occurrence of any such event, the District may request of the Contractor, or its successor in interest, assurance of future performance in accordance with the Contract. Upon failure to comply with such request within ten (10) days of the request, the District may terminate the Contract.

**35.5** If the District stops or suspends the Work, or terminates the Contract, and an arbitrator or a court determines that the District's termination was wrongful, such termination will be deemed converted to a termination without cause, set forth above, and the Contractor's remedy is limited



to the recovery of the payments permitted for such termination for public interest and without cause as set forth in subparagraph C, above.

**35.6** Termination by the District will not constitute any waiver of rights, claims or causes of action the District may have against the Contractor.

#### **ARTICLE 36 Arbitration**

Arbitration Required/Mediation First Option. Any dispute or claim that arises out of or which relates to this Contract, or to the interpretation or breach thereof, or to the existence, scope, or validity of this agreement or the arbitration agreement, will be resolved by arbitration in accordance with the then-effective arbitration rules of Arbitration Service of Portland, Inc., and judgment upon the award rendered pursuant to such arbitration may be entered in any court having jurisdiction thereof. The District, the Contractor, and all subcontractors, sub-subcontractors, material suppliers, engineers, architects, designers, construction lenders, bonding companies, and all other parties concerned with and involved in the performance of the contract are bound, each to the other, by this arbitration clause, provided such party has signed this Contract, or signs an agreement that incorporates this Contract by reference, or signs any other agreement to be bound by this arbitration clause. The parties acknowledge that mediation usually helps parties to settle their dispute. Therefore, any party may propose mediation whenever appropriate by any mediation process or mediator as the parties may agree upon. Any mediation or arbitration will take place in Deschutes County.

#### **ARTICLE 37 Attorney Fees**

If any arbitration or litigation is instituted to interpret, enforce, or rescind this Contract, including but not limited to any proceeding brought under the United States Bankruptcy Code, the prevailing party on a claim will be entitled to recover with respect to the claim, in addition to any other relief awarded, the prevailing party's reasonable attorney's fees and other fees, costs, and expenses of every kind, including but not limited to the costs and disbursements specified in Oregon Rules of Civil Procedure 68 A(2), incurred in connection with the arbitration, the litigation, any appeal or petition for review, the collection of any award, or the enforcement of any order, as determined by the arbitrator or court.

#### **ARTICLE 38 Assignment**

**38.1** The Contractor will not assign its rights or obligations under, or arising from, the whole or any part of the Contract or any subcontract without the District's prior written consent. The Contractor will not assign any amounts due or to become due under the Contract without prior written notice to the District.

**38.2** The Contractor hereby assigns, to the District (and its assigns), all interest in subcontracts and purchase orders, now existing or hereinafter entered into by the Contractor, for performance of any part of the Work. Assignment will be effective upon acceptance by the District, in writing and only as to those subcontracts and purchase orders that the District so designates. The District may accept assignment at any time during the course of construction prior to final completion. All of the Contractor's subcontracts and purchase orders will provide that they are freely assignable by the Contractor to the District (and its assigns). It is agreed and understood that such assignment is part of the consideration to the District for entering into the Contract and may not be withdrawn prior to final completion.

#### **ARTICLE 39 Guarantees and Warranties**

**39.1** In addition to any specific guarantees and warranties required by the Contract, the Contractor guarantees to perform the Work in a first class, workmanlike manner and guarantees all Work against defects in material or workmanship for a period of one (1) year from the date of acceptance of the Work or final payment by the District, whichever is later. Acceptance will mean final acceptance of the entire Work, early partial occupancy notwithstanding. However, the Contractor will be liable to the District for all damages sustained by the District due to the failure of any foundation within two (2) years of final payment under the contract.

**39.2** All guarantees or warranties of equipment or materials furnished to the Contractor or subcontractors by any manufacturer or supplier will be deemed to run to the benefit of the District. If any manufacturer or supplier of any equipment or material furnishes a guarantee or warranty for a period in excess of one (1) year from the date of acceptance, the Contractor's guarantee, as provided in Paragraph A of this Article will be deemed to extend for a like period as to such equipment or material.

**39.3** The Contractor will fulfill any warranties of manufacturers for material or equipment installed.

**39.4** Within a reasonable time after receipt of written notice thereof, the Contractor will correct defects in material or workmanship which exist prior to or during the period of any guarantee provided herein and any damage to other Work or property caused by such defects or the repairing of such defects, at the Contractor's own expense and without cost to the District, and without interruption to the District's occupancy.

**39.5** The guarantees and warranties will not be construed to modify or limit any rights or actions, which the District may otherwise have against the Contractor by law or statute, or in equity.

#### **ARTICLE 40 Public Contract**

**40.1** The Contractor will make payment promptly, as due, to all persons supplying to the Contractor labor or materials for the performance of the work provided for in this Contract.

**40.2** The Contractor will pay all contributions or amounts due the Industrial Accident Fund from the Contractor or any Subcontractor incurred in the performance of the Contract.

**40.3** The Contractor will not permit any lien or claim to be filed or prosecuted against the state, or a county, school district, municipality, municipal corporation or subdivision thereof, on account of any labor or materials furnished for the Work.

**40.4** The Contractor will pay to the Department of Revenue all sums withheld from employees under ORS 316.167.

**40.5** The Contractor will demonstrate that an employee drug testing program is in place.

**40.6** To the extent lawn and landscape maintenance is part of the Work, Contractor is required to compost or mulch yard waste material at an approved site, if feasible and cost-effective.

**40.7** If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or any Subcontractor by any person in connection with this Contract as the claim becomes due, the proper officer or officers representing the District may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due the Contractor by reason of this Contract.

**40.8** If the Contractor or a first-tier Subcontractor fails, neglects or refuses to make payment to a person furnishing labor materials in connection with this Contract within 30 days after receipt

of payment from the District or a contractor, the Contractor or the Subcontractor will owe the person the amount due plus interest charges commencing at the end of the 10-day period that payment is due under ORS 279C.580(4) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest charged to the Contractor or the Subcontractor on the amount due will equal three times the discount rate on 90-day commercial paper in effect at the Federal Reserve Bank in the Federal Reserve district that includes Oregon on the date that is 30 days after the date when payment was received from the District or from the contractor, but the rate of interest may not exceed 30 percent. The amount of interest may not be waived.

**40.9** If the Contractor or any Subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with this Contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The payment of a claim in the manner authorized in this section does not relieve the Contractor or the Contractor's surety from obligation with respect to any unpaid claims.

**40.10** A person may not be employed by the Contractor or any Subcontractor for more than 10 hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency or when the public policy absolutely requires it, and in such cases, except in cases of agreements for personal services as defined in ORS 279C.100, the employee will be paid at least time and a half pay:

- .1 For all overtime in excess of eight hours in any one day or 40 hours in any one week when the work week is five consecutive days, Monday through Friday; or
- .2 For all overtime in excess of 10 hours in any one day or 40 hours in one week when the work week is four consecutive days, Monday through Friday; and
- .3 For all work performed on Saturday and on any legal holiday specified in ORS 279C.540.

**40.11** The Contractor will give notice in writing to employees either at the time of hire or before commencement of work on the agreement, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that the employees may be required to work. The Contractor will include an identical provision in its subcontracts and require all Subcontractors, of any tier, to include an identical provision in all subcontracts.

**40.12** In the case of agreement for personal services as defined in ORS 279C.100, the employee will be paid at least time and half for all overtime worked in excess of 40 hours in any one week, except for individuals under personal services agreements who are excluded under ORS 653.010 to 653.261 or under 29 U.S.C. 201 to 209 from receiving overtime.

**40.13** Agreements for services must contain a provision that requires that persons employed under the agreement will receive at least time and a half pay for work performed on the legal holidays specified in a collective bargaining agreement or in ORS 279C.540 (1)(b)(B) to (G) and for all time worked in excess of 10 hours in any one day or in excess of 40 hours in any one week, whichever is greater.

**40.14** The Contractor will promptly, as due, make payment to any person, copartner ship, association or corporation furnishing medical, surgical and hospital care services or other needed care and attention, incident to sickness or injury, to the employees of the Contractor, of all sums that the Contractor will pay for the services and all moneys and sums that the

Contractor collected or deducted from the wages of employees under any agreement for the purpose of providing or paying for the services.

**40.15** The Contractor and all Subcontractors are either employers that will comply with ORS 656.017, or employers that are exempt under ORS 656.126.

**40.16** The Contractor and all Subcontractors will comply with the existing state prevailing rate of wage and, if applicable, the federal prevailing rate of wage required under the Davis-Bacon Act (40 U.S.C. 3141 et seq.) that may be paid to workers in each trade or occupation required for the public works employed in the performance of this Contract either by the Contractor or the Subcontractor or other person doing or contracting to do the whole or any part of the Work contemplated by this Contract, as specified in the specifications for the Work.

**40.17** Workers will be paid not less than the specified minimum hourly rate of wage in accordance with ORS 279C.838 and ORS 279C.840.

**40.18** Contractor represents and agrees that the specifications contain a sufficient provision stating that a fee is required to be paid by the District to the Commissioner of the Bureau of Labor and Industries as provided in ORS 279C.825 (1). The fee will be paid to the Commissioner under the administrative rule of the Commissioner.

**40.19** The Contractor represents and agrees that the specifications contain a sufficient provision stating that Contractor and every Subcontractor must have a public works bond filed with the Construction Contractors Board before starting work on the project, unless exempt under ORS 279C.836(4), (7), (8) or (9).

.1 The Contractor must have a public works bond filed with the Construction Contractors Board before starting work on the project, unless exempt under ORS 279C.836 (4), (7), (8) or (9).

.2 Every Subcontractor must require the Subcontractor to have a public works bond filed with the Construction Contractors Board before starting work on the project, unless exempt under ORS 279C.836(4), (7), (8) or (9).

**40.20** The hourly rate of wage to be paid by the Contractor or every Subcontractor subject to prevailing wage rates to workers, will be not less than the prevailing rate of wage for an hour's work in the same trade or occupation in the locality where such labor is performed.

**40.21** The Contractor and every Subcontractor subject to prevailing wage rates to workers will keep the prevailing wage rates for that project posted in a conspicuous and accessible place in or about the project.

**40.22** To the extent the Contractor or any Subcontractor subject to prevailing wage rates will also provide for or contribute to a health and welfare plan or a pension plan, or both, for its employees on the project, the Contractor or Subcontractor, as applicable, will post notice describing such plans in a conspicuous and accessible place in or about the project. The notice preferably will be posted in the same place as the notice required under Paragraph U, above. In addition to the description of the plans, the notice will contain information on how and where to make claims and where to obtain further information.

**40.23** Contractor or the Contractor's surety, and every Subcontractor or Subcontractor's surety, will file certified statements with the District in writing on the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker whom the Contractor or the Subcontractor has employed upon such public work, and that no worker employed upon such public work has been paid less than the prevailing rate

of wage or less than the minimum hourly rate of wage specified in the contract, which certificate and statement will be verified by the oath of the Contractor or the Contractor's surety, or Subcontractor or the Subcontractor's surety that the Contractor or Subcontractor has read such statement and certificate and knows the contents thereof and that the same is true to the Contractor's or the Subcontractor's knowledge. The certified statements will set out accurately and completely the payroll records for the prior week, including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made and actual wages paid. Each certified statement required will be delivered or mailed by the Contractor or the Subcontractor to the District. Certified statements will be submitted for each week during which the Contractor or Subcontractor employs a worker upon the public work will be submitted once a month by the fifth business day of the following month. If a contractor fails to file the required certified statements, the public agency will retain 25 percent of any amount earned by the contractor until the contractor has filed with the public agency certified statements as required by this Paragraph W. Information submitted on certified statements may be used only to ensure compliance with the provisions of ORS 279C.800 to 279C.870.

**40.24** The Contractor or the Subcontractor will preserve the certified statements for a period of three years from the date of completion of the Contract.

**40.25** Contractor represents and agrees that the District has fully and timely included a provision that the Contractor and any Subcontractor will comply with ORS 279C.840 in the advertisement for bids, the request for bids, the contract specifications, the accepted bid or elsewhere in the contract documents and that the District has no liability for unpaid minimum wages.

**40.26** The District will make progress payments under the Contract monthly as work progresses. Payment will be based upon estimates of work completed that are approved by the District. A progress payment will not be considered acceptance or approval of any work or waiver of any defects therein. In instances when an invoice is filled out incorrectly or when there is any defect or impropriety in any submitted invoice when there is a good faith dispute, the District will so notify the Contractor within 15 days stating the reason or reasons the invoice is defective or improper or the reasons for the dispute. A defective or improper invoice, if corrected by the Contractor within seven days of being notified by the District, will not cause a payment to be made later than specified in this Paragraph Z.

**40.27** If requested in writing by a first-tier Subcontractor, the Contractor, within 10 calendar days after receiving the request, will send to the first-tier Subcontractor a copy of that portion of any invoice, request for payment submitted to the District or pay document provided by the District, to the Contractor specifically related to any labor or materials supplied by the first-tier Subcontractor.

**40.28** Payment of interest may be postponed when payment on the principal is delayed because of disagreement between the District and the Contractor.

**40.29** The District may reserve as retainage from any progress payment an amount not to exceed five percent of the payment. As work progresses, the District may in its sole discretion reduce the amount of the retainage and the District may in its sole discretion eliminate retainage on any remaining monthly contract payments after 50 percent of the work under the contract is completed if, in the District's sole opinion, such Work is progressing satisfactorily. Elimination or reduction of retainage will be allowed only upon written application by the Contractor, which application will include written approval of the Contractor's surety; except that when the contract

work is 97 ½ percent completed the District may, at its discretion, and without application by the Contractor, reduce the retained amount to 100 percent of the value of the contract work remaining to be done. Upon receipt of a written application by the Contractor, the District will respond in writing within a reasonable time.

**40.30** The retainage held by the District will be included in and paid to the Contractor as part of the final payment of the contract price. The Construction Manager will notify the District in writing when the Contractor considers the work complete and the District will, within 15 days after receiving the written notice, either accept the work or notify the Contractor of work yet to be performed on the contract.

**40.31** The Contractor will not request payment from the District of any amount withheld or retained in accordance herewith until such time as the Contractor has determined and certified to the District that the Subcontractor is entitled to the payment of such amount. A dispute between the Contractor and a first-tier Subcontractor relating to the amount or entitlement of a first-tier Subcontractor to a payment or a late payment interest penalty under a clause included in the subcontract pursuant to the terms hereof does not constitute a dispute to which the District is a party. The District will not be included as a party in any administrative or judicial proceeding involving such a dispute. The Contractor will include in each subcontract for property or services entered into by the Contractor and a first-tier Subcontractor, including material supplier, for the purpose of performing a construction contract:

.1 A payment clause that obligates the Contractor to pay the first-tier Subcontractor for satisfactory performance under its subcontract within 10 days out of such amounts as are paid to the Contractor by the District under such contract; and,

.2 An interest penalty clause that obligates the Contractor, if payment is not made within 30 days after receipt of payment from the District, to pay the first-tier Subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause included in the subcontract pursuant to subparagraph (1) of this Paragraph FF. The Contractor or first-tier Subcontractor will not be obligated to pay an interest penalty if the only reason that the Contractor or first-tier Subcontractor did not make payment when payment was due is that the Contractor or first-tier Subcontractor did not receive payment from the District or the Contractor when payment was due. The interest penalty will be:

(a) For the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and,

(b) Computed at the rate specified in ORS 279C.515(2).

**40.32** The Contractor will include in each of its subcontracts, for the purpose of performance of such contraction condition, a provision requiring the first-tier Subcontractor to include payment clause and an interest penalty clause conforming to the standards of Paragraph EE, above, in each of its subcontracts and to require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

**40.33** The Contractor will comply and require all Subcontractors to comply with applicable requirements of all laws, codes, ordinances, regulations and statutes, including but not limited to those in ORS Chapter 279C. To the extent that ORS Chapter 279C, or any other law, code, ordinance or regulations, requires any term or condition to be included in this Contract, such term or condition are hereby incorporated by this reference. Nothing contained herein will be construed so as to require the commission of any act contrary to law, code, rule, statute,

Pacific Crest Athletic Field Development Project

ordinance or regulation and whenever there is any conflict between any provisions contained herein and any statute, law, code, ordinance, rule or regulation the provision of this Contract which is affected will be curtailed and limited only to the extent necessary to bring it within the requirements of the law, code, rule, statute, ordinance or regulation.

END OF DOCUMENT 00 7200

Bend Park and Recreation District  
General Specifications

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Division 00, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Phased construction.
  - 4. Work by Owner.
  - 5. Work under separate contracts.
  - 6. Future work.
  - 7. Purchase contracts.
  - 8. Owner-furnished products.
  - 9. Contractor-furnished, Owner-installed products.
  - 10. Access to site.
  - 11. Coordination with occupants.
  - 12. Work restrictions.
  - 13. Specification and drawing conventions.
  - 14. Miscellaneous provisions.

1.3 PROJECT INFORMATION

- A. Project Identification: Pacific Crest Athletic Field Development Project.
  - 1. Project Location: 19150 Skyliners Road, Bend, OR.
- B. Owner: Bend Park and Recreation District, 799 SW Columbia St, Bend OR 97702.
  - 1. Owner's Representative: Jason Powell, 541-706-6158.
- C. Engineer: BECON Civil Engineering & Land Surveying.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:



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1. Project consists of the construction of turf athletic fields, asphalt paving, concrete paving and stairs, aggregate pathways, fences and gates, irrigation and landscape and other work to complete the project as described in the drawings and specifications.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 OWNER-FURNISHED, CONTRACTOR INSTALLED, (OFCI) PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

1.6 ACCESS TO SITE

- A. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  1. Limits: Confine construction operations to areas in which work is indicated in the drawings.
  2. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Condition of Existing Site / Facilities: Maintain portions of existing areas affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations to the satisfaction of the District.

1.7 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and existing adjacent area(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
  1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
  2. Notify Owner not less than 48 (forty eight) hours in advance of activities that will affect Owner's operations.

Bend Park and Recreation District  
General Specifications

- B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 48 (forty eight) hours' notice to Owner of activities that will affect Owner's operations.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1.8 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two (2) days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

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- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
  - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

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SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. 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 Owner 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.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2300

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SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 01 2300 "Alternates" for products selected under an alternate.
  - 2. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit electronic PDF copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and

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separate contractors that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - h. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - j. Cost information, including a proposal of change, if any, in the Contract Sum.
  - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Owner's Action: If necessary, Owner will request additional information or documentation for evaluation within five (5) days of receipt of a request for substitution. Owner will notify Contractor of acceptance or rejection of proposed substitution within ten (10) days of receipt of request, or five (5) days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Owners approval signature on CSI form 13.1A, Change Order Request, Proposal Request, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Owner does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

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1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 10 ten days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Owner will consider requests for substitution if received within 60 sixty days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Owner.
  - 1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.



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- b. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- c. Substitution request is fully documented and properly submitted.
- d. Requested substitution will not adversely affect Contractor's construction schedule.
- e. Requested substitution has received necessary approvals of authorities having jurisdiction.
- f. Requested substitution is compatible with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500

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SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 01 2500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Owner / Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Owner will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Owner are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request submit a Change Order Request, estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated costs, with total amount of purchases and credits to be made.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity

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duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- e. Quotation Form: Use forms provided by Owner, (00 6357 Change Order Request). Sample copies are included in Project Manual.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a Change Order Request to Owner.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use form provide by Owner, (00 6357 Change Order Request). Sample copies are included in Project Manual.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Change Order Request, Owner will issue a Change Order for signatures of Owner and Contractor on form included in Project Manual, (00 6363 Change Order Form).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

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SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 2. Section 01 3200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
  - 2. Submit the schedule of values to Owner at earliest possible date, but no later than (7) seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Sub-schedules for Separate Elements of Work: Where the Owner has defined separate elements of the Work for separate project funding sources; provide sub-schedules showing values coordinated with each element.

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- B. Format and Content: Use Project Manual section 00 6273 Schedule of Values as a guide to establish line items for the schedule of values. Provide at least one line item for each Section.
1. Arrange schedule of values consistent with format of Owners form 006365 "Owners Application for Payment".
  2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports..
  3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  4. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of overhead and profit for each item.
  5. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments.
1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use Owners form 006365 "Owners Application for Payment" as form for Applications for Payment. Electronic copy will be available upon request to Owner.
- D. Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of Contractor. Owner will return incomplete applications without action.
1. Entries shall match data on the schedule of values. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders issued before last day of construction period covered by application.
- E. Transmittal: Submit electronically via email (1) one signed PDF copy of each Application for Payment to Owner.

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1. Transmit required BOLI wage certifications of all contractor employees having worked onsite during the application period for Owner reference per contract documents.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. Schedule of values.
  2. Submittal schedule (preliminary if not final).
- G. Application for Payment at Substantial Completion: After Owner issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
- H. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence that claims have been settled if required.
  2. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2900

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SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Requests for Information (RFIs).
  - 4. Project Web site.
  - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.
  - 4. Section 01 9113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

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1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Submit with signed contract, per Article 6 of the General Conditions, a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in temporary field office. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.



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- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Scheduling and oversee all Special Inspections required by Owner and Owners special inspection agency.
  7. Preinstallation conferences.
  8. Project closeout activities.
  9. Startup and adjustment of systems.
  10. Onsite training and demonstrations of systems.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

## 1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.

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- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
  - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
  - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
  - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

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9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
  10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 3300 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
  2. File Preparation Format: DWG, Version AutoCad 2010 or later, operating in Microsoft Windows operating system.
  3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
  4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    - b. Digital Data Software Program: Drawings are available in AutoCad 2010 or newer version.
    - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect or Owner will return RFIs submitted to Architect or Owner by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.

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9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Form 006319, bound in Project Manual.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect / Owner will review each RFI, determine action required, and respond. Allow seven, (7), working days for Architect's / Owner's response for each RFI. RFIs received by Architect or Owner after 3:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's / Owner's action may include a request for additional information, in which case Architect's / Owner's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Owner in writing within (3), three days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.

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7. Date Architect's or Owner's response was received.

F. On receipt of Architect's or Owner's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Owner within three (3) days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

## 1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Contractor is responsible for conducting meeting and shall record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three (3) days of the meeting.

B. Preconstruction Conference: Owner will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than five (5) days after a Notice to Proceed.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
  - a. Tentative construction schedule.
  - b. Phasing.
  - c. Critical work sequencing and long-lead items.
  - d. Designation of key personnel and their duties.
  - e. Lines of communications.
  - f. Procedures for processing field decisions and Change Orders.
  - g. Procedures for RFIs.
  - h. Procedures for testing and inspecting.
  - i. Procedures for processing Applications for Payment.
  - j. Distribution of the Contract Documents.
  - k. Submittal procedures.

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- l. Sustainable design requirements.
  - m. Preparation of record documents.
  - n. Use of the premises.
  - o. Work restrictions.
  - p. Working hours.
  - q. Owner's occupancy requirements.
  - r. Responsibility for temporary facilities and controls.
  - s. Erosion and Sediment Control, 1200C permit requirements if any.
  - t. Procedures for disruptions and shutdowns.
  - u. Construction waste management and recycling.
  - v. Parking availability.
  - w. Office, work, and storage areas.
  - x. Equipment deliveries and priorities.
  - y. First aid.
  - z. Security.
  - aa. Progress cleaning.
  - bb. Construction waste management.
4. Minutes: Contractor will record and distribute meeting minutes.
- C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.

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- u. Testing and inspecting requirements.
  - v. Installation procedures.
  - w. Coordination with other work.
  - x. Required performance results.
  - y. Protection of adjacent work.
  - z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Contractor shall schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than thirty (30) days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for completing sustainable design documentation.
    - e. Requirements for preparing operations and maintenance data.
    - f. Requirements for delivery of material samples, attic stock, and spare parts.
    - g. Requirements for demonstration and training.
    - h. Preparation of Contractor's punch list.
    - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - j. Submittal procedures.
    - k. Coordination of separate contracts.
    - l. Owner's partial occupancy requirements.
    - m. Installation of Owner's furniture, fixtures, and equipment.
    - n. Responsibility for removing temporary facilities and controls.
  - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Contractor shall conduct progress meetings at regular intervals, as discussed at preconstruction meeting.

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1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
  - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - 1) Review schedule for next period.
  - b. Review present and future needs of each entity present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Status of submittals.
    - 4) Deliveries.
    - 5) Off-site fabrication.
    - 6) Access.
    - 7) Site utilization.
    - 8) Temporary facilities and controls.
    - 9) Progress cleaning.
    - 10) Quality and work standards.
    - 11) Status of correction of deficient items.
    - 12) Field observations.
    - 13) Status of RFIs.
    - 14) Status of proposal requests.
    - 15) Pending changes.
    - 16) Status of Change Orders.
    - 17) Pending claims and disputes.
    - 18) Documentation of information for payment requests.
3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.



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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

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SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Construction schedule updating reports.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Special reports.
- B. Related Requirements:
  - 1. Section 01 3300 "Submittal Procedures" for submitting schedules and reports.
  - 2. Section 01 4000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Owner.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships.

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Network calculations determine when activities can be performed and the critical path of Project.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- C. Contractor's 3 week "look ahead" schedule.
  - 1. Submit a working electronic copy of schedule in PDF or Excel format.
  - 2. Schedule shall list work occurring in current week, and show work occurring the next two (2) consecutive weeks.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. 3 week "look ahead" schedule: Submit at weekly intervals.
- F. Daily Construction Reports: Submit at monthly intervals.
- G. Material Location Reports: Submit at monthly intervals.
- H. Site Condition Reports: Submit at time of discovery of differing conditions.

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- I. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
  - 4. Review delivery dates for Owner-furnished products.
  - 5. Review schedule for work of Owner's separate contracts.
  - 6. Review submittal requirements and procedures.
  - 7. Review time required for review of submittals and resubmittals.
  - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
  - 10. Review and finalize list of construction activities to be included in schedule.
  - 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from entities involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

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1. Activity Duration: Define activities so no activity is longer than forty five (45) days, unless specifically allowed by Architect or Owner.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 fifteen days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Owner's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 30 Thirty days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.

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- g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
  - 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
  - D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
  - E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
    - 1. Unresolved issues.
    - 2. Unanswered Requests for Information.
    - 3. Rejected or unreturned submittals.
    - 4. Notations on returned submittals.
    - 5. Pending modifications affecting the Work and Contract Time.
  - F. Recovery Schedule: When periodic update indicates the Work is 14 fourteen or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
  - G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
    - 1. Use Microsoft Project, for current Windows operating system operating system.
- 2.2 STARTUP CONSTRUCTION SCHEDULE
- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven (7) days of date established for the Notice to Proceed.

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- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first (30) thirty days of construction.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within (10) ten days of date established for the Notice of Award. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

## 2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.
  - 5. Material deliveries.
  - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
  - 7. Accidents.
  - 8. Meetings and significant decisions.
  - 9. Unusual events (see special reports).
  - 10. Stoppages, delays, shortages, and losses.
  - 11. Emergency procedures.
  - 12. Orders and requests of authorities having jurisdiction.
  - 13. Change Orders received and implemented.
  - 14. Construction Change Directives received and implemented.
  - 15. Services connected and disconnected.
  - 16. Equipment or system tests and startups.
  - 17. Partial completions and occupancies.
  - 18. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
  - 1. Material stored prior to previous report and remaining in storage.
  - 2. Material stored prior to previous report and since removed from storage and installed.
  - 3. Material stored following previous report and remaining in storage.

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- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with each regularly scheduled progress payment.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 3200



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SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Section 01 2900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's or Owner's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's or Owner's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

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1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect or Owner and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  4. Format: Arrange the following information in a tabular format:
    - a. Submittal number, submittal sequence shall start with 001.
    - b. Scheduled date for first submittal.
    - c. Specification Section number and title.
    - d. Submittal category: Action; informational.
    - e. Name of subcontractor.
    - f. Description of the Work covered.
    - g. Scheduled date for Architect's or Owner's final release or approval.
    - h. Scheduled date of fabrication.
    - i. Scheduled dates for purchasing.
    - j. Scheduled dates for installation.
    - k. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
    - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCad Microsoft Windows version.
    - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

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- d. The following digital data files will be furnished for each appropriate discipline:
  - 1) Floor plans.
  - 2) Reflected ceiling plans.
  - 3) Civil Site plans
  - 4) Plumbing layout plans
  - 5) HVAC layout plans
  - 6) Electrical layout plans
  - 7) Sections and elevations as required.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect and Owner reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's or Owner's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow (10) ten days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect or Owner will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow (10) ten days for review of each resubmittal.
  - 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow (10) ten days for review of each submittal. Submittal will be returned to Architect or Owner before being returned to Contractor.
- D. Paper Submittals: *All efforts shall be taken to submit electronically, however, if electronic submittal is not practical then:* Place a permanent label or title block on each submittal item for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on label or title block.

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2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect or Owner.
3. Include the following information for processing and recording action taken:
  - a. Project name.
  - b. Date.
  - c. Name of Architect.
  - d. Name of Contractor.
  - e. Name of subcontractor.
  - f. Name of supplier.
  - g. Name of manufacturer.
  - h. Submittal number or other unique identifier, including revision identifier.
    - 1) Submittal File name shall use sequential number followed by an underscore, a Specification Section number followed by a hyphen a title of the submittal followed by a hyphen, and then a project identifier (e.g., 001\_061000-Rough Carpentry-LNHS). Resubmittals shall include an alphabetic suffix after the sequential number (e.g., 001a\_061000-Rough Carpentry-LNHS).
  - i. Number and title of appropriate Specification Section.
  - j. Drawing number and detail references, as appropriate.
  - k. Location(s) where product is to be installed, as appropriate.
  - l. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect or Owner observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect or Owner.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect or Owner will discard submittals received from sources other than Contractor.
  - a. Transmittal Form for Paper Submittals: Use CSI Form 12.1A.
  - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
    - 1) Project name.
    - 2) Date.
    - 3) Destination (To:).
    - 4) Source (From:).
    - 5) Name and address of Architect.
    - 6) Name of Contractor.
    - 7) Name of firm or entity that prepared submittal.
    - 8) Names of subcontractor, manufacturer, and supplier.
    - 9) Category and type of submittal.

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- 10) Submittal purpose and description.
- 11) Specification Section number and title.
- 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 13) Drawing number and detail references, as appropriate.
- 14) Indication of full or partial submittal.
- 15) Submittal number, numbered consecutively.
- 16) Submittal and transmittal distribution record.
- 17) Remarks.
- 18) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
  - a. File name shall use sequential number followed by a underscore, a Specification Section number followed by a hyphen a title of the submittal followed by a hyphen, and then a project identifier (e.g., 001\_061000-Rough Carpentry-LNHS). Resubmittals shall include an alphabetic suffix after the sequential number (e.g., 001a\_061000-Rough Carpentry-LNHS).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect or Owner.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
  - a. Project name.
  - b. Date.
  - c. Name and address of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of firm or entity that prepared submittal.
  - g. Names of subcontractor, manufacturer, and supplier.
  - h. Category and type of submittal.
  - i. Submittal purpose and description.
  - j. Specification Section number and title.
  - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - l. Drawing number and detail references, as appropriate.
  - m. Location(s) where product is to be installed, as appropriate.
  - n. Related physical samples submitted directly.
  - o. Indication of full or partial submittal.
  - p. Transmittal number, numbered consecutively.
  - q. Submittal and transmittal distribution record.
  - r. Other necessary identification.
  - s. Remarks.

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- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect or Owner on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's or Owner's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's or Owner's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals as PDF electronic files directly to Owner and Architect via email, files over 8mb shall be posted to a DropBox site setup by Owner for use by the project team, contractor shall notify receiving parties via email if posting a submittal to DropBox.
    - a. Architect or Owner will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Action Submittals: Submit electronically, if unable to; submit three (3) paper copies of each submittal unless otherwise indicated. Architect or Owner will return (1) one copy.
  - 3. Informational Submittals: Submit electronically, if unable to; submit (2) two paper copies of each submittal unless otherwise indicated. Architect or Owner will not return copies.
  - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and

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certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

- a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
  - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
    - b. Three (3) paper copies of Product Data unless otherwise indicated. Architect or Owner will return (1) one copy.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
  1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.

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- c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 36 inches.
  - 3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
    - b. Three opaque (bond) copies of each submittal. Architect or Owner will return one (1) copy.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one (1) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected



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from manufacturer's product line. Architect or Owner will return one submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three (3) sets of Samples. Architect or Owner will retain two (2) Sample sets; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 3100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."

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- K. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed

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before installation of product, for compliance with performance requirements in the Contract Documents.

- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written 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.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. BIM File Incorporation: Incorporate delegated-design drawing and data files into Building Information Model established for Project.
  - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.

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PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Prior to submittal to Architect or Owner 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 Architect or Owner.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."
- C. 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.

3.2 ARCHITECT'S OR OWNER'S ACTION

- A. Action Submittals: Architect or Owner will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect or Owner will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
  - 1. Rejected
  - 2. Approved
  - 3. Approved as Noted
  - 4. Revise and Resubmit.
- B. Informational Submittals: Architect or Owner will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect or Owner will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect or Owner.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned rejected without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect or Owner without action.

END OF SECTION 01 3300

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SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
  - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Owner.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not

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Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
  2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
  3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect and Owner for a decision before proceeding.

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- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Owner for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data : For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
  - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
  - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.

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1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award. Submit in format acceptable to Owner. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
  - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.



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6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

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- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Oregon and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

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1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
  2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Owner, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Owner.
  2. Notify Architect and Owner seven days in advance of dates and times when mockups will be constructed.
  3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
  4. Demonstrate the proposed range of aesthetic effects and workmanship.
  5. Obtain Architect's and Owners approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

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1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  - 2. Payment for these services will be made by the Owner.
  - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

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- F. Testing Agency Responsibilities: Cooperate with Architect, Owner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Owner and Contractor immediately of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency (special inspector) to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Owner and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and owner with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. For Contractor required quality testing, the Contractor shall submit to the Owner a list of agencies intended for use.

3.2 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  - 1. Date test or inspection was conducted.
  - 2. Description of the Work tested or inspected.
  - 3. Date test or inspection results were transmitted to Owner.
  - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Owner's reference during normal working hours.

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3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

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SECTION 01 4200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and



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effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200

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SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.
  - 2. Section 31 2319 "Dewatering" for disposal of ground water at Project site.
  - 3. Section 32 1216 "Asphalt Paving" for construction and maintenance of asphalt pavement for temporary roads and paved areas.
  - 4. Section 32 1313 "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

- A. General: 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, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

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- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Provide a detailed site plan for submittal showing temporary facilities, utility hookups, staging areas, vehicular and pedestrian control including fencing layouts and fence types, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of DEQ Construction General Permit, 1200C.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
  - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
  - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - 1. Locations of dust-control partitions at each phase of work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air-filtration system discharge.
  - 4. Waste handling procedures.
  - 5. Other dust-control measures.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in [the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines] [and] [ICC/ANSI A117.1].

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1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- C. Plastic Safety Fence: Minimum 4' high, color "Orange" with a 1.8 x 1.8" mesh; metal "T" posts max. 6'-0" O.C. with 3/8" yellow nylon 3 strand rope woven through mesh at top of fence and secured to metal posts.
- D. Wood Enclosure Fence: Plywood, 8 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.
- E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- F. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

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1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
  2. Conference room of sufficient size to accommodate meetings of (6) six individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
  3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  4. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 7700 "Closeout Procedures".
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. 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.

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1. Locate facilities to limit site disturbance as specified in Section 01 1000 "Summary."
- B. 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.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: If allowed by owner, connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with OSHA requirements for type, number, location, operation, and maintenance of fixtures and facilities.
  1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- F. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition

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construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- H. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Install electric power service underground unless otherwise indicated.
  2. Connect temporary service to Owner's existing power source, as directed by Owner.
- J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- K. Internet Service: Broadband modem, router, Wifi, and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds, allow access for Owner and Architect.
1. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after

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Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.
  - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
  - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 2000 "Earth Moving."
  - 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
  - 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 1216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Provide temporary parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.



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3. Maintain and touchup signs so they are legible at all times.
  - H. Waste Disposal Facilities: Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."
  - I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 7300 "Execution."
  - J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
    1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
  - K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
  - L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
- 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Protection of Existing Facilities: Protect existing landscaping, vegetation, Irrigation systems, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of the Owner.
  - B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects, including Temporary Erosion and Sediment Control, and Stormwater Control.
    1. Comply with work restrictions specified in Section 01 1000 "Summary."
  - C. Tree and Plant Protection: Comply with requirements specified in Section 01 5639 "Temporary Tree and Plant Protection."
  - D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
  - E. Weed Control: Engage a qualified service for the removal and eradication of noxious weeds during construction activities. Weeds shall be removed prior to blooming.
    1. Information on noxious weeds can be found at Deschutes County Noxious Weed web site, <http://www.deschutes.org/road/page/noxious-weed-program>.
  - F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform

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extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
    - a. Allow for Owner's lock to be placed for owners use, do not "lockout" Owner's lock.
    - b. Or provide key or combination to Owner for access.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  - 2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

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3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  4. Insulate partitions to control noise transmission to occupied areas.
  5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  6. Protect air-handling equipment.
  7. Provide walk-off mats at each entrance through temporary partition.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking while on Owner's property.
  2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
  2. Protect stored and installed material from flowing or standing water.
  3. Keep porous and organic materials from coming into prolonged contact with concrete.
  4. Remove standing water from decks.
  5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Periodically collect and remove waste containing cellulose or other organic matter.
  4. Discard or replace water-damaged material.

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5. Do not install material that is wet.
  6. Discard, replace, or clean stored or installed material that begins to grow mold.
  7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Use permanent HVAC system to control humidity.
  3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Owner.
    - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. 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. 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. Owner reserves right to take possession of Project identification signs.

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2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

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SECTION 01 5639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Requirements:
  - 1. Section 01 5000 "Temporary Facilities and Controls" for temporary site fencing.
  - 2. Section 31 1000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings or directed by the Owner.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings or as defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated or as otherwise directed by the Owner.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
    - a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.

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- b. Arborist's responsibilities.
- c. Quality-control program.
- d. Coordination of Work and equipment movement with the locations of protection zones.
- e. Trenching by hand or with air spade within protection zones.
- f. Field quality control.
- g. Location and extent of protection
- h. Contractors responsibilities
- i. Owner's responsibilities.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
  - 2. Detail fabrication and assembly of protection-zone fencing and signage.
  - 3. Indicate extent of trenching by hand or with air spade within protection zones.
- C. Samples: For each type of the following:
  - 1. Organic Mulch: 1/2-quart volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
  - 2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
  - 3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.
- D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
  - 1. Species and size of tree.
  - 2. Location on site plan. Include unique identifier for each.
  - 3. Reason for pruning.
  - 4. Description of pruning to be performed.
  - 5. Description of maintenance following pruning.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For arborist and tree service firm.
- B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

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- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
  - 1. Use sufficiently detailed photographs or video recordings.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- E. Quality-control program.

1.7 QUALITY ASSURANCE

- A. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Moving or parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.



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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
  - 1. Mixture: Well-blended mix of two parts stockpiled soil to one part planting soil.
  - 2. Planting Soil: Planting soil as specified in Section 32 9113 "Soil Preparation"
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
  - 1. Type: Ground or shredded bark.
  - 2. Size Range: 3 inches maximum, 1/2 inch minimum.
  - 3. Color: Natural.
- C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements:
  - 1. Wood Protection-Zone Fencing: Constructed of two 2-by-4-inch horizontal rails, with 4-by-4-inch preservative-treated wood posts spaced not more than 96 inches apart, and lower rail set halfway between top rail and ground.
    - a. Height: 48 inches.
    - b. Lumber: #2 and better Douglas Fir.
  - 2. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape steel posts spaced not more than 96 inches apart.
    - a. Height: 48 inches.
    - b. Color: High-visibility orange, nonfading.
  - 3. Gates: Single- swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width as required.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
  - 1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
  - 1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
  - 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
  - 3. Access Gates: Install as required; adjust 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.

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- B. Maintain protection zones free of weeds and trash.
- C. Maintain protection-zone fencing and signage in good condition as acceptable to Owner and remove when construction operations are complete and equipment has been removed from the site.
  - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
  - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

### 3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 31 2000 "Earth Moving" unless otherwise indicated.
- B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

### 3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:
  - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
  - 2. Cut Ends: Do not paint cut root ends.
  - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
  - 4. Cover exposed roots with burlap and water regularly.

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5. Backfill as soon as possible according to requirements in Section 31 2000 "Earth Moving."

- B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

### 3.6 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.
  - 1. Prune to remove only broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
  - 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
  - 3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
    - a. Type of Pruning: reducing and thinning where indicated.
    - b. Specialty Pruning: Structural restoration vista espalier pollarding palm and utility where indicated.
- B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.
- E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.
- F. Chip removed branches and dispose of off-site.

### 3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

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1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- D. Minor Fill within Protection Zone: Where existing grade is 6" or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Owner.
  1. Submit details of proposed pruning and repairs.
  2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
  3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Owner.
- B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Owner determines are incapable of restoring to normal growth pattern.
  1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches or smaller in caliper size.
  2. Large Trees: Provide one new tree(s) of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
    - a. Species: As selected by Owner.
  3. Plant and maintain new trees as specified in Section 32 9300 "Plants."
- C. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 4-inch uniform thickness to remain.

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- D. Soil Aeration: Where directed by Owner, aerate surface soil compacted during construction. Aerate 6' beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 01 5639

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SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 01 2500 "Substitution Procedures" for requests for substitutions.
  - 2. Section 01 4200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through substitution process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

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1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Comply with section 01 2500 Substitution Procedures.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
  - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Owner will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  - 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.



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5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect or Owner will make selection.

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5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
  - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
  - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Owner's decision will be final on whether a proposed product matches.

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1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Owner will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Owner may return requests without action, except to record noncompliance with these requirements:
  1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

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SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Coordination of Owner-installed products.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.
- B. Related Requirements:
  - 1. Section 01 1000 "Summary" for limits on use of Project site.
  - 2. Section 01 3300 "Submittal Procedures" for submitting surveys.
  - 3. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 4. Section 02 4119 "Selective Demolition" for demolition and removal of selected portions of the building.
  - 5. Section 07 8413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

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1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor or professional engineer.
- B. Certificates: Submit certificate signed by land survey or professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 5 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit two copies signed by land surveyor.
- F. Final Property Survey: Submit 2 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in Oregon and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect and Owner of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

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2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operational elements may include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.
    - i. Conveying systems.
    - j. Electrical wiring systems.
    - k. Operating systems of special construction.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
  - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Owner for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work.

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2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Owner according to requirements in Section 01 3100 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Owner promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish limits on use of Project site.
  3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  4. Inform installers of lines and levels to which they must comply.
  5. Check the location, level and plumb, of every major element as the Work progresses.
  6. Notify Owner when deviations from required lines and levels exceed allowable tolerances.
  7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.



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- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Owner.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Owner. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owner before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

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1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 84 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

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5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
- 3.7 OWNER-INSTALLED PRODUCTS
- A. Site Access: Provide access to Project site for Owner's construction personnel.
  - B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

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1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials, debris, snow, and Ice.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

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- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 9113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 7300

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SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
  - 1. Section 02 4119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
  - 2. Section 04 2000 "Unit Masonry" for disposal requirements for masonry waste.
  - 3. Section 04 4313.13 "Anchored Stone Masonry Veneer" for disposal requirements for excess stone and stone waste.
  - 4. Section 04 4313.16 "Adhered Stone Masonry Veneer" for disposal requirements for excess stone and stone waste.
  - 5. Section 31 1000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 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.

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- 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.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 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

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

- A. Keep available onsite a record of all waste salvaged, records shall contain the following:
  - 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. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- C. 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.
- D. 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.



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1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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.
  - 1. Comply with operation, termination, and removal requirements in Section 01 5000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 1. Distribute waste management plan to everyone concerned within three days of start of construction.
  - 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.
- C. 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.

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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 Section 01 5000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 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: Salvage items for Owner's use 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 delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

### 3.3 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:

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1. Knott Landfill, Deschutes County.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
  1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  4. Store components off the ground and protect from the weather.
  5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 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.
  2. Crush concrete and screen to comply with requirements in Section 31 2000 "Earth Moving" for use as satisfactory soil for fill or subbase.
- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
  1. Pulverize masonry to maximum 4-inch size.
  2. Clean and stack undamaged, whole masonry units on wood pallets.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

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- E. Metals: Separate metals by type.
  - 1. Structural Steel: Stack members according to size, type of member, and length.
  - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- G. 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.
- H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- I. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
  - 1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- K. Carpet Tile: Remove debris, trash, and adhesive.
  - 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- L. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- M. Conduit: Reduce conduit to straight lengths and store by type and size.

### 3.5 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. Wood Materials:
  - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

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2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. 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.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.
- D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.7 ATTACHMENTS

- A. Form CWM-1 for construction waste identification.
- B. Form CWM-2 for demolition waste identification.

END OF SECTION 01 7419

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SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 01 3233 "Photographic Documentation" for submitting final completion construction photographic documentation.
  - 2. Section 01 7300 "Execution" for progress cleaning of Project site.
  - 3. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 4. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Section 01 7900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

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1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
  - 5. Submit test/adjust/balance records.
  - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.



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5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900 "Demonstration and Training."
  6. Advise Owner of changeover in heat and other utilities.
  7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  9. Complete final cleaning requirements, including touchup painting.
  10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
  11. Clean and sweep all site hardscapes to an acceptable appearance.
  12. Remove all temporary sediment and erosion control measures.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Owner, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  2. Results of completed inspection will form the basis of requirements for final completion.

## 1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Owner's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner will prepare a final Certificate for Final Completion after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

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1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Owner will provide a punch list of items needing correction with the Notice of Substantial Completion.
  - 1. Submit list of incomplete items in the following format:
    - a. PDF electronic file. Owner will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Owner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

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1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

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- m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
  - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - q. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700

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SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
  - 1. Section 01 3300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Section 01 9113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Owner will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

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- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Owner.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
  - 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 10 days before requesting inspection for Substantial Completion. Owner will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
  - 1. List of documents.
  - 2. List of systems.
  - 3. List of equipment.
  - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

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2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name and contact information for Contractor.
  - 6. Name and contact information for Architect.
  - 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  - 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

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- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
  5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.



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5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor has delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:

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1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

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1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  1. Standard maintenance instructions and bulletins.
  2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

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- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

### PART 3 - EXECUTION

#### 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble 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.
- E. 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 include 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.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

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1. Do not use original project record documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared record Drawings in Section 01 7839 "Project Record Documents."
- G. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

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SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements:
  - 1. Section 01 7300 "Execution" for final property survey.
  - 2. Section 01 7700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
  - 2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit PDF electronic files of scanned record prints and one of file prints.
    - b. Final Submittal:
      - 1) Submit three paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record.
      - 3) Print each drawing, whether or not changes and additional information were recorded.

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- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: 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 provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order.
    - k. Changes made following Architect's or Owner's written orders.
    - l. Details not on the original Contract Drawings.

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- m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Owner determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
- 1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  - 2. Consult Owner for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - 2. Format: Annotated PDF electronic file.
  - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  - 4. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.



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1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

## 2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

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PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Owner's reference during normal working hours.

END OF SECTION 01 7839

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SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.
- B. Training costs shall be included in the bid price.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

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1. Identification: On each copy, provide an applied label with the following information:
  - a. Name of Project.
  - b. Description of training by CSI and system.
  - c. Name and address of videographer.
  - d. Name of Architect.
  - e. Name of Contractor.
  - f. Date of video recording.
2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 4000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  1. Inspect and discuss locations and other facilities required for instruction.
  2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  3. Review required content of instruction.
  4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

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1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:

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- a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
  - b. Repair instructions.

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- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 7823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

### 3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.
- 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 with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### 3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

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1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
  2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
  3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
  4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
    - a. Name of Contractor/Installer.
    - b. Business address.
    - c. Business phone number.
    - d. Point of contact.
    - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
    - a. Produce segments to present a single significant piece of equipment per segment.
    - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.



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END OF SECTION 01 7900

**SECTION 03 30 00  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Material certificates.
- B. Material test reports.

**1.4 QUALITY ASSURANCE**

- A. 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."
- B. Testing Agency Qualifications: An independent agency, acceptable to Deschutes County Building Safety Division, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

**1.5 PRECONSTRUCTION TESTING**

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

**1.6 FIELD CONDITIONS**

- A. Cold-Weather Placement: Comply with ACI 306.1.
  - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

PART 2 PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301 (ACI 301M).
  2. ACI 117 (ACI 117M).

2.2 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.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- 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."

2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
1. Portland Cement: ASTM C 150/C 150M, Type I/II
  2. Fly Ash: ASTM C 618, Class F or C.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.
1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C 260/C 260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do 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. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
- E. Water: ASTM C 94/C 94M and potable.

2.5 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, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating.
- H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- I. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

## 2.6 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 (ACI 301M).
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing 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 in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

## 2.7 CONCRETE MIXTURES FOR FOUNDATIONS

- A. Normal-Weight Concrete:
  - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 2. Maximum W/C Ratio: 0.45.
  - 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture, plus or minus 1 inch (25 mm).
  - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.

## 2.8 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
  - 1. When air temperature is between 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 INSTALLATION

- A. Design, erect, brace, and maintain formwork, according to ACI 301 (ACI 301M), 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 (ACI 117M).
- C. Chamfer exterior corners and edges of permanently exposed concrete.

## 3.2 EMBEDDED ITEM INSTALLATION

- 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.

## 3.3 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

## 3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Owner.

## 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

## 3.6 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.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view.
- C. Board-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner.
  - 1. Apply to concrete surfaces exposed to public view at curb walls.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

## 3.7 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 (ACI 301M) 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. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by the following method:
  - 1. 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.

## 3.8 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Owner. Remove and replace concrete that cannot be repaired and patched to Owner approval.

3.9 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

## **SECTION 10 14 35 - DISABLED PARKING SIGNS**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section includes post-mounted signs for disabled parking signs.
- B. Related Sections:
  - 1. Division 03 Section "Cast-in-Place Concrete", for post-mounted sign footings.
  - 2. Division 32 Section "Pavement Marking", for surface signage and parking space lines at disabled parking.

#### **1.2 SUBMITTALS**

- A. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
- B. Manufacturer's Installation Instructions: Include installation template and attachment devices.

#### **1.3 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Shop that employs skilled workers who install products similar to those required for this Project and whose installations have a record of successful in-service performance.

#### **1.4 REGULATORY REQUIREMENTS**

- A. Comply with 2010 ADA Standards for Accessible Design and State Building Code for accessibility recommendations and requirements for the physically disabled.
- B. Provide signs in accordance with local building regulations.

#### **1.5 DEFINITIONS**

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

### **PART 2 PRODUCTS**

#### **2.1 SIGNS FOR DISABLED PARKING**



- A. Provide metal signs for disabled parking with night reflective surfacing, with the international symbol of accessibility and letters on sign that state "Reserved Parking," or as otherwise required by local jurisdiction.
  - 1. Van Parking Spaces shall contain the designation "Van Accessible."
  - 2. Sign size shall be as required by local jurisdiction and have a width-to-height ratio between 3:5 and 1:1, and a stroke width-to-height ratio between 1:5 and 1:10.
    - a. Construction: Aluminum sheet.
    - b. Minimum Sheet Thickness: 0.080 inches.
    - c. Nominal Corner Radius: 1/2 inch.
- B. Provide color contrasting characters and symbols with light characters on dark background as required by local jurisdiction.
- C. Mount signs on a 6x6 juniper post at minimum height of 7'-0" above concrete sidewalk or other paving surface.
  - 1. Verify height with local jurisdiction.
- D. Accessories: Mounting Hardware; galvanized screws and anchor bolts.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in compliance with 2010 ADA Standards for Accessible Design.
- B. Pole Footing: Cast concrete extending 12 inches below frostline.
  - 1. Concrete: Minimum compressive strength of 3,500 psi at 28 days.
  - 2. Trowel finish top of concrete footing to Class B tolerance.
- C. Center parking signs on disabled parking spaces.

#### 3.2 ADJUSTING AND CLEANING

- A. Relocate misplaced disabled parking signs.
- B. Replace defective and damaged sign components.
- C. Clean letters and sign face.

END OF SECTION

SECTION 12 93 00  
SITE FURNISHINGS

PART 1 GENERAL

**1.1 SECTION INCLUDES**

- A. Surface Mount Pedestal Table (Owner Provided, Contractor Installed)
- B. Park Bench (Owner Provided, Contractor Installed)
- C. Litter Receptacle (Owner Provided, Contractor Installed)
- D. Bicycle racks (Owner Provided, Contractor Installed)
- E. Neighborhood Park Sign (Owner Provided, Contractor Installed)
- F. Park Rules Sign (Owner Provided, Contractor Installed)
- G. Portable Lavatory (Owner Provided, Contractor Installed)

**1.2 RELATED REQUIREMENTS**

- A. Section 32 13 13 - Site Concrete.

**1.3 SUBMITTALS**

- A. See Section 01 33 00 - Submittal Procedures.
- B. Contractor to be provided product data for Owner Furnished Contractor Installed items.
- C. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Coordinate delivery, handling, and storage of Owner Furnished equipment. Provide equipment to off load trucks and store materials in a dry, covered area, elevated above grade.
- B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

**2.1 As Shown on Plans**

PART 3 EXECUTION

**3.1 EXAMINATION**

- A. Examine surfaces to receive furnishings.
- B. If substrate preparation is the responsibility of another installer, notify Owner's Representative of unsatisfactory preparation before proceeding.
- C. Do not begin installation until unsatisfactory substrates have been properly repaired.

**3.2 PREPARATION**

- A. Ensure surfaces to receive furnishings are clean, flat, and level.

**3.3**      **INSTALLATION**

- A.      Install in accordance with manufacturer's instructions.
- B.      Install furnishings level, plumb, square, and as indicated on the drawings.
- C.      Prior to installation review location of furnishings with Owner's Representative for approval. Make adjustments to locations as directed.

**3.4**      **CLEANING**

- A.      Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

**3.5**      **PROTECTION**

- A.      Protect installed products until completion of project.
- B.      Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 93 00

SECTION 26 01 00  
GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Description of System.
- B. Coordination Requirements

1.2 PROJECT OVERVIEW

- A. The attached electrical drawings and specifications show the proposed arrangement of lighting poles, lighting branch circuit requirements and electrical service enclosure.

1.3 QUALITY ASSURANCE

- A. Qualifications of Installers:
  - 1. For actual fabrication, installation and testing of Work of this Section, use only thoroughly trained and experienced personnel familiar with requirements for this Work and with installation recommendations of Manufacturers of specified items.
- B. Design Criteria:
  - 1. Work shall conform with existing field conditions.
  - 2. Pay for equipment relocations or modifications necessitated by failure to advise Owner of conflicts or coordinate work.
- C. Select equipment to meet design conditions stated. Contractor is responsible for meeting technical data and performance requirements of system.
- D. Satisfy requirements of regulatory agencies or codes having jurisdiction over project. Provide U.L. labels for all equipment falling under testing capabilities of U.L.
- E. Procure licenses and permits, and pay fees, deposits, assessments and tax charges required for Electrical Work.
- F. Arrange for and pay for inspections and tests required by codes and ordinances during construction.

1.4 REFERENCE STANDARDS

- A. The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and from a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.
  - 1. Underwriters Laboratories (UL).
  - 2. National Fire Protection Association (NFPA), Specifically:
    - a. NFPA 70 - National Electric Code.
  - 3. National Electrical Safety Code.
  - 4. National Electrical Manufacturer's Association (NEMA).
  - 5. American National Standards Institute (ANSI).
  - 6. Occupational Safety and Health Administration (OSHA).
  - 7. City, County, and State Codes and Ordinances.

## 1.5 SUBMITTALS

- A. Provide shop drawings and product data for the Work of this Division.
- B. Submittal material sent by facsimile machine will not be accepted.
- C. Post Contract Award:
  - 1. Prepare and submit as follows:
    - a. Provide complete drawings, diagrams, illustrations, performance charts, brochures, and/or other data which adequately describes product to enable thorough evaluation.
    - b. Number of copies, method of distribution, format and schedule for submission;
    - c. Submit all at one time.
    - d. Use 3-ring loose leaf binders for submittals with index referenced to Specification section and page. Tab individual sections.
    - e. Do not order or manufacture equipment until full review received from Engineer.
    - f. Submit, where applicable, certificates denoting conformance to standards adopted by recognized organizations such as NEMA, UL, OSHA, etc.
    - g. Schedule of values.
- D. Provide product data for materials and equipment as required by individual sections.
- E. Provide Shop Drawings for materials and equipment as required by individual sections.

## 1.6 SUBSTITUTIONS

- A. Products specified herein are so specified to establish a minimum level of product quality. Except where indicated that no substitutions are allowable, equivalent quality products may be submitted to the Architect for approval.
- B. Substitution requests will not be considered unless they include the following:
  - 1. Model numbers of proposed substitutions.
  - 2. Options which are required to make the proposed substitution comply with Specifications.
  - 3. Summary of modifications of the Work which are required to accommodate the proposed substitution.

## 1.7 OPERATION AND MAINTENANCE MANUALS, INSTRUCTION AND TRAINING

- A. Manual:
  - 1. Following installation of electrical equipment, and prior to acceptance of Electrical Work, prepare manuals describing operations, servicing, and maintenance requirements of electrical equipment and systems installed.
  - 2. Information contained in manual:
    - a. Catalog data on each item including complete parts lists, catalog numbers, maintenance information and wiring diagrams.
    - b. Service organizations for equipment.
    - c. Manufacturer's recommended servicing instructions.
  - 3. Presentation:
    - a. Provide information on neat, clean 8-1/2 inch x 11 inch sheets.
    - b. Provide drawings, accordion folded to letter size.
    - c. Divide manual into chapters which follow section sequence of Specifications of this Division.
  - 4. Cover:
    - a. Enclose each manual in hardboard post-type binder.
    - b. Imprint front of binder with following:
      - 1) "Electrical Equipment."
      - 2) Name of Owner, Engineer and Contractor.
      - 3) Year completed.

B. Instruction and Training:

1. Contractor responsibilities:
  - a. Train Owner personnel in operation and maintenance of all installed electrical equipment and systems.
  - b. Submit proposed scope of training materials and instruction schedule to Architect for review and approval 30 days prior to scheduled completion of building.
  - c. Arrange mutually agreeable dates for training with Owner.

**1.8 RECORD DRAWINGS**

- A. Provide record drawings in O & M Manuals

**1.9 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Make inspection of equipment for possible damage at time of delivery to avoid future delays in construction due to replacement or repair.
- B. Protect against damage, theft and deterioration.
  1. Store in original factory containers.
  2. Do not expose equipment to dust, powder, abrasive, wetness, excessive dampness or temperature extremes, unless equipment approved for that use.
- C. In event of damage, immediately make all repairs and/or replacements necessary to approval of Architect, at no additional expense to Owner.

**1.10 PROTECTION**

- A. Suitably protect any unfinished Work from potential physical damage.
- B. Do not leave unfinished Work unattended, which would pose life safety hazard.
- C. Protect other Work against damage and discoloration caused by Work of this Section.

**1.11 COORDINATION**

- A. Report any discrepancies discovered between existing job conditions and Work to be installed. Fully resolve such discrepancies prior to continuation of work.
- B. Coordinate sequencing of equipment installation and energizing with other trades.
- C. Consult Owner prior to installing equipment in area which obviously exceeds, or will exceed, ambient operating requirements such as for temperature and humidity.

**1.12 WARRANTY**

- A. Warrant all Work included in this Specification for period of one year from date of substantial completion.
- B. During warranty period, remedy without delay or expense to Owner any defects providing, in judgment of Engineer, that such defects are not result of misuse or abuse on part of Owner.
- C. Warrant that all equipment and installations are in compliance with OSHA regulations.

## PART 2 - PRODUCTS

### 2.1 MATERIAL

- A. Provide new material and equipment items that are standard products of Manufacturers regularly engaged in production of such materials and equipment. Owner reserves right to reject items not in accordance with Specifications.
- B. Provide corrosion protection for ferrous metalwork exposed to weather by hot dip galvanizing, or factory painted finish suitable for outdoor installations.
- C. Verify all materials are acceptable to Authority having jurisdiction, as suitable for the use intended.

## PART 3 - EXECUTION

### 3.1 COMPLETION

- A. Complete each system as shown or specified herein and place in operation, except where only roughing-in or partial systems are called for.

### 3.2 SCHEDULING OF WORK

- A. Schedule Work with all other Contractors to maintain job progress schedule, and avoid conflicts in installation of Work by various trades.

### 3.3 EXCAVATION

- A. Contact utilities before starting any excavation to locate underground services on site or in adjacent streets.
- B. Locate and protect any existing underground services.
- C. Repair any services damaged.

### 3.4 TRENCHING AND BACKFILLING

- A. Provide trenching and backfilling to depth required for underground conduit, per NEC and/or Utility requirements, 36 inches minimum.
- B. Backfilling prior to inspection of installation by Owner's representative and serving Utility not permitted.
- C. Minimum backfill requirements:
  - 1. Use 1/4 inch to 1 inch diameter, crushed or clean round river rock for raceway runs beneath building slabs, beneath areas to be paved and beneath streets and sidewalks.
  - 2. Underground raceway runs at all other locations.
    - a. Backfill in compacted layers not exceeding 6 inches in depth.
    - b. Use sand or "clean" earth free from rock larger than 1 inch diameter and debris.
  - 3. Provide one continuous #14 copper conductor as a tracing conductor for locating the conduits in the future. Provide a 6 foot coil of tracing wire at each end of the trench clearly marked on an identification tag: "TRENCH TRACING CONDUCTOR". Also include the tracing conductor destination and a description of the conduits/conductors in the trench. The identification tag shall be machine generated text, enclosed in a waterproof clear plastic seal, and attached to the coil by means of a tywrap.

- D. Trenching and Backfilling for Services:
  - 1. Coordinate with all utilities for joint trench service Work.
  - 2. Uncover existing utilities by hand digging only.
  - 3. Size to accommodate all utility service conduits and accessories.
  - 4. See joint trench detail on drawings for additional information.
- E. Power digging only in direction away from existing facilities.
- F. Restore, to Owner's satisfaction at no additional expense, any sidewalks, landscaping, or other existing structure damaged due to excavation.

### 3.5 MANUFACTURER'S INSTALLATION DETAILS

- A. Follow exactly, where available.
- B. Provide special wiring or fittings as required.

### 3.6 ACCESSIBILITY OF EQUIPMENT

- A. Install equipment accessible for operation, maintenance or repair as required by NEC.
- B. Inaccessible Equipment:
  - 1. Where the Owner's representative determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed, at no additional cost to the Owner.
  - 2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles.

### 3.7 COORDINATION

- A. Coordinate conduit, junction boxes, supporting equipment, etc. Affecting normal operating and maintenance activities related to irrigation equipment, piping, valves, accessories, etc.

### 3.8 TESTS

- A. Fully test and adjust equipment installed under this specifications prior to Owner's personnel instruction. Each system shall be left in proper operation free of faults, shorts or unintentional grounds.
- B. Demonstrate essential features of the site lighting control system.
- C. Submit to engineer certificate of completed demonstration countersigned by Owner.

### 3.9 CLEANING OF ELECTRICAL INSTALLATION

- A. Prior to acceptance of work, thoroughly clean all exposed portions of electrical installation.
- B. Remove all nonessential labels and traces of foreign substances.
- C. Use only cleaning solution approved by Manufacturer.
- D. Avoid any damage to finished surfaces.

END OF SECTION



SECTION 26 05 30  
CONDUIT

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Rigid metal conduit and fittings.
- B. Intermediate metal conduit and fittings.
- C. Electrical metallic tubing and fittings.
- D. Flexible metal conduit and fittings.
- E. Liquidtight flexible metal conduit and fittings.
- F. Non-metallic conduit and fittings.

**PART 2 - PRODUCTS**

**2.1 RIGID STEEL CONDUIT**

- A. Standard pipe with screwed joints for electrical raceway use.
- B. Zinc coated by hot dip galvanizing or sherardizing.
- C. Manufacturer: Allied Tube and Conduit, Triangle PWC Inc., Western Tube & Conduit, or approved.

**2.2 INTERMEDIATE METALLIC CONDUIT (IMC)**

- A. Standard pipe with threaded joints for electrical raceway use.
- B. Zinc coated by hot dip galvanizing or sherardizing.
- C. Manufacturer: Allied Tube and Conduit, Triangle PWC or approved.

**2.3 FLEXIBLE CONDUIT**

- A. Galvanized steel or aluminum, abrasion resistant.
- B. Manufacturer: Anamet (Type DE-710), Triangle PWC, Inc. (Type 710), or approved.

**2.4 PVC (RIGID PLASTIC) CONDUIT**

- A. Heavy wall, high impact plastic, Schedule 40 Polyvinyl Chloride.
- B. Manufacturer: Carlon, PW Pipe, Triangle PWC, or approved.

**2.5 CONNECTIONS AND FITTINGS**

- A. Especially for purpose used.

- B. Same material and finish as raceway.

## **2.6 UNION JOINTS FOR RIGID STEEL OR IMC CONDUIT**

- A. Split coupling.
- B. Running threads not allowed.
- C. Insulated throat.
- D. Manufacturer: O.Z. Gedney type "SSP," or approved.

## **PART 3 - EXECUTION**

### **3.1 CONDUIT SIZING AND ARRANGEMENT**

- A. Size conduit for Type THW conductors. Minimum conduit size for home runs and underground conduit system is 3/4 inch.

### **3.2 CONDUIT INSTALLATION**

- A. Cut conduit square using a saw; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of four 90 degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction, as around beams.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-1/4 inch size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Avoid condensation between moist warm locations and cool locations by blocking air flow in conduit with "Duct Seal" or similar material.
- I. Thoroughly clean interior of conduits.
- J. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- K. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- L. Install expansion joints where conduit crosses building expansion or seismic joints.

### **3.3 RIGID PVC**

- A. Use limited to underground installations. PVC may not be used above grade.
- B. Schedule 40.

- C. Provide ground wire full length of circuit.
- D. Use rigid steel factory elbows. Extend rigid steel conduit into pole or service enclosure.
- E. Wipe plastic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

### **3.4 RIGID STEEL OR INTERMEDIATE METAL CONDUIT**

- A. Exposed location inside service enclosure.

### **3.5 UNDERGROUND CONDUIT INSTALLATION**

- A. Install top of conduit minimum 24 inches below finished grade.
- B. Conduit stub-ups to equipment shall be rigid steel.
- C. Rigid steel shall extend a minimum 10 feet outside building foundation line and 5 feet outside outdoor concrete pads.
- D. Terminate conduit with insulated grounding bushing.
- E. Upon completion of conduit installation, seal ducts at building entrances and outdoor equipment terminations with moisture resistant non-hardening compound.
- F. Clearances Between Individual Ducts:
  - 1. For Like Services: Not less than 2 inches.
  - 2. For High Voltage and Signal Services: Not less than six inches.
  - 3. Provide plastic spacers to maintain clearances.

### **END OF SECTION**

SECTION 26 05 32  
OUTLET, PULL, AND JUNCTION BOXES

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Freestanding outlet pedestals.
- B. Pull and junction boxes.

**1.2 RELATED SECTIONS**

- A. Section 26 27 60 - Cabinets and Enclosures.

**1.3 PROJECT CONDITIONS**

- A. Verify Field measurements are as shown on drawings.

**1.4 SUBMITTALS**

- A. Submit product data under provisions of Section 260100.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS – FREESTANDING OUTLET PEDESTALS**

- A. PEDOC Power Solutions, 5P42-C, 14 ga. stainless steel pedestal, weatherproof outlet covers.
- B. Substitutions: under provisions in Section 26 01 00.

**2.2 OUTLET BOXES**

- A. Cast Boxes: Aluminum or cast fer alloy, deep type, gasketed cover, threaded hubs.

**2.3 ACCEPTABLE MANUFACTURERS - PULL AND JUNCTION BOXES**

- A. Circle AW.
- B. Hoffman.
- C. Rittal.
- D. Substitutions: under provisions of Section 26 01 00.

**2.4 ACCEPTABLE MANUFACTURERS - FIBERGLASS HAND HOLES FOR UNDERGROUND INSTALLATIONS**

- A. Quazite.
- B. Substitutions: under provisions of Section 26 01 00.

## **2.5 FIBERGLASS HAND HOLES FOR UNDERGROUND INSTALLATIONS**

- A. Die-molded.
- B. Pre-cut 6 x 6 inch cable entrance at center bottom of each side.
- C. Fiberglass weatherproof cover with non-skid finish.

## **PART 3 - EXECUTION**

### **3.1 FREESTANDING OUTLET PEDESTALS**

- A. PEDOC Power Solutions, 5P42-C, 14 ga. stainless steel pedestal, weatherproof outlet covers.
- B. Color: Terra Brown (RAL 8028)
- C. Preparation: Ensure surfaces to receive furnishings are clean, flat, and level.
- D. Installation:
  - 1) Install in accordance with manufacturer's instructions.
  - 2) Install furnishings level, plumb, square, and as indicated on the drawings.
  - 3) Prior to installation, review location of furnishings with owner for approval. Make adjustments to locations as directed.

### **3.2 PULL AND JUNCTION BOX INSTALLATION**

- A. Support pull and junction boxes independent of conduit.
- B. Boxes larger than 200 cubic inches or 18 inches in any dimension: Use hinged locking enclosure.

**END OF SECTION**

SECTION 26 05 46  
UTILITY POLES FOR ELECTRICAL SYSTEMS (FOR BACKSTOP NETTING SYSTEM)

1. General
  - 1.1 RELATED REQUIREMENTS
    1. Submittal Procedures: Section 01 33 00.
  - 1.3 SOURCE OF SUPPLY
    1. All service poles shall be by a single manufacture.
  - 1.3 DELIVERY, STORAGE AND HANDLING
    1. Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
2. Products
  - 2.1 SERVICE POLES
    - 1 Service Pole Construction: As Shown on Plans
    2. Power Receptacles: None
    3. Trim and Accessories:
      1. Eye Bolts as Shown on Plans
      2. Pole to Pole Tension Netting System as Shown on Plans.
      3. Knotted Nylon Netting as Shown on Plans.
3. Execution
  - 3.1 INSTALLATION
    1. Install service poles plumb at locations indicated on drawings.
    2. Install service poles in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 26 05 53  
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

**1.1 SECTION INCLUDES**

- A. Nameplates.
- B. Wire and cable markers.
- C. Pull box and junction box identification.
- D. Device plate identification.

**1.2 RELATED SECTIONS**

- A. Section 26 27 26 - Wiring Devices.

PART 2 - PRODUCTS

**2.1 MATERIALS**

- A. Nameplates:
  - 1. Engraved three-layer laminated plastic.
  - 2. White letters.
  - 3. Black background.

PART 3 - EXECUTION

**3.1 INSTALLATION**

- A. Degrease and clean surfaces to receive nameplates.
- B. Install nameplates parallel to equipment lines.
- C. Secure nameplates to equipment fronts using screws or drive rivets.
  - 1. Secure nameplate to inside face of recessed panelboard doors in finished locations.
  - 2. Secure nameplate to inside face of panelboard doors in unfinished locations.
- D. Use stick-on characters for identification of individual receptacle circuits.

**3.2 WIRE IDENTIFICATION**

- A. Provide wire markers on each conductor in panelboards, gutters, pull boxes, and at load connection.
- B. Identify with branch circuit or feeder number for power and lighting circuits.
- C. Identify control wire number as indicated on equipment manufacturer's shop drawings.

### 3.3 NAMEPLATE ENGRAVING SCHEDULE

- A. Identify all electrical distribution and control equipment and disconnect switches at loads served.
- B. Letter Height:
  - 1. 1/8 inch for individual switches and loads served.
  - 2. 1/4 inch for distribution and control equipment identification.
  - 3. 1/8 inch identifying voltage rating and source.

### 3.4 PULL BOX AND JUNCTION BOX IDENTIFICATION

- A. Identify each junction box with complete system description. Examples:
  - 1. Communication
  - 2. 120/240 V system.
- B. Method:
  - 1. Stick on labels.
- C. Locations:
  - 1. On outside of box cover where concealed.
  - 2. In exposed box locations, locate on inside of box cover.
  - 3. Identify main pull boxes by number and indicate numbers on record drawings.

END OF SECTION



SECTION 26 19 20  
SERVICE ENTRANCE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work by Utility:
  - 1. Current transformers (CTs) and metering equipment.
- B. Work by Contractor:
  - 1. Service lateral conduit and conductors from the utility transformer to the electrical service switchgear.

1.2 RELATED WORK

- A. Section 260100 - General Electrical Provisions: Trenching.
- B. Section 260530 - Conduit:

1.3 SYSTEM DESCRIPTION

- A. System Voltage: 120/240 volts, 1 phase, three-wire, 60 hertz.
- B. Service Entrance: Underground
- C. Utility Company: Pacific Power
- D. Install service entrance in accordance with Utility Company's rules and regulations.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 260100.
- B. Submit Utility Company prepared drawings.

1.5 JOB CONDITIONS

- A. Interruption to Existing Services: Kept to minimum and only with Owner's written consent.
- B. Protection:
  - 1. Protect existing services.
- C. Sequencing/Scheduling:
  - 2. Coordinate with Utility to preclude delays.

1.6 COORDINATION

- A. Contact Utility, verify Owner and Utility responsibilities for service connections and equipment regardless of what is specified herein or shown on Drawings and be

responsible for complete service indicating same in Bid Proposal.

- B. Obtain and include in Bid Proposal the cost of all utility service charges.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS - METERING EQUIPMENT

- A. As approved by Utility.

### 2.2 METERING EQUIPMENT

- A. Meter by Utility, meter base end enclosure under this Section.
- B. Meter Base Construction:
1. Hoffman, Single-Door Dual Access enclosure, A-L1DR latch kit, with two full length panels.
  2. Size: 72" x 24" x 24"
  3. Color: Gray
  4. Preparation: Ensure surfaces to receive furnishings are clean, flat, and level.
  5. Installation:
    - 1) Install in accordance with manufacturer's instructions.
    - 2) Install furnishings level, plumb, square, and as indicated on the drawings.
    - 3) Prior to installation, review location of furnishings with owner for approval. Make adjustments to locations as directed.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Make arrangements with Utility Company to obtain permanent electric service to the project.
- B. Underground:
1. Install service entrance conduits.
  2. Install from Utility Company's transformer to service entrance equipment.
  3. Utility Company will connect service lateral conductors to service entrance conductors.
  4. Primary/Secondary service conduits: Seal conduits at transformer pad and at main service equipment with pliable duct sealing mastic, sealing tight around all conductors.
  5. Verify Secondary Conductors with utility. Visually inspect for defects and clean prior to installation.
  6. Leave sufficient pigtails at both ends for proper terminations. Coordinate with Utility.

## END OF SECTION

SECTION 26 27 26  
WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Receptacles.
- B. Device plates and box covers.

1.2 RELATED SECTIONS

- A. Section 26 05 32 - Outlet, Pull and Junction Boxes.
- B. Section 26 05 53 - Electrical Identification.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 26 01 00.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

1.4 SUBSTITUTIONS

- A. Products specified herein are so specified to establish a minimum level of product quality as determined by the engineer. Except where indicated no substitutions are allowable, equivalent quality products may be submitted to the Architect for approval, under provisions of Section 26 01 00.

PART 2 - PRODUCTS

2.1 FREESTANDING OUTLET PEDESTALS

- A. PEDOC Power Solutions, 5P42-C, 14 ga. stainless steel pedestal, weatherproof outlet covers.
- B. Color: Terra Brown (RAL 8028)
- C. Preparation: Ensure surfaces to receive furnishings are clean, flat, and level.
- D. Installation:
  - 1) Install in accordance with manufacturer's instructions.
  - 2) Install furnishings level, plumb, square, and as indicated on the drawings.
  - 3) Prior to installation, review location of furnishings with owner for approval. Make adjustments to locations as directed.

PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Receptacles:
  - 1. As noted on drawings.
  - 2. Grounding pole on bottom.

END OF SECTION

SECTION 26 27 60  
CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Service Equipment Enclosures

1.2 REFERENCES

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 26 01 00.
- B. Shop Drawings for Equipment Panels: Include wiring schematic diagram, wiring diagram, outline drawing, and construction diagram as described in ANSI/NEMA ICS 1.

PART 2 - PRODUCTS

2.1 SERVICE ENCLOSURE

- A. Hoffman, Single-Door Dual Access enclosure, A-L1DR latch kit, with two full length panels.
- B. Size: 72" x 24" x 24"
- C. Color: Gray
- D. Preparation: Ensure surfaces to receive furnishings are clean, flat, and level.
- E. Installation:
  - 1) Install in accordance with manufacturer's instructions.
  - 2) Install furnishings level, plumb, square, and as indicated on the drawings.
  - 3) Prior to installation, review location of furnishings with owner for approval. Make adjustments to locations as directed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinets and enclosures plumb: anchor securely with seismic anchors at each corner, minimum.
- B. Provide conduit rough in per manufacturer's installation instructions.

3.2 FIELD QUALITY CONTROL

- A. Visual and Mechanical Inspection:
  - 1. Inspect for physical damage, proper alignment, anchorage, and grounding.

2. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

## SECTION 311000 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Disconnecting, capping or sealing, and removing site utilities.
8. Temporary erosion and sedimentation control.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

- C. Related Requirements:

1. Section 01500 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

#### 1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious,

and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as indicated on Drawings.
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: No separate pre-installation conference for site clearing is required.

#### 1.5 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, 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 video recordings.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.
- C. Rock stockpiling program.
- D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.
- E. Burning: Documentation of compliance with burning requirements and permitting of authorities having jurisdiction. Identify location(s) and conditions under which burning will be performed.

#### 1.7 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.



- B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

## 1.8 FIELD 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 Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on site.
- D. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
- F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

### 3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Grind down stumps and remove roots larger than 2 inches (50 mm) in diameter, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
  - 3. Use only hand methods or air spade for grubbing within protection zones.
  - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

### 3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 4 inches (100 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  - 2. Do not stockpile topsoil within protection zones.

3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### 3.7 STOCKPILING ROCK

- A. Remove from construction area naturally formed rocks that measure more than 1 foot (300 mm) across in least dimension. Do not include excavated or crushed rock.
  1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- B. Stockpile rock away from edge of excavations without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
  1. Limit height of rock stockpiles to 36 inches (900 mm).
  2. Do not stockpile rock within protection zones.
  3. Dispose of surplus rock. Surplus rock is that which exceeds quantity indicated to be stockpiled or reused.
  4. Stockpile surplus rock to allow later use by the Owner.

### 3.8 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
  2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

### 3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Burning tree, shrub, and other vegetation waste is permitted according to burning requirements and permitting of authorities having jurisdiction. Control such burning to produce the least smoke or air pollutants and minimum annoyance to surrounding properties. Burning of other waste and debris is prohibited.

- C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

## SECTION 312000 - EARTH MOVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, pavements, turf and grasses, and plants.
3. Subbase course for concrete walks and pavements.
4. Subbase course and base course for asphalt paving.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

- B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for recording preexcavation and earth-moving progress.
2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
4. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

#### 1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- F. Fill: Soil materials used to raise existing grades.
- G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by a geotechnical testing agency, according to ASTM D 1586.
- H. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: No separate pre-installation conference for Earth Moving is required.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Base Rock
  - 2. Warning tapes.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Laboratory compaction curve according to ASTM D 698.
- C. Blasting: Not allowed.
- D. Seismic survey report from seismic survey agency.
- E. Preexcavation 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.

## 1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify "Call Before You Dig" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures are in place.
- E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.
- F. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.



1. Liquid Limit Satisfactory native soils must be maintained within a specified optimum moisture content range at time of compaction.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.
  1. Unsatisfactory soils also include satisfactory soils not maintained within 4 percent of optimum moisture content at time of compaction.
- D. Base Course: Aggregate base shall be 3/4"-minus unless otherwise specified.
- E. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and zero to 5 percent passing a No. 4 (4.75-mm) sieve.
- F. Sand: ASTM C 33/C 33M; fine aggregate.
- G. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) 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 6 inches (150 mm) wide and 4 mils (0.1 mm) 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 30 inches (750 mm) 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 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. 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. 6 inches (150 mm) beneath pipe in trenches and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). 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 6 to 12 inches (150 to 300 mm) 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. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
  - 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  - 2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: 12 inches (300 mm) each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
  3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
  4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Trenches in Tree- and Plant-Protection Zones:
1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
  3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.8 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Compaction: Test subgrade compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing. Space tests at no less than one for each 10,000 sf of in-place soil or part thereof.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.9 UNAUTHORIZED EXCAVATION

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

### 3.10 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 remaining trees.

### 3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring, bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while removing shoring and bracing.
- D. Initial Backfill:
  - 1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
    - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Final Backfill:
  - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

- F. Warning Tape: Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

### 3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use engineered fill.
  - 4. Under building slabs, use engineered fill.
  - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.

4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

### 3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
  1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
  2. Walks: Plus or minus 1 inch (25 mm).
  3. Pavements: Plus or minus 1/2 inch (13 mm).

### 3.17 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Section 334600 "Subdrainage."
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).
  1. Place and compact impervious fill over drainage backfill in 6-inch- (150-mm-) thick compacted layers to final subgrade.

### 3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
  1. Place base course material over subbase course under hot-mix asphalt pavement.
  2. Shape subbase course and base course to required crown elevations and cross-slope grades.
  3. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
  4. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

### 3.19 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  - 2. Determine that fill material classification and maximum lift thickness comply with requirements.
  - 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. 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.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab but in no case fewer than three tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) 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 150 feet (46 m) or less of trench length but no fewer than two tests.
- E. 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; recompact and retest until specified compaction is obtained.

### 3.20 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 Architect; reshape and recompact.
- 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, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

## **SECTION 31 2333 - TRENCHING AND BACKFILLING FOR UTILITIES**

### **PART 1 - GENERAL**

#### **1.1 CONTRACT CONDITIONS**

- A. Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.

#### **1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS**

- A. Division 31, Section "Earth Moving"
- B. Division 33, Section "Storm Utility Drainage Piping"
- C. Division 33, Section "Storm Utility Drainage Piping"

#### **1.3 DEFINITIONS**

- A. Unstable Soil:
  - 1. Soft, loose, or wet ground that is incapable of supporting materials, equipment, personnel, or structure.
- B. AASHTO:
  - 1. American Association of State Highway and Transportation Officials, 341 National Press Building, Washington DC., 2004.
- C. Pipe:
  - 1. Water pipe, sewage pipe, storm drain pipe, and electrical conduit.

#### **1.4 OPTIONS**

- A. All proposed substitutions and areas of use shall be submitted for approval prior to use.

#### **1.5 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include cut sheet with material descriptions, dimensions of individual components and profiles, colors, finishes, field assembly requirements, and installation details.

#### **1.6 COORDINATION**

- A. Coordinate with other Trades affecting or affected by Work of this Section.

#### **1.7 REGULATORY AGENCY REQUIREMENTS**

- A. Obtain and pay for any Permits and Inspections required by governing agencies and utility companies.

1.8 ADVANCE NOTICES

- A. Notify Engineer and governing authorities at least 24 hours prior to covering over Work of this Section so that Inspections can be made.

1.9 FIELD MEASUREMENTS

- A. Systems layout on Drawings, including existing utility locations, is diagrammatic and may not be exact.
- B. Verify prior to fabrication.
- C. If field measurements differ slightly from Drawing dimensions modify Work as required for accurate fit. If measurements differ substantially, notify the Owner prior to fabrication.

PART 2 - PRODUCTS

2.1 SOIL AND AGGREGATE MATERIALS

- A. Soil and aggregate materials shall be in accordance with those listed in section 31 2000 Earth Moving.

2.2 BURIED UTILITY MARKERS

- A. Tracer Wire
  - 1. Material: Bare Solid Copper wire
  - 2. Minimum size: 1 ga.
  - 3. Color:
    - a. Over storm drain pipe: Green
    - b. Over water pipe: Blue
    - c. Over sanitary sewer pipe: Purple or Red
  - 4. Splicing: Make with electrical connectors
  - 5. Successful conductivity testing: Required for system acceptance.
- B. Underground Detectable Marking Tape:
  - 1. Manufacturer & Brand: Reef Industries Terra tape, or approved equal.
  - 2. Material: Polyethylene with solid foil core
  - 3. Thickness: 1 mil
  - 4. Width: 6 inches
  - 5. Imprinted message:
    - a. "Caution (Type of Utility) Line buried below"
    - b. Repeat message over full length of tape.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

- A. Prior to starting work, verify that existing conditions are suitable to perform work.
- B. Notify General Contractor about defects requiring correction.
- C. Do not start work until conditions are satisfactory.

3.2 SOIL BEARING TESTS

- A. Should doubt exist as to bearing capacity of existing soil, tests at Owner's expense may be ordered by the Owner.

3.3 TRAFFIC CONTROL

- A. Unless otherwise approved by governing authorities, provide barricades, detours, warning devices, flag men and equipment movement necessary to maintain vehicle and pedestrian traffic on public or private streets and walks.

3.4 PROTECTING OTHER WORK

- A. Existing monuments:
  - 1. Carefully maintain bench marks, monuments, and other reference points.
  - 2. If disturbed or destroyed, replace as directed.
- B. Existing utilities:
  - 1. Existing utilities shown on Drawings are located according to best available information, but accuracy is not guaranteed.
  - 2. Protect active utility lines encountered; notify Line Owner.
  - 3. Repair or replace active utility lines damaged by work of this Section.
- C. Street cleaning:
  - 1. Maintain public and private streets and walkways clean at all times.
- D. Dust control:
  - 1. Protect persons and property against damage and discomfort caused by dust. Water as necessary and when directed.
- E. Existing trees & plants to remain:
  - 1. Protect against damage.
- F. Open trenches:
  - 1. Protect persons and property against injury and damage caused by open trenches.
- G. Other work & adjacent property:
  - 1. Protect against damage and discoloration caused by work of this Section.

3.5 INTERFERING EXISTING SIGNS

- A. Remove and protect against damage.
- B. Provide temporary traffic control signs where necessary.
- C. Replace original signs during clean-up operations in locations similar to original location and construction.

3.6 CUTTING EXISTING PAVEMENT

- A. Cut prior to excavation with vertical, straight-line joints using pavement saw or other tool designed for cutting pavement.
- B. Make cuts parallel or perpendicular to pavement centerline.
- C. Cut width: Extend cut 1 ft. beyond each side of trench.
- D. Replace pavement to condition at least as good as existing prior to cutting.

3.7 TRENCHING

- A. Before starting to excavate:
  - 1. Strip available topsoil from areas to be excavated in accordance with Div 31 "Site Clearing" Section.
  - 2. Stockpile topsoil where and as directed by General Contractor.
- B. Excavating:
  - 1. Excavate to lines and grades shown on Drawings or Specifications, unless otherwise directed by the Owner.
  - 2. Allow ample space for pipe and pipe bedding.
  - 3. Leave bearing surfaces undisturbed, level, and true.
  - 4. Hand-grade where necessary.
- C. Blasting:
  - 1. Not allowed at this site.
- D. Depth:
  - 1. Unless otherwise specified or shown on Drawings, allow for at least 24 inches cover over pipe.
- E. Excavation width:
  - 1. Where parallel pipes are to be laid: At least 18 inches wider than sum of inside diameters of parallel pipes plus distance between pipes.
  - 2. Elsewhere: At least 18 inches wider than inside diameter of pipe.
  - 3. Increase widths where directed by Engineer and where necessary to receive shoring.
  - 4. Do not damage adjacent structures or property.
  - 5. Do not extend Excavation beyond construction easements, unless approved by affected Property Owners.

F. Temporary stockpiling of excavated material:

1. Locate within construction area.
2. Unless otherwise approved, do not obstruct private or public streets, drives, or walkways.
3. Locate at least 2 ft. from trench edges. Contractor responsible for safe-loading trenches.
4. At temporary stockpiles remaining during rainy periods, grade and cover stockpile as required to prevent compaction, erosion, and water infiltration.

G. Over-excavation:

1. Where excavation, through Contractor's error is carried to levels lower than those shown on drawings, fill with compacted pipe bedding material to proper levels at no additional cost to Owner.

3.8 EXCESS & UNSUITABLE EXCAVATED MATERIAL

- A. Deposit excess material suitable for filling site where directed.
- B. Remove from site unsuitable fill material, such as concrete, debris, silt, clay, grasses, weeds, and other deleterious substances which cannot be buried at least 3 ft.

3.9 PIPE BEDDING INSTALLATION

A. Material:

1. Aggregate base
- B. Fill full trench width and compact to 95% maximum density per ASTM D 1557.
- C. Minimum pipe bedding thickness below pipe bottom: 4 inches.
- D. Excavate bell holes at each joint to permit proper joint assembly and inspection.
- E. Hand-shape trench bottom to provide uniform, even support over bottom 120 deg. of pipe.
- F. Firmly support full pipe length; do not rest bell-to-bell.

3.10 PIPE ZONE MATERIAL INSTALLATION

A. Material:

1. Aggregate base
- B. Fill full trench width.
- C. Sufficiently compact pipe zone material to prevent pipe movement during final backfilling.
- D. At pipe smaller than 15 inches diameter: Backfill with pipe zone material to 10 inches above pipe top.

- E. At pipe 15 inches and larger: Backfill up to 12-inches above top of pipe and carefully pack under pipe haunches.
- F. Pipe bedding and pipe zone material shall be compacted to 95% of maximum density per ASTM D 1557.

3.11 BURIED UTILITY MARKER INSTALLATION

- A. Install tracer wire for non-metallic pipes approximately 6" above the top of buried pipe.
- B. Install detectable warning tape 6 to 12 inches below finished grade.

3.12 TRENCH BACKFILLING (12 inches above top of pipe)

- A. Remove debris and decayable matter from areas to be filled before proceeding.
- B. Make fills as soon as feasible to assure thorough settlement.
- C. Do not drop sharp, heavy material onto pipe.
- D. Do not use sharp tamping tool around pipe.
- E. Do not push backfill material into trench allowing material to free-fall into open trench, until at least 2 feet of Cover is provided over pipe

3.13 COMPACTION OF BACKFILLS (12 inches above top of pipe)

- A. Place fills in 6 to 8 inch maximum lifts and compact with mechanical vibration.
- B. 95% minimum density under and within 2 ft. of structure foundations, slabs, and pavement; 90% elsewhere.
- C. Refer to Section 31 20 00 for testing details.
- D. Replace any slabs and pavement which develop settlement cracks during Warranty Period.
- E. Regrade any unsurfaced areas where settlement develops during Warranty Period.

3.14 TRENCH BACKFILL MAINTENANCE

- A. Continually maintain unsurfaced, backfilled trenches through Construction Period.

3.15 PROTECTING COMPLETED WORK

- A. Protect against displacement and intrusion by foreign matter.
- B. PRODUCT CLEANING AND REPAIRING
- C. Where completed areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.
- D. Including work of other trades, clean, repair and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by work of

this Section.

- E. Remove debris from Project Site upon work completion, or sooner if directed.

END OF SECTION



## **SECTION 31 2500 - EROSION AND SEDIMENTATION CONTROLS**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: Erosion and Sedimentation Control (ESC) Plan.
- B. Related Sections:
  - 1. Division 31 Section "Site Clearing"
  - 2. Division 31 Section "Earth Moving"

#### **1.2 SUBMITTALS**

- A. Product Submittals:
  - 1. Submit two copies of product data on erosion control materials.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- E. ESC facilities shown on drawings are minimum requirements for anticipated site conditions.
  - 1. Upgrade these ESC facilities as needed during construction period for unexpected storm events or site conditions to ensure that sediment and sediment laden water do not leave site.

### **PART 2 PRODUCTS**

2.1 MATERIALS

- A. Provide materials required for this work.

PART 3 EXECUTION

3.1 INSTALLATION AND MAINTENANCE PROCEDURES

- A. Inspect ESC facilities daily and maintain as necessary to ensure continued functioning.
- B. Do not allow more than one foot of sediment to accumulate within a trapped catch basin.
  - 1. Clean catch basins and conveyance systems prior to paving.
  - 2. Do not allow cleaning operations to flush sediment laden water into other drainage systems, roadways, or natural waterways.
- C. Construct Stabilized Construction Entrances at beginning of construction and maintain for duration of project.
  - 1. Provide additional measures required to ensure paved areas adjacent to project are kept clean for duration of project.
- D. Follow guidelines established by Governing Authority for construction and maintenance of graveled construction entrances and temporary sediment barriers.
- E. Follow guidelines established by Governing Authority for erosion control work.
- F. Provide materials in good physical condition to provide proper sediment retention.
- G. Inspect sediment fences and barriers immediately after each rainfall and at least daily during prolonged rainfall and perform required repairs.

END OF SECTION

## SECTION 321216 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Asphalt curbs.
6. Asphalt traffic-calming devices.
7. Asphalt surface treatments.

- B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal of existing asphalt pavement.
2. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
4. Section 321400 "Unit Paving" for bituminous setting bed for pavers.

#### 1.3 UNIT PRICES

- A. Work of this Section is affected by square yard measurement.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
  - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
  - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include technical data and tested physical and performance properties.
  - 2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
  - 3. Job-Mix Designs: For each job mix proposed for the Work.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Certificates: For each paving material, include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports.

## 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Bend LaPine School District, Bend Park and Recreation District, and City of Bend for asphalt paving work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
  - 2. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
  - 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
  - 4. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
  - 5. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.

## PART 2 - PRODUCTS

### 2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
  - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: ASTM D 242/D 242M or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

### 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320, PG 64-28.
- B. Asphalt Cement: ASTM D 3381/D 3381M for viscosity-graded material, ASTM D 946/D 946M for penetration-graded material.
- C. Emulsified Asphalt Prime Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- D. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Water: Potable.
- F. Undersealing Asphalt: ASTM D 3141/D 3141M; pumping consistency.

### 2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled tires, asphalt shingles or glass from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Sand: ASTM D 1073 or AASHTO M 29, Grade No. 2 or No. 3.
- C. Joint Sealant: ASTM D 6690 or AASHTO M 324, Type I, hot-applied, single-component, polymer-modified bituminous sealant.

## 2.4 MIXES

1. Surface Course Limit: Recycled content no more than 10 percent by weight.
- B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; and complying with the following requirements:
  1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
  2. Surface Course: 1/2" Dense Graded Level 2 HMA

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
  2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
  3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
  1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

- D. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

### 3.3 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
  - 1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch (6 mm).
  - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
  - 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
  - 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

### 3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth (0.5 to 1.40 L/sq. m per 25 mm depth). Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
  - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
  - 2. Protect primed substrate from damage until ready to receive paving.

### 3.5 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
  - 2. Place hot-mix asphalt surface course in single lift.
  - 3. Spread mix at a minimum temperature of 250 deg F (121 deg C).
  - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
  - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

- B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
  - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches (25 to 38 mm) from strip to strip to ensure proper compaction of mix along longitudinal joints.
  - 2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - 1. Clean contact surfaces and apply tack coat to joints.
  - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
  - 3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
  - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
  - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

### 3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  - 1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent or greater than 100 percent.
  - 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.



- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Surface Course: Plus 1/4 inch (6 mm), no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
  - 1. Surface Course: 1/8 inch (3 mm).
  - 2. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
  - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
  - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

- a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than three cores taken.
  - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Replace and compact hot-mix asphalt where core tests were taken.
- G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

### 3.10 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

## SECTION 321313 - CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes Concrete Paving, including the Following:
  - 1. Driveways.
  - 2. Roadways.
  - 3. Parking lots.
  - 4. Curbs and gutters.
  - 5. Walks.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" Section 033053 "Miscellaneous Cast-in-Place Concrete" for general building applications of concrete.
  - 2. Section 321316 "Decorative Concrete Paving" for stamped concrete other than stamped detectable warnings.
  - 3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
  - 4. Section 321713 "Parking Bumpers."
  - 5. Section 321723 "Pavement Markings."
  - 6. Section 321726 "Tactile Warning Surfacing" for detectable warning tiles.
  - 7. Section 321729 "Manufactured Traffic-Calming Devices."

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:

- a. Concrete mixture design.
  - b. Quality control of concrete materials and concrete paving construction practices.
2. Require representatives of each entity directly concerned with concrete paving 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 paving Subcontractor.
  - e. Manufacturer's representative of stamped concrete paving system used for stamped detectable warnings.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:
  1. Exposed Aggregate: 10-lb (4.5-kg) Sample of each mix.
- D. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- B. 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.
- C. Material Test Reports: For each of the following:
  1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Stamped 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.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.9 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete 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 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- C. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to 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 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.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

### 2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
  1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

### 2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- C. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- D. 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.
- E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, 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.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type I/II.
  - 2. Fly Ash: ASTM C 618, Class C or Class F.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
  - 1. Aggregate Sizes: 3/4 to 1 inch (19 to 25 mm)
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: Potable and complying with ASTM C 94/C 94M.

## 2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry or cotton mat.
- 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.

## 2.6 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.7 STAMPED DETECTABLE WARNING MATERIALS

- A. Detectable Warning Stamp: Semirigid polyurethane mats with formed underside capable of imprinting detectable warning pattern on plastic concrete; perforated with a vent hole at each dome.
  - 1. Size of Stamp: One piece, matching detectable warning area shown on Drawings.
- B. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation designed to facilitate release of stamp mats.

## 2.8 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
  - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash or Pozzolan: 25 percent.
  - 2. Slag Cement: 50 percent.
  - 3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 6 percent plus or minus 1-1/2 percent for 3/4-inch (19-mm) nominal maximum aggregate size.



- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Concrete Mixtures: Normal-weight concrete.
  - 1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
  - 2. Maximum W/C Ratio at Point of Placement: 0.45
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).

## 2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
  - 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.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
  - 2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
  - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  - 2. Provide tie bars at sides of paving strips where indicated.
  - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. 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.
- D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 (ACI 301M) 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 and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. 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.

### 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  - 2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
  - 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

### 3.8 SPECIAL FINISHES

- A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:
  - 1. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
  - 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
  - 3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
  - 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.

### 3.9 DETECTABLE WARNING INSTALLATION

- A. Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Section 321726 "Tactile Warning Surfacing."
  - 1. Tolerance for Opening Size: Plus 1/4 inch (6 mm), no minus.

- B. Cast-in-Place Detectable Warning Tiles: Form blockouts in concrete for installation of tiles specified in Section 321726 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with Section 321726 "Tactile Warning Surfacing" immediately after screeding concrete surface.
- C. Stamped Detectable Warnings: Install stamped detectable warnings as part of a continuous concrete paving placement and according to stamp-mat manufacturer's written instructions.
  - 1. Before using stamp mats, verify that the vent holes are unobstructed.
  - 2. Apply liquid release agent to the concrete surface and the stamp mat.
  - 3. Stamping: While initially finished concrete is plastic, accurately align and place stamp mats in sequence. Uniformly load, gently vibrate, and press mats into concrete to produce imprint pattern on concrete surface. Load and tamp mats directly perpendicular to the stamp-mat surface to prevent distortion in shape of domes. Press and tamp until mortar begins to come through all of the vent holes. Gently remove stamp mats.
  - 4. Trimming: After 24 hours, cut off the tips of mortar formed by the vent holes.
  - 5. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

### 3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to 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.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture-retaining-cover curing as follows:
  - 1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

### 3.11 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 (ACI 117M) and as follows:

1. Elevation: 3/4 inch (19 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-feet- (3-m-) long; unlevelled straightedge not to exceed 1/2 inch (13 mm).
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

### 3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
  1. Testing Frequency: Obtain at least one composite sample for each 5000 sq. ft. (465 sq. m) 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/C 231M, pressure method; 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 (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

- D. 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.
- E. 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.
- F. 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.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

### 3.13 REPAIR 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 Architect.
- B. Drill test cores, where directed by Architect, 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.

END OF SECTION 321313

**SECTION 32 15 40—CRUSHED STONE SURFACING**

**TRAIL SURFACE AGGRAGATE, (TSA)**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Work of this section includes all labor and materials necessary to construct aggregate, (crushed stone) pathways and trails as shown on the plans.
- B. The work includes, but is not limited to, the following:
  - 1. Surveying
  - 2. Staking
  - 3. Excavation
  - 4. Base Materials
  - 5. Surface Materials
  - 6. Associated Drainage structures
  - 7. Associated Backfill
- C. Related Documents and Sections:
  - 1. Section 01 5639; Temporary Plant Protection
  - 2. Section 31 2200; Grading

**1.3 DEFINITIONS AND REFERENCES**

- A. American Public Works Association (APWA).
- B. American Standards for Testing and Materials (ASTM).
- C. Oregon Standard Specifications for Construction, Oregon Department of Transportation, 2015 edition

**1.4 SUBMITTALS**

- A. Submit on cubic foot of “Crusher Run” crushed rock and sieve analysis indicating gradation.



## CRUSHED STONE SURFACING

- B. Submit one cubic foot of crushed rock base material and sieve analysis indicating gradation.
- C. The Contractor shall submit certified test results from a commercial testing laboratory or other evidence satisfactory to the Owner proving that all materials used meet the quality and gradation requirements specified.

## 1.5 QUALITY ASSURANCE

- A. Proprietary items shown on the drawings and specified herein are shown to establish standards of quality, utility, design, and function. Equivalent units by other manufacturers (substitutions) will be considered provided they are similar in characteristics. They shall be substituted only if approved by the Owner's Representative.
- B. Construction shall be done by a contractor with at least five years experience in construction of similar surfaces.
- C. Construction superintendent shall have a minimum of three years of documented experience with successful completion of projects of similar size and complexity.
- D. Work shall be completed in accordance with the United State Access Board section 1017, (Trails).
- E. All local, municipal and state laws and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications and the Contractor shall carry out their provisions. Any specification herein contained, shall not be construed to conflict with the above rules, regulations or requirements.

## 1.6 PROJECT CONDITIONS

- A. Inspection of the site: The contractor shall inspect the site prior to construction and verify the extent of the work required. Commencement of construction by the Contractor designates acceptance of the site conditions apparent at outset.
- B. The Contractor shall verify the locations of all existing utilities, structures, and services before commencing work. The location of utilities, structures, and services shown on these plans are approximate only. Any discrepancies between these plans and the actual field conditions shall be reported to the Owner 's representative immediately.
- C. Weather Limitations: Soil work shall be performed only when weather conditions do not detrimentally affect the quality of work.
- D. Project Limits: Areas, as specified within which work is to be performed.

## CRUSHED STONE SURFACING

- E. The Contractor shall protect all areas of work defined on the drawings and any existing on-site vegetation, structures, utilities, etc. All damage as a result of work under this contract shall be repaired at no cost to the Owner. The Contractor shall be responsible for the provision of traffic control, barricades, safety guards, and any other structures or improvements necessary for the complete protection of the public.
- F. The Contractor shall verify, locate and protect all existing utilities and features on and adjacent to the project site during construction and shall repair, at their own expense; all damage as a result of construction activities.
- G. Materials stored on site shall be protected with waterproof covering to prevent exposure to wind and rain.

## 1.7 COORDINATION

- A. Coordinate with other trades affecting or affected by work of this section.
- B. Verify that sleeving and other conduits, of sizes and types specified, are installed as required.

## PART 2 - PRODUCTS

## 2.1 "TRAIL SURFACE AGGREGATE, (#10 MINUS, OR TSA)" CRUSHED ROCK SURFACE

- A. Trail Surface Aggregate mix design:
  - 1. 1 part AASHTO #8
  - 2. 4 parts unwashed AASHTO #10
  - 3. 1 part minus #200 fines
- B. Trail surface aggregate shall be crushed rock free from deleterious or foreign matter with a plasticity index not exceeding 6 by ASTM D4318, a pH between 6-12.45 per EPA 9045C, and abrasion of 35% maximum per AASHTO T96, meeting the following gradation:

SIEVE	PERCENT PASSING
1/2"	100
3/8"	96-100
#4	75-90
#8	55-75
#16	35-50
#200	10-15

## CRUSHED STONE SURFACING

## 2.2 CRUSHED ROCK BASE COURSE (STATE SPEC)

A. Crushed rock base shall conform to the following quality standards:

B.

Abrasion (AASHTO T 96) Maximum wear	35%
Fractured Face Minimum wear	75%
Liquid Limit (AASHTO T89) not greater than	30%
Plasticity Limit (AASHTO T91) not greater than	6%

C. Aggregates shall consist of uniform quality, clean, tough, durable fragments of rock or gravel, free from flat, elongated, soft or disintegrated pieces, and other objectionable matter occurring either free or as a coating on the stone.

D. Based on U.S. standard sieves, the gradation of the aggregates to be furnished shall be as indicated below:

E.

GRADATION		
Sieve designation (Square Opening)	Percent Passing By Weight	
	1-1/2" Minus Base or Surfacing Course	3/4" Minus Leveling or Surfacing Course
2"	100	-
1-1/2"	95-100	-
1"	-	-100
3/4"	55-75	90-100
3/8"	-	55-75
1/4"	35-50	40-60
No. 200	0-5	0-5

## 2.3 GEOTEXTILE FABRIC

A. Filter fabric shall be pervious synthetic polymer, non-woven, from continuous filaments. Fabric shall be Mirafi N series nonwoven, or approved equal.

## PART 3 - EXECUTION

## 3.1 PREPARATION

A. Prior to all work of this section, the Contractor shall carefully inspect all previously installed work and verify that all such work is complete to the point where specified installation may properly commence.

## CRUSHED STONE SURFACING

- B. Verify that proposed path(s) may be installed in strict accordance with all pertinent codes and regulations, the accepted design, and the referenced standards.
- C. Based on site walk-through, Contractor shall furnish survey of proposed surfacing and paths including centerline staking marked with stationing and other significant layout information. Survey shall also stake all proposed locations of culverts, water bars, and other drainage features, changes in path types and other significant features. These stakes shall be marked with appropriate stationing. Staking shall be reviewed and approved by Owner prior to beginning excavation for paths.

## 3.2 PATH EXCAVATION

- A. Contractor shall excavate path to create a smooth, even subgrade for path base rock material.

## 3.3 PREPARATION OF SUBGRADE

- A. Bring all pathway and paving areas to required subgrade levels on undisturbed ground and compact by sprinkling and rolling or mechanical tamping. As depressions occur, refill with specified fill material and re-compact until the surface is at the proper grade. Prior to placement of concrete curbs the subgrade shall be inspected and approved by the Owner. Subgrade shall be compacted to not less than 92% relative compaction as determined by ASTM D 1557-00.

## 3.4 GEOTEXTILE FABRIC

- A. Geotextile fabric shall be placed prior to the rock base course. Fabric shall be unrolled directly to the line and dimension shown on the drawings. Fabric shall be lapped a minimum of 24 inches in all directions. Contractor shall place base rock material in such a way as to not tear, puncture, or shift the filter fabric. Tears or rips in the fabric shall be patched with fabric lapped a minimum of 12 inches around the rip. Tracked or wheeled equipment shall not be permitted on the filter fabric.

## 3.5 BASE COURSE PLACEMENT

- A. Place base rock in maximum of 3" lifts to reach designed thickness. Compact each lift to 95% compaction prior to placing additional lifts.
- B. Compact base rock to 95% of maximum dry density at optimum moisture content as determined by ASTM D 698.

### 3.6 SURFACE COURSE PLACEMENT

- A. Trail Surface Aggregate
  - 1. Place "TSA" only after acceptance of base rock by Owner.
  - 2. Place "TSA" in a maximum lift thickness of 3 inches.
  - 3. "TSA" shall be pre-conditioned to maximum moisture content prior to being placed on base rock. Pre-conditioning may occur onsite if sufficient storage and stockpile area is available, or be conditioned at the plant prior to trucking.
  - 4. Compact "TSA" to 95% of maximum dry density at optimum moisture content as determined by ASTM D 698 with a vibratory roller capable of rolling a min of 6' width in a single pass.
  - 5. Slope surface of tread as necessary to provide positive drainage across tread, and to minimize drainage along path length.
- B. Place TSA with a small paver in 4" loose, 3" compacted lifts
  - 1. If unable to place material with a paver, verify with owner for normal aggregate placement methods.
- C. TSA to be delivered and placed at optimum moisture content.
- D. Do not operate equipment on finished surface.

### 3.7 FINISH GRADING

- A. After path surface is constructed, complete grading of path-side ditches, swales, and slopes as necessary.
- B. Shoulder material should be placed with enough coverage to create a min of 2:1 slope from the top of the finished path to native grade. Once placed the shoulder material shall be mechanically compacted along its top edge to work the material into the "TSA" finished path. Shoulder material shall then be hand raked to along the slop to prepare the surface for restoration planting.
- C. Final grades should appear natural, with slope rounding as necessary.
- D. Place stockpiled duff material on all disturbed ground, to a depth of 2-3 inches.

### 3.8 FINAL INSPECTION AND CLEANING

- A. Remove all construction debris from site.
- B. Repair all path surface irregularities.
- C. Eliminate all areas of pooling or standing water on path surface.

- D. Remove all excess path materials from plant beds, walks, roadways or other adjacent paving surfaces.

END OF SECTION 32 15 40

**SECTION 32 1723 - PAVEMENT MARKING**

**PART 1 GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Traffic lane, curb, and parking stall painting and striping.
2. Symbols of accessibility.

**B. Related Sections:**

1. Division 32 Section "Asphalt Paving", for substrate.
2. Division 32 Section "Concrete Pavement", for substrate.

**1.2 SUBMITTALS**

**A. Product Data:** Product data sheet for paint to include general properties of paint, surface preparation, application instructions, and cleanup information.

**B. Shop Drawings:**

1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
3. Indicate pavement markings, colors, defining basketball court boundary striping and markings.

**1.3 SITE CONDITIONS**

**A. Environmental Requirements:**

1. Do not apply marking paint when wind velocity exceeds 15 mph.
2. Do not apply marking paint when pavement temperature is less than 40 degrees F, and ambient air temperature is less than 45 degrees F.

**1.4 SCHEDULING**

**A. Perform pavement marking work after concrete curbs, and walks have been installed and cured.**

**B. Perform pavement marking work after asphaltic concrete paving has been installed, cured, and sealed.**

1.5 REGULATORY REQUIREMENTS

- A. Comply with 2010 ADA Standards for Accessible Design and State Building Code for accessibility recommendations and requirements for the physically disabled.

1.6 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide products by manufacturers indicated in this Section, or approved.
  - 1. Substitutions: Pre-approval by Owner according to requirements of Division 01 Section for "Substitution Procedures."

2.2 TRAFFIC MARKING PAINT

- A. Latex Traffic Marking Paints: Provide products by one of the following:
  - 1. Benjamin Moore: Super Spec HP, Safety & Zone Marking Latex P58.
  - 2. Kelly-Moore: 1472 Zone Marking Paint or 1473 Curb Marking Paint.
  - 3. PPG: ZONELINE, Traffic & Zone Marking Latex, 11-53, 11-54, 11-55, 11-56.
  - 4. Rodda: Professional Maintenance, Driveline, 57341A
  - 5. Sherwin-Williams: Setfast Acrylic Traffic Marking Paint.
- B. Alkyd Traffic Marking Paints: Provide products by one of the following:
  - 1. P.P.G. Industries: 11-3 Series.
  - 2. Sherwin-Williams: Setfast Premium Alkyd Zone Marking Paint..

2.3 ACCESSORIES

- C. Asphalt Mark-out Materials:
  - 1. Asphalt Emulsion: SS-sh.
- D. Mark-Out Paint:
  - 1. Color: Black.
  - 2. Type: Acrylic latex or alkyd oil, flat enamel.

2.5 PAVEMENT MARKING EQUIPMENT



- A. Apply paint with motor powered atomizing spray striping machine.
- B. Adjust equipment to provide the specified wet film thickness.

### PART 3 EXECUTION

#### 3.1 PROTECTION AND PREPARATION

- A. Protection: Place temporary barricade and rope or plastic cone barriers to protect striping from vehicular traffic until paint is dry.
- B. Surface Preparation:
  - 1. Pressure wash paving surface and blow dry wet areas prior to applying paint.
  - 2. Cover existing striping with black paint where indicated.

#### 3.2 PAVEMENT STRIPING

- A. Spray apply paint with straight edges, true alignment, and uniform wet film thickness of 17 mils with thickness variation not to exceed 2 mils.
- B. Form disabled accessibility symbols and arrows with templates. Paint color shall comply with local jurisdiction Accessibility Guidelines.
- C. Apply white paint to no parking striped paving areas, parking stall dividers, stop bars and cross walks.
- D. Apply red paint to curbs where parking is restricted.
- E. Apply yellow paint to center lines of two direction drive lanes. .
- F. Apply parking area striping in 3 inch wide white lines.

#### 3.3 ADJUSTING

- A. Remove misplaced marking paint from concrete surfaces and other surfaces.
- B. Cover misplaced paint on asphaltic concrete with asphalt emulsion.
- C. Remove and reinstall misplaced marking buttons.

END OF SECTION

**32 18 23.26**  
**NATURAL ATHLETIC FIELD SURFACING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES:**

- A. Import, placement and amending of topsoil on natural grass athletic field surfaces.
- B. Fine grading of all natural grass athletic field surfaces.

**1.02 RELATED SECTIONS**

- A. 32 91 13 Soil Preparation

**1.03 SUBMITTALS**

- A. Submit under provisions of 01 33 00 Submittal Procedures
- B. Product Data: Submit product data for all products including specifications and sieve analysis prepared by third party testing agency.
- C. Product Samples: Submit a sample of each product type in 1 gallon zip lock bags with each product labeled with the name of the product and the project name.
- D. Installer Qualifications: Submit qualifying experience as defined in Quality Assurance paragraph below to include name of project, brief description of work (10-25 words), location, date of installation and Owner contact name and phone number.
- E. Topsoil Tests: Provide the following soil tests by approved testing lab prior on stockpiled topsoil, if any, and on imported topsoil, if any. Perform tests prior to importing soil material. Collect soil samples according to procedures recommended by testing lab. Do not begin importing soil material until soil analysis submittals have been approved.
  - 1. Approved Testing Labs:
    - a. A & L Western Agricultural Laboratories, <http://www.al-labs-west.com>
    - b. Soil and Plant Laboratory, [www.soilandplantlaboratory.com](http://www.soilandplantlaboratory.com)
  - 2. Fertility Analysis: Provide topsoil Fertility Analysis including organic matter, half saturation percentage, pH, salinity, nitrate, nitrogen, sodium, copper, zinc, manganese, iron, sulfate and boron, in accordance with methods established by the Association of Official Agriculture Chemists performed by testing lab below or approved equal. Laboratory Analysis shall include recommendations for incorporation of fertilizers to improve fertility. All recommendations shall be made by a ARCPACS Certified Professional Agronomists.
  - 3. Particle Size Distribution Analysis (PSDA): Provide the test results of a Particle Size Analysis from an approved testing lab indicating that the topsoil meets the specified requirements for textural class according to USDA Soil Class definitions. The report shall identify the percentages of sand, silt and clay in the topsoil. Tests shall be conducted according to methods described in USDA Soil Survey Investigations Report No. 42, version 4.0, method code number 3A
  - 4. Soil Amendment Plan: Based on Fertility analysis, submit adjusted plan for application of compost, lime, fertilizers and trace elements, including product data with guaranteed analysis, application rates, timing, and methods.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications
  - 1. The installer performing the Work of this Section shall be a firm specializing in the construction and reconstruction of athletic facilities having completed the construction or major renovation of at least 10 new natural grass baseball, soccer football fields for

schools or parks. Work shall have included work substantially similar to the work of this section.

B. Grading Tolerances:

1. Surface of topsoil, infield surfacing:  $\pm 0.02$  feet

**1.05 DELIVERY STORAGE AND HANDLING**

- A. Deliver, store and handle materials in accordance with manufacturer's instructions.
- B. Material shall be labeled by the manufacturer. Keep labels in place until placement.
- C. Keep material dry and free from contamination until placed.

**1.06 FIELD CONDITIONS**

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during and after installation.
- B. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations

**1.07 SCHEDULING**

- A. Schedule the Work of this Section so that it may be completed in dry weather.
- B. Sequence the Work of this Section after adjacent work so that it is protected from vehicular traffic and contamination.
- C. Schedule the Work so that seeding operations may be completed as soon as soil preparation work is completed and planarity test is approved by Owner's representative.

**PART 2 PRODUCTS**

A. MATERIALS

1. Topsoil: Topsoil shall be imported and shall meet the following specifications:
  - a. Soil Texture: Topsoil shall be sandy loam, loam or silt loam according to the U.S. Department of Agriculture definitions of soil types as defined by mechanical analysis.
  - b. Organic Matter: Topsoil shall contain at least 3% but not more than 6% organic matter by weight as determined by soil fertility analysis.
  - c. pH: Soil pH shall be between 5.5 and 6.5.
  - d. Fertility: Macronutrients, Nitrogen, Phosphorus and Potassium, (NPK) shall be at least a medium level and below toxic levels as determined by soil fertility test. Micronutrients including magnesium, calcium, sodium, sulphur, zinc, manganese, iron, copper and boron shall be below toxic levels. Add macro and micro nutrients as recommended by soil analysis. Topsoil shall not contain natural or unnatural minerals, compounds, chemicals, microbes or other elements at levels that are toxic or otherwise inhibit growth.
  - e. Homogeneity and Purity: Topsoil shall be screened. All topsoil shall pass through a  $\frac{1}{4}$ " mesh screen. It shall be homogenous, free of rock, roots or other clumps of organic matter, and variation in soil texture, fertility or organic content before placing.
  - f. Weeds: Do not use topsoil from a site infested with Canadian thistle, bracken fern, scotch broom, horsetail or any Oregon state-listed noxious weeds.
2. Lime:
  - a. Calcium Carbonate (Calpril or approved equal)
  - b. Dolomitic Lime (Dolopril or approved equal)
3. Commercial Fertilizer: Commercial Fertilizer shall be a combination of natural organic and inorganic granular fertilizers dry and free flowing complying with Oregon State fertilizer laws, (ORS 633.311) uniform in composition, and shall be labeled as required with a guaranteed analysis. "Complete" fertilizers which contain a combination of Nitrogen,

Phosphate and Soluble Potash may be used only if the combined application rates match the recommendations provided by the independent soil testing agency's lab report.

4. Organic Soil Amendment: Compost, certified by the US Composting Council Seal of Testing Assurance (USCC-STA) as derived from the controlled biological decomposition of organic wastes that have been sanitized through the generation of heat and processed to further reduce the pathogens as defined by the US EPA (Code of Federal Regulations Title 40, Part 503, Appendix B, Section B) or approved equal. Raw material may include items such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) that meet all State environmental agency requirements and have been stabilized to the point that is beneficial to plant growth. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth and meeting the following criteria:
  - a. PH of the material shall be between 6.7-7.5
  - b. Moisture content shall be between 35%-50%
  - c. Bulk density shall be no less than 800 lbs/cu. yd. And no more than 1000 lbs./cu. yd.
  - d. Carbon to Nitrogen ration (C:N) shall be between 20-25:1
  - e. Organic Nitrogen content (NH<sub>4</sub>) shall be no greater than 1.25 parts per million
  - f. Potassium content shall be no greater than 5500 parts per million
  - g. Phosphorous content shall be no greater than 325 parts per million
  - h. Pesticide residues shall not exceed 0.05 parts per million
  - i. Heavy Metals (trace) shall not exceed 0.5 parts per million
  - j. Material shall have been "aged" a minimum of six (6) months prior to delivery to site
  - k. The material shall not contain rocks or other inert organic debris larger than 1/4" and
  - l. The material shall not contain pieces of plastic, metal glass or other inorganic materials.
  - m. The material shall not contain soluble salts (Ecs) exceeding 5.0 ds/m as indicated by a certified soil testing agency

- B. Non-selective post emergent contact herbicide: Glyphosate

### **PART 3 EXECUTION**

#### **A. EXAMINATION**

1. Examine the field conditions in which the work will be performed. Do not proceed with work until deleterious conditions have been corrected.
2. Subgrades: Subgrades and slopes shall have been established prior to beginning the Work of this Section to allow the placement of the full depth as required by this Section and/or the Drawings.
3. Schedule so that work is not required in periods of excessive rainfall.

#### **B. PREPARATION**

1. Scarify areas to receive topsoil prior to placement.

#### **C. TOPSOIL**

1. Place 12" of topsoil in all athletic field areas (all lawn areas within perimeter walk).
2. Amend Topsoil: Incorporate soil amendments into the topsoil according to recommendations by of soil testing lab report. Assume, for bidding purposes, the following applications per 1000 s.f. and adjust up or down according to the recommendations:
  - a. Organic Soil Amendment: 6 cu.yd. (2" layer)
  - b. Lime (100 Score): 200 lb.
  - c. Nitrogen (N): 3.0 lb.
  - d. Phosphate (P): 2.5 lb.
  - e. Potash (K): 4.5

- f. Sulfur: 0.7.
- 3. Thoroughly till in soil amendments to a depth of 6"-8" to achieve uniform homogeneous mixture.
- 4. Lightly compact to a firm unyielding condition. Avoid over-compaction.
- D. INSTALLATION
  - 1. Use laser guided, machine controlled grading equipment to establish precise grades as shown on drawings and establish field planarity for all athletic field areas. Conduct grading operations in soils with optimal moisture content.
- E. TOLERANCES
  - 1. Finish grades shall match specified grades to within 0.25" plus or minus.
  - 2. Maintain clean edges between surfaces. Horizontal locations of edges between infields and outfields and warning tracks shall be within 1" of specified location.
- F. PLANARITY TEST
  - 1. Conduct planarity test in the presence of the Owner's Representative prior to seeding or sodding. Finished surface of prepared topsoil shall not deviate from true plane by more than specified grading tolerances in the Quality Assurance paragraph in Part 1 of this Section. Provide a 50 foot string line, and orange construction marking spray paint sufficient to mark areas to be corrected. Provide workers to hold each end of the string line. Demonstrate surface planarity by stretching string line over surface at regular intervals as directed by turf manufacturer's representative and/or Owner's Representative sufficient to identify all areas in need of correction.
  - 2. Correct any deficiencies observed during test.
  - 3. Repeat steps 1 and 2 above until planarity is approved by Owner.
- G. SEEDING AND SODDING:
  - 1. Proceed with seeding or sodding operation as soon as planarity is approved by Owner and irrigation system is completed.
- H. PROTECTION
  - 1. Protect installed Work of this Section from contamination from other soil materials, construction debris, trench spoils, trash and other deleterious materials.
  - 2. Do not drive any vehicles over installed surfaces except lawn mowers as required to mow fields.
- I. CLEANING
  - 1. Clean up any spilled materials, pallets, super sack bags and any other construction debris and remove from site
  - 2. Clean any staining caused by spilled or leaching of materials onto adjacent paved surfaces.

**END OF SECTION**

## SECTION 323113 - CHAIN LINK FENCES AND GATES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Chain-link fences.
  - 2. Swing gates.

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" Section 033053 "Miscellaneous Cast-in-Place Concrete" for cast-in-place concrete post footings.
  - 2. Section 281300 "Access Control" for gate controls.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review coordination of interlocked equipment specified in this Section and elsewhere.
  - 2. Review required testing, inspecting, and certifying procedures.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Fence and gate posts, rails, and fittings.
    - b. Chain-link fabric, reinforcements, and attachments.
    - c. Accessories:
    - d. Gates and hardware.
    - e. Gate operators, including operating instructions and motor characteristics.

- B. Shop Drawings: For each type of fence and gate assembly.

- 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Include accessories, hardware, gate operation, and operational clearances.

- 3. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
- 4. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of factory-applied finish.
- D. Samples for Verification: For each type of component with factory-applied finish, 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 structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chain-link fence and gate.
- B. Product Test Reports: For framework strength according to ASTM F 1043, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

#### 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

#### 1.8 FIELD CONDITIONS

- A. 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.

## 1.9 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to comply with performance requirements.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - c. Faulty operation of gate operators and controls.
  - 2. Warranty Period: One year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.
- B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
- C. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

### 2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
  - 1. Fabric Height: As Shown on Plan.
  - 2. Steel Wire for Fabric: Chain link fence fabric shall be a minimum 9-gage steel wire, prior to any coatings.
  - 3. Provide minimum 7-gauge fabric for vinyl coating.
  - 4. Vinyl Coating shall be Brown in color to match existing fencing on site.
  - 5. All chain link fabric is to be closed loop at the top.
  - 6. All fence hardware shall be pressed steel.
  - 7. All fence ties shall be steel ties.

### 2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:



1. Fence Height: As Shown on Plan.
2. All fence posts shall be schedule 40.
3. Fences under 6-feet high shall use 2 3/8" OD terminal posts and 1 7/8" OD line posts.
4. All fencing 6-feet and over and up to 12- feet in height shall use 2 7/8" OD terminal posts and 2 3/8" line posts.
5. Include top rail 1.66 inches in diameter with swedged ends. No couplings are allowed.
6. Brace Rails: ASTM F 1043.
7. Metallic Coating for Steel Framework:
  - a. Type A: Not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating according to ASTM A 123/A 123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating according to ASTM A 653/A 653M.

## 2.4 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire according to ASTM A 817 or ASTM A 824, with the following metallic coating:
  1. Type I: Aluminum coated (aluminized).
- B. Polymer-Coated Steel Wire: 0.177-inch- (4.5-mm) diameter, tension wire according to ASTM F 1664, coated steel wire.
  1. Color: Brown according to ASTM F 934.
- C. Aluminum Wire: 0.192-inch- (4.88-mm-) diameter tension wire, mill finished, according to ASTM B 211 (ASTM B211M), Alloy 6061-T94 with 50,000-psi (344-MPa) minimum tensile strength.

## 2.5 SWING GATES

- A. General: ASTM F 900 for gate posts and double swing gate types.
  1. Gate Leaf Width: As indicated.
  2. Framework Member Sizes and Strength: Based on gate fabric height as indicated.
- B. Pipe and Tubing:
  1. Gate Posts: Round tubular steel.
  2. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: assembled with corner fittings.
- D. Hardware:
  1. Hinges: 180-degree inward swing.
  2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
  3. Lock: Manufacturer's standard internal device.
  4. Padlock and Chain: Provided by Owner

- E. Provide fittings according to ASTM F 626.
- F. Post Caps: Provide for each post.
  - 1. Provide line post caps with loop to receive tension wire or top rail.
- G. Rail and Brace Ends: For each gate, corner, pull, and end post.
- H. 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 rails to posts.
- I. Tension and Brace Bands: Pressed steel
- J. 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.
- K. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- L. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
  - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
    - a. Hot-Dip Galvanized Steel: galvanized coating thickness matching coating thickness of chain-link fence fabric.
- M. Finish:
  - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. (366 g/sq. m) of zinc.
    - a. Polymer coating over metallic coating.
  - 2. Aluminum: Mill finish.

## 2.6 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure

without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

## 2.7 GROUNDING MATERIALS

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
  - 1. Connectors for Below-Grade Use: Exothermic welded type.
  - 2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches (16 by 2440 mm).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. 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.
  - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
  - 1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Concealed Concrete: Place top of concrete 2 inches (50 mm) below grade to allow covering with surface material.

## CHAIN LINK FENCES AND GATES

- b. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches (127 mm) deep and 3/4 inch (20 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet (152 m), space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at 96 inches (2440 mm) o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 72 inches (1830 mm) or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- (3.05-mm-) diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches (610 mm) o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
  - 1. Extended along top of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches (152 mm) of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- H. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. 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.
- I. Intermediate and Bottom Rails: Secure to posts with fittings.
- J. Chain-Link Fabric: Apply fabric to inside of enclosing framework. Leave 1-inch (25-mm) bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches (380 mm) o.c.
- L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach

other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

### 3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

### 3.5 GROUNDING AND BONDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fence and Gate Grounding:
1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
  2. Install ground rods and connections at maximum intervals of 750 feet (225 m).
  3. Ground fence on each side of gates and other fence openings.
    - a. Bond metal gates to gate posts.
    - b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches (457 mm) below finished grade.
- C. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a ground rod located a maximum distance of 150 feet (45 m) on each side of crossing.
- D. Fences Enclosing Electrical Power Distribution Equipment: Ground according to IEEE C2 unless otherwise indicated.
- E. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches (152 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
- F. Connections:
1. Make connections with clean, bare metal at points of contact.
  2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
  3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.

4. Make above-grade ground connections with mechanical fasteners.
  5. Make below-grade ground connections with exothermic welds.
  6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- G. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.
- H. Comply with requirements in Section 264113 "Lightning Protection for Structures."

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Grounding Tests: Comply with requirements in Section 264113 "Lightning Protection for Structures."
- C. Prepare test reports.

### 3.7 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. Automatic Gate Operator: Energize circuits to electrical equipment and devices, start units, and verify proper motor rotation and unit operation.
  1. Hydraulic Operator: Purge operating system, adjust pressure and fluid levels, and check for leaks.
  2. Test and adjust operators, controls, and safety devices. Replace damaged and malfunctioning controls and equipment.
  3. Lubricate operator and related components.
- C. Lubricate hardware and other moving parts.

### 3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113

## **SECTION 328400 – PLANTING IRRIGATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Piping.
  - 2. Encasement for piping.
  - 3. Manual valves.
  - 4. Pressure-reducing valves.
  - 5. Automatic control valves.
  - 6. Automatic drain valves.
  - 7. Transition fittings.
  - 8. Dielectric fittings.
  - 9. Miscellaneous piping specialties.
  - 10. Sprinklers.
  - 11. Quick couplers.
  - 12. Drip irrigation specialties.
  - 13. Controllers.
  - 14. Boxes for automatic control valves.

#### **1.3 DEFINITIONS**

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
- E. Trace Wire: A conductive trace wire used for locating Circuit Piping with an electronic pipe locator after installation.

#### **1.4 PERFORMANCE REQUIREMENTS**

- A. Irrigation zone control shall be automatic two-wire system operation with controller, decoders, and automatic control valves.
- B. Delegated Design: Design 100 percent coverage irrigation system, including comprehensive engineering analysis by a qualified irrigation designer, using performance requirements and design criteria indicated.

- C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
  - 1. Irrigation Main Piping: 200 psig.
  - 2. Circuit Piping: 150 psig.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For irrigation systems indicated to comply with performance requirements and design criteria, including analysis data by the qualified irrigation designer responsible for their preparation.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sprinklers controllers and automatic control valves to include in operation and maintenance manuals.
- B. Field quality-control testing (post installation), reports.
- C. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.

#### 1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Spray Sprinklers: Equal to 10 percent of amount installed for each type and size indicated, but no fewer than 2 units.
  - 2. Bubblers: Equal to 10 percent of amount installed for each type and size indicated, but no fewer than 2 units.

#### 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers that include a Professional Class member of the American Society of Irrigation Consultants.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.



## 1.11 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Owner's Representative no fewer than two days in advance of proposed interruption of water service.
  - 2. Do not proceed with interruption of water service without Owner's Representative's written permission.

## PART 2 - PRODUCTS

### 2.1 PIPES, TUBES, AND FITTINGS

- A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
- B. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40 and 80.
  - 1. PVC Socket Fittings: ASTM D 2466, Schedules 40 and 80.
  - 2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
  - 3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.
- C. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, SDR 21.
  - 1. PVC Socket Fittings: ASTM D 2467, Schedule 80.
  - 2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.
- D. Unions
  - a. Schedule 80
  - b. Body, Nut and End Connector Material: PVC (ASTM F1498)
  - c. Pressure Rating: 150 psi.
  - d. O Ring Material: EPDM.
  - e. Ends: Socket Weld ASTM D2466.
  - f. NSF Approved.

### 2.2 PIPING JOINING MATERIALS

- A. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
- B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

### 2.3 MANUAL VALVES

- A. Brass Ball Valves:
  - 1. Description:
    - a. Standard: MSS SP-110.
    - b. SWP Rating: 150 psig.
    - c. CWP Rating: 600 psig.
    - d. Body Design: Two piece.

- e. Body Material: Forged brass.
- f. Ends: Threaded or solder joint if indicated.
- g. Seats: PTFE or TFE.
- h. Stem: Brass.
- i. Ball: Chrome-plated brass.
- j. Port: Full.

B. Valves in first paragraph below are available in NPS 1/4 to NPS 4 (DN 8 to DN 100).

C. Plastic Ball Valves:

- a. ISO 9002
- b. Standard Port
- c. Pressure Rating: 150 psi.
- d. Body Design: Two Piece.
- e. Ball and Body Material: PVC
- f. Handle Material ABS
- g. O Ring: EPDM.
- h. Ends: Socket Weld ASTM D2466.
- i. NSF Approved.

## 2.4 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Rain Bird Corporation.
- 2. Description:
  - a. Plastic, Automatic Control Valves:
  - b. Molded ABS-plastic body.
  - c. Normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

## 2.5 TRANSITION FITTINGS

- A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings:
  - 1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- C. Plastic-to-Metal Transition Fittings:
  - 1. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-socket or threaded end.
- D. Plastic-to-Metal Transition Unions:
  - 1. Description: MSS SP-107, PVC four-part union. Include one brass or stainless-steel threaded end, one solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

## 2.6 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.
- B. Pressure Gages: ASME B40.1. Include 4-1/2-inch-diameter dial, dial range of two times system operating pressure, and bottom outlet.

## 2.7 SPRINKLERS

- A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.
- B. Plastic Rotors:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Rain Bird Corporation.
  - 2. Description: Rainbird 6504 Falcon, Rainbird 5505
    - a. Body Material: ABS.
    - b. Nozzle: ABS.
    - c. Retraction Spring: Stainless steel.
    - d. Internal Parts: Corrosion resistant.
    - e. SAM Check Device.
- C. Plastic, Pop-up Spray Sprinklers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Rain Bird Corporation.
  - 2. Description:
    - a. Body Material: ABS.
    - b. Nozzle: ABS.
    - c. Retraction Spring: Stainless steel.
    - d. Internal Parts: Corrosion resistant.
    - e. Pattern: Fixed, with flow adjustment.
- D. Plastic Shrub Sprinklers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Rain Bird Corporation
  - 2. Description:
    - a. Body Material: ABS or other plastic.
    - b. Pattern: Fixed, with flow adjustment.

## 2.8 QUICK COUPLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Rain Bird Corporation: Model; 44-RC: 1" (26/34) Rubber Cover, 2-Piece Body
- B. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler waterseal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
  - 1. Locking-Top Option: Vandal-resistant locking feature. Include two matching key(s).

- C. Off-Ground Supports: Plastic stakes.
- D. Application Pressure Regulators: Brass or plastic housing, NPS 3/4, with corrosion-resistant internal parts; capable of controlling outlet pressure to approximately 20 psig.
- E. Filter Units: Brass or plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.
- F. Air Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.
- G. Vacuum Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.

## 2.9 TRACE WIRE

- A. Provide 18-gauge direct burial wire (blue) for locating irrigation Circuit Piping.
- B. Provide connectors which securely connect wires to the main trace wire, effectively moisture sealed by means of a dielectric non-hardening silicone sealant, and manufacturer approved for direct burial, for splices to establish a continuous run of trace wire.

## 2.10 CONTROLLERS

- C. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Baseline, BaseStation 1000, two-wire system with Baseline biLine two-wire decoders;  
  
Description:
    - a. Display Features
      - 1) Screen size is 3.5 inches.
      - 2) Screen resolution is 128x64 pixels.
      - 3) Screen LCD brightness is 250 lumens for easy viewing in direct sunlight.
    - b. Operating Features
      - 1) Supports up to 100 zones in any combination of two-wire and conventional wire
      - 2) Supports up to 30 separate programs with overlapping run times
      - 3) Supports up to 20 biSensor Soil Moisture Sensors
      - 4) Supports up to 3 flow sensors or meters, which manage and monitor flow across a site as independent or connected hydraulic systems
      - 5) Supports up to 7 separate normally closed pause devices
      - 6) Concurrently operates up to 15 typical solenoids over two-wire or up to 2 typical solenoids over conventional wire
      - 7) Operates up to 7 normally open and normally closed master valves and/or pump starts for the entire system
      - 8) Maximizes watering efficiency and minimizes total irrigation time by using Intelligent Soak Cycles™ to prioritize cycles for zones that have already started to water over zones that have not started

- 9) Automatically stacks up to 10 overlapping programs. The system can run any number of programs concurrently if permitted by the zone concurrency settings.
  - 10) Learns the actual flow for each zone when one or more flow meters are configured in the system
  - 11) Executes a high-flow or low-flow shutdown based on total system flow or on flow per flow meter
  - 12) Intelligently schedules watering based on available flow to maximize concurrent valve operation and minimize total water time
  - 13) Runs a diagnostic test weekly on normally open master valves to help prevent a normally open master valve from “sticking” open
  - 14) Detects and repairs all address conflicts for devices that are connected to the two-wire from the controller
  - 15) Supports two-way communication with two-wire decoders (biCoders) to gather information about the two-wire voltage and communication integrity, the solenoid voltage and current, and status (open circuit, short circuit, or ok)
  - 16) Stores all program and history information in non-volatile memory
- c. Programmable Features
- 1) Program up to 8 start times per program in 10-minute increments
  - 2) Program the run times for zones from 1 second to 18 hours
  - 3) Program the day intervals in even days, odd days, or odd days excluding the 31st
  - 4) Create a custom 7-day calendar, and historical calendar with customizable half-months
  - 5) Program unique soak and cycle times (Intelligent Soak Cycles™) for each zone. Soak times can be programmed between 0 minutes and 23.5 hours.
  - 6) Specify hours during each day of the week when water can or cannot be applied (Water Windows) in 1-hour increments for each 24-hour period
  - 7) Assign an irrigation mode (such as timed, primary, soil moisture based, or linked) to each zone
  - 8) Manually enter a design flow for each zone, with or without an installed flow meter
  - 9) Manually or automatically configure soil moisture thresholds and make irrigation decisions based on those thresholds
  - 10) Adjust your water budget from 10% to 200% by program
  - 11) Schedule up to 8 future dates when no watering will occur
  - 12) Manually operate one zone, all zones of a program, or all zones, with programmable run times, delay before starting first zone, and time between zones
  - 13) Search for and identify all devices connected to the two-wire and list them according to device type and serial number
  - 14) Address two-wire decoders (biCoders) by serial number by assigning each zone address a device serial number
  - 15) Re-address any two-wire decoder (biCoder) from the controller by re-assigning the device’s serial number to a new zone address
  - 16) Assign any station or terminal number on a multi-station biCoder from the controller to any zone address in any order
  - 17) Back up all programming and historical data with any USB flash drive

- 18) Establish 3 levels of remote password protection: read only access and read/write access
- 19) Configure pipe stabilization time for flow management
- d. Central Control and Remote Control
  - 1) Connect the BaseStation 1000 to BaseManager™ central control software when configured with an approved communication module. Communication options include Ethernet, Wi-Fi, cellular modem, mesh radio, and serial connections.
  - 2) Receive email and text message alerts when connected to BaseManager central control software
  - 3) Perform manual operations remotely with Mobile Access™ when connected to BaseManager central control software
- e. Power Output
  - 1) Station Output: 30 VAC RMS over two-wire
  - 2) Supports up to 1.45-amp output
  - 3) UL Listed
  - 4) The controller powers down the two-wire after one minute of idle time
  - 5) Drive current to a decoder is 100 to 250 milliamps (depending on the solenoid)
  - 6) Supports up to 110 device loads on a two-wire path
    - a) 1, 2, and 4 station biCoders = 1 load
    - b) 12 to 24 station Powered biCoder = 2 loads
    - c) Soil Moisture Sensor = 1 load
    - d) Flow biCoder = 3 loads
- f. Solenoid Specification
  - 1) Requires a typical solenoid with approximately 400 milliamps of inrush current and approximately 200 milliamps holding current
- g. Surge
  - 1) 10 levels of surge protection
  - 2) Up to 5 levels of surge protection built into the controller boards
  - 3) Minimum surge response time of 1 picosecond
- h. Enclosure Options
  - 1) "XS" Cabinet—Wall Mount Enclosure
  - 2) Dimensions: 15.50" x 12.38" x 6.40"
  - 3) 16-gauge steel, powder-coated
2. 2-wire biDecoders: Baseline BL-5201 single configuration biDecoders.
3. Control Wire: Regency Wire 14-2 Maxi Wire, Two-conductor parallel wire, one insulated red and the other black. Outer jacket shall be blue. UL approved for direct burial in NEC Class II circuits, minimum AWG size no. 14. Size according to manufacturer's recommendations.
4. Electrical Connectors: 3M DBY, Scotch-lock connector sealing pack No. 3576 with Type R electrical connectors; Rainbird Pen-Tite Wire Connectors 101 through 104 or approved.

## 2.12 MASTER VALVE AND FLOW SENSOR

- A. Master valve and flow sensor to be Baseline product BaseStation 1000 compatible.
1. Master valve to be normally open.

## 2.13 BOXES FOR AUTOMATIC CONTROL VALVES

- A. Plastic Boxes:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
    - a. Armorcast Products Company.
    - b. Oldcastle, Inc.
- B. Orbit Irrigation Products, Inc. or equal:
  - 1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
    - a. Size: As required for valves and service.
    - b. Shape: Rectangular.
    - c. Sidewall Material: PE, ABS, or FRP.
    - d. Cover Material: PE, ABS, or FRP.
      - 1) Lettering: " IRRIGATION."
- C. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch minimum to 3 inches maximum.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."
- B. Install warning tape directly above Irrigation Main Piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
- C. Install trace wire directly above Circuit Piping, minimum 10 inches below finished grades.
- D. Provide minimum cover over top of underground piping according to the following:
  - 1. Irrigation Main Piping: Minimum depth of 16 inches below finished grade.
  - 2. Circuit Piping: 12 inches.
  - 3. Drain Piping: 12 inches.
  - 4. Sleeves: 24 inches.

#### 3.2 PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain Owner's Representative's approval before excavation.

#### 3.3 PIPING SCHEDULE

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.
- C. Underground irrigation main piping, NPS 4 and smaller, shall be one of the following:
  - 1. Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints.
  - 2. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.
  - 3. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent cemented joints.

- D. Underground irrigation main piping, NPS 5 and larger, shall be one of the following:
  - 1. Schedule 40 Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.
  - 2. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent cemented joints.
- E. Circuit piping, NPS 2 and smaller, shall be one of the following:
  - 1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
  - 2. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent cemented joints.
- F. Circuit piping, NPS 2-1/2 to NPS 4, shall be one of the following:
  - 1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
  - 2. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent cemented joints.
- G. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80, PVC pipe; threaded PVC fittings; and threaded joints.
  - 1. Option: Plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.
- H. Risers to Aboveground Sprinklers and Specialties: Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.
- I. Drain piping shall be one of the following:
  - 1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
  - 2. SDR 21, 26, or 32.5, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

### 3.4 VALVE SCHEDULE

- A. Underground, Shutoff-Duty Valves: Use the following:
  - 1. NPS 2 and Smaller: Curb valve, curb-valve casing, and shutoff rod.
  - 2. NPS 3 and Larger: Iron gate valve, resilient seated; iron gate valve casing; and operating wrench(es).

### 3.5 PIPING INSTALLATION

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved.
- B. Install piping at minimum uniform slope.
- C. Install piping free of sags and bends.
- D. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- E. Install fittings for changes in direction and branch connections.
- F. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.
- G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.
- H. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.
- I. Install expansion loops in control-valve boxes for plastic piping.



- J. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- K. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
- L. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.
- M. Install piping in sleeves under parking lots, roadways, and sidewalks.
- N. Install sleeves made of Schedule 40 PVC pipe and socket fittings, and solvent-cemented joints.
- O. Install transition fittings for plastic-to-metal pipe connections according to the following:
  - 1. Underground Piping:
    - a. NPS 1-1/2 and Smaller: Plastic-to-metal transition fittings.
    - b. NPS 2 and Larger: AWWA transition couplings.
  - 2. Aboveground Piping:
    - a. NPS 2 and Smaller: Plastic-to-metal transition fittings.
    - b. NPS 2 and Larger: Use dielectric flange kits with one plastic flange.
- P. Install dielectric fittings for dissimilar-metal pipe connections according to the following:
  - 1. Underground Piping:
    - a. NPS 2 and Smaller: Dielectric coupling or dielectric nipple.
    - b. NPS 2-1/2 and Larger: Prohibited except in control-valve box.
  - 2. Aboveground Piping:
    - a. NPS 2 and Smaller: Dielectric union.
    - b. NPS 2-1/2 to NPS 4: Dielectric flange.
    - c. NPS 5 and Larger: Dielectric flange kit.
  - 3. Piping in Control-Valve Boxes:
    - a. NPS 2 and Smaller: Dielectric union.
    - b. NPS 2-1/2 to NPS 4: Dielectric flange.
    - c. NPS 5 and Larger: Dielectric flange kit.

### 3.6 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- H. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

- I. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
  - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- J. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 3. PVC Nonpressure Piping: Join according to ASTM D 2855.

### 3.7 VALVE INSTALLATION

- A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.
- B. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44.
- C. Install in valve casing with top flush with grade.
  - 1. Install valves and PVC pipe with restrained, gasketed joints.

### 3.8 SPRINKLER INSTALLATION

- A. Install sprinklers after hydrostatic test is completed.
- B. Install sprinklers at manufacturer's recommended heights.
- C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.
- D. Install heads 12" off paving and 12" off curbs.
- E. Install heads 24" off curbs at vehicle overhangs.
- F. Install sprinkler heads after final grading.

### 3.9 TRACE WIRE INSTALLATION

- A. Trace wire shall be installed in the same trench, including through sleeves, with the piping during installation. The wire shall be installed directly above the pipe. The trace wire shall be securely bonded together at all wire joints with an approved watertight connector to provide electrical continuity.
- B. Except for approved spliced-in repair or replacement connections, trace wire shall be continuous and without splices from each trace wire access point.
- C. Trace wire access points will be accessible at all automatic control valve locations.
- D. Trace wire shall be protected from damage during the execution of the Work. No cuts or breaks in the trace wire or trace wire insulation shall be permitted.
- E. At each automatic control valve, a minimum of 3 feet of trace wire will be coiled and secured near the control valve.

- F. Contractor shall perform a continuity test on all trace wire in the presence of the Owner's representative. If the trace wire is found to be non-continuous after testing, the Contractor shall repair or replace the failed segment of the wire.

### 3.10 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

- A. Equipment Mounting: Install controller in Hoffman Enclosure. See civil plans and specifications.
- B. Install control cable in same trench as irrigation piping and at least 2 inches below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

### 3.11 CONNECTIONS

- A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
- B. Connect wiring between controllers and automatic control valves utilizing 3M brand DBR Direct Bury Splice Kit waterproof connectors.

### 3.12 IDENTIFICATION

- A. Identify system components.
- B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
  - 1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Section 312000 "Earth Moving" for warning tapes.

### 3.13 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Any irrigation product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.14 STARTUP SERVICE

- A. Perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. Verify that controllers are installed and connected according to manufacturer's written instructions.

3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.15 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with finish grade.
- D. Adjust and balance system to provide uniform coverage following installation of landscape work.
- E. Adjust heads for proper direction and optimum coverage without excessive over-throw on walks and roads.
- F. Assure that no spray strikes buildings, roadways, or parked cars.
- G. Set controllers to operate system as required.

3.16 CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.
- B. Replace all permanent features disturbed by installation.

3.17 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.
- B. Demonstrate the entire system to owner, showing the remote-control valves are properly balanced, the heads are properly adjusted for radius and arc coverage, and the installed system is working properly.
- C. Demonstrate head adjustment, controller and valve operation, and winterization procedures.

3.18 MAINTENANCE

- A. The Contractor shall provide a minimum one-year maintenance period unless otherwise specified in the contract documents. The maintenance period shall start on the day following the date of written acceptance of system installation by the Owner's Representative.
- B. After two weeks of operation, flush lines and remove particulates from system. Adjust and clean all filters and/or screens bi-monthly.
- C. Review site conditions and adjust components as necessary.
- D. Perform one season winterization (blow-out), and one system start-up if requested by Owner's Representative. Demonstrate start-up and winterizing procedures to operating personnel.
- E. Repair and adjust system throughout warranty period, and prior to turning maintenance schedule over to Owner's operating personnel.

END OF SECTION 328400

## SECTION 329113 – SOIL PREPARATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary

Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes planting soils specified by composition of the mixes for general landscape areas. See Section 321823.26 Natural Athletic Field Surfacing for soil preparation and finish grading of athletic fields.
- B. Related Requirements:
  - 1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
  - 2. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
  - 3. Section 329300 "Plants" for placing planting soil for plantings.
  - 4. Section 321823.26 Natural Athletic Field Surfacing.

#### 1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or other soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
  - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

This product should be from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Layered Soil Assembly: A designed series of planting soils, layered on each other that together produce an environment for plant growth.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil in accordance with soil fertility report recommendations.

- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through inter-laboratory sample exchanges and statistical evaluation of analytical data.
- J. Organic Matter: The total of organic materials in soil exclusive of un-decayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to comply with soil fertility report recommendations. On-site soils shall be tested for soil fertility by a certified testing lab prior to preparation of Planting Soil.
- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. 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.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

#### 1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

- A. 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. Include sieve analyses for aggregate materials.
  - 4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
    - a. Manufacturer's qualified testing agency's certified analysis of standard products.
    - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SU1P #25.
    - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
- B. Samples: For each bulk-supplied material, 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.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

#### 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: 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. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

#### 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil.
  - 1. Notify Owner's Representative seven days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each un-amended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment 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.

#### 1.9 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 Owner's Representative under the direction of the testing agency.
  - 1. Number and Location of Samples: Minimum of three representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
  - 2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
  - 3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
  - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

#### 1.10 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 one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

- a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
  - b. Hydrometer Method: Report percentages of sand, silt, and clay.
  2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).
- C. Chemical Testing:
1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
  2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
  3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
  4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT WERA-103, including 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. Nitrogen ppm.
  6. Phosphorous ppm.
  7. Potassium ppm.
  8. Manganese ppm.
  9. Manganese-availability ppm.
  10. Zinc ppm.
  11. Zinc availability ppm.
  12. Copper ppm.
  13. Sodium ppm.
  14. Soluble-salts ppm.
  15. 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.
  16. Other deleterious materials, including their characteristics and content of each.
- E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."



- F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments 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 1000 sq. ft. for 6-inch 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 1000 sq. ft. for 6-inch depth of soil.

#### 1.11 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 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil in accordance with soil fertility report recommendations.
- C. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy loam soil according to USDA textures; and modified to produce viable planting soil equal or exceeding qualities in soil fertility report recommendations.
1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass.
  2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 2 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
  3. Unacceptable Properties: Clean soil of the following:

- a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
  - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
  - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
4. Amended Soil Composition: Blend imported, unamended soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
- a. Ratio of Loose Compost to Soil: 1:4 by volume.

## 2.2 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
- 1. Feedstock: Limited to leaves.
  - 2. Reaction: pH of 5.5 to 8.
  - 3. Soluble-Salt Concentration: Less than 4 dS/m.
  - 4. Moisture Content: 35 to 55 percent by weight.
  - 5. Organic-Matter Content: 30 to 40 percent of dry weight.
  - 6. Particle Size: Requirement 3/4 (19 mm).
  - 7. Particle Size: Minimum of 98 percent passing through a 2-inch sieve.

## 2.3 FERTILIZERS

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
- 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
  - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- B. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial grade FeDTPA for ornamental grasses and monocots.

# PART 3 - EXECUTION

## 3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. 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 planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

### 3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site in accordance with soil fertility report recommendations, to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 12 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Amend soil to total depth of 6 inches and mix with tilled subgrade, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.3 BLENDING PLANTING SOIL IN PLACE

- A. General: Mix amendments, prepared in accordance with soil fertility report recommendations, in-place, with unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Preparation: Till unamended existing soil in planting areas to a minimum depth of 12 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Remove excess subsoil off-site in legal manner if necessary to meet finish grades and apply 6 inches of planting soil amendments and fertilizer, as required, evenly on surface, and thoroughly blend them into full depth of tilled soil.
  - 1. Mix fertilizer with planting soil no more than seven days before planting.
- D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.4 PROTECTION

- A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."
- 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 over compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Owner's Representative and replace contaminated planting soil with new planting soil.

### 3.5 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 surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

END OF SECTION 329113

## **PART 1 GENERAL**

### **1.01 SECTION INCLUDES**

- A. This Section includes seeding of natural grass athletic fields.

### **1.02 WORK IN OTHER SECTIONS**

- A. Topsoil and Soil Amendments: Section 32 18 23.26 NATURAL ATHLETIC FIELD SURFACING.
- B. Fine Grading: Section 32 18 23.26 NATURAL ATHLETIC FIELD SURFACING.

### **1.03 ALTERNATES**

- A. This Section is affected by Alternates. Refer to the Drawings, the Bid Form and Section 01 23 00 Alternates for requirements.

### **1.04 QUALITY ASSURANCE**

- A. Certification of Seed Purity and Germination: Comply with standards established by the Association of Official Seed Certifying Agencies.

### **1.05 SUBMITTALS**

- A. Maintenance Notification: Notify Owner's Representative in writing 14 days minimum prior to Owner's assumption of maintenance responsibility for lawn areas. Owner will accept maintenance responsibility for lawn and grass areas after final acceptance of entire project.
- B. Submit certification of seed.

### **1.06 SITE CONDITIONS**

- A. Wind Velocity: Apply seed by hydromulching or sowing when wind velocity is less than 5 miles per hour at the Site.
- B. Seasonal Requirements:
  - 1. Seed only during the following seeding windows.
    - a. Spring: April 1 – June 30
    - b. Fall: August 1 – October 15
  - 2. Plan construction schedule accordingly. Notify Owner immediately if schedule does not allow for timely seeding within overall construction schedule.

### **1.07 WARRANTY**

- A. Installer shall guarantee seeding of lawn areas to produce vigorous, healthy and weed free growth as specified. Installer shall replace eroded areas, washouts or bare areas within the period of the contract at no additional cost. Otherwise conform to the warranty provisions of the General Requirements.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Lawn Seed: Lawn seed shall be a blend of the following by weight:
  - 1. Perennial Ryegrass 40%

- 2. Kentucky Bluegrass 60%
- B. Seeding Rate: 6-8 lbs./1000 s.f.
- C. Urea: 46-0-0 sulfur coated, slow release

## **2.02 EQUIPMENT**

- A. Seeding Equipment: Use centrifugal (rotary) or drop seeders.

## **PART 3 EXECUTION**

### **3.01 LAWN AREAS**

- A. Preparation:
  - 1. Do not begin seeding work until finish grades have been approved in writing by Owner's representative.
  - 2. Do not begin seeding work until irrigation system is complete, tested, adjusted and fully operational.
  - 3. Do not seed subgrades with weed growth. If a time lapse has occurred between grading and seeding allowing weeds to emerge, apply a broad spectrum non-selective contact herbicide to achieve a positive kill prior to seeding. Apply herbicides in strict accordance with manufacturer's instructions and in compliance with all laws. Ensure that herbicides will not have an adverse effect on seeding.
  - 4. Preparation for Seeding: After fine grading has been completed, apply urea at a rate of 2 lbs. per 1000 s.f. Do not incorporate into soil.
  - 5. Stabilize by lightly irrigating soil and rolling with a roller. Repeat operation until surface is stabilized within specified tolerances of finish grade and approved by Owner's representative.
- B. Installation: Apply seed with approved equipment. Sow seed in uniform overlapping rows. Sow one half of seed in one direction and half of the seed in a perpendicular direction. Comply with specified seeding rates.

### **3.02 ADJUSTING AND CLEANING**

- A. Adjusting: Repair grades, and reseed lawn areas where soil erosion or poor germination cause bare areas or "wash-outs". Contractor is responsible for producing a thick, even turf in lawn areas.
- B. Cleaning: At completion of Work in each area, remove debris, equipment and surplus materials. Wash walks, walls and paving areas adjacent to seeded areas to remove seed, fertilizer, mulch and soil materials.

### **3.03 MAINTENANCE**

- A. Maintenance:
  - 1. Do not walk on lawn areas to irrigate, weed, or replace seed, plugs or sod. When required, use plywood protection boards to reach lawn areas.
  - 2. Maintain seeded areas until final acceptance of entire project.
  - 3. First mowing shall occur at 2-1/2" maximum grass height, cut grass to 1-1/2 inches and remove clippings.
  - 4. Repeat for second mowing two weeks after first mowing and continue mowings weekly or as needed until final acceptance.
  - 5. Continue care 60 days from date of Substantial Completion.

**END OF SECTION**

## SECTION 329200 – TURF AND GRASSES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Seeding.
  - 2. Hydroseeding.
  - 3. Meadow grasses and wildflowers.
  - 4. Plugging
- B. Related Requirements:
  - 1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.
  - 2. Section 334600 "Subdrainage" for below-grade drainage of landscaped areas.

#### 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. 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.
- C. 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.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth in accordance with soil fertility recommendations. See Section 329113 "Soil Preparation" and drawing designations for planting soils.
- E. 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.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed and Sod: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
  - 1. Certification of each seed mixture for turfgrass sod and plugs. Include identification of source and name and telephone number of suppliers.



- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and meadow 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 Section 014000 "Quality Requirements."
  - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 4. Pesticide Applicator: State licensed, commercial.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as 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. Accompany each delivery of bulk materials with appropriate certificates.

#### 1.8 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Spring Planting: April 1 to June 30.
  - 2. Fall Planting: August 1 to October 15.
- B. 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.

## PART 2 - PRODUCTS

## 2.1 SEED AND PLUGS

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed and Plug Species:
  - 1. Quality: State-certified seed of grass species as listed below for solar exposure.
  - 2. Quality: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
  - 3. Seed: Central Oregon Lawn Mix, available at [helenaculver.com](http://helenaculver.com) (or approved equal).
    - a. 60% Kentucky Bluegrass, 40% Perennial Ryegrass
  - 4. Plugs: Three and one half-inch plugs for shallow rooted species. Species as suitable for solar exposure. Species hardened-off suitable for Central Oregon with robust crown and vigorous root system. Plugs shall be inoculated with endomycorrhizal fungi.

## 2.2 SOD BID ALTERNATE

- A. Sod: Sod shall be a locally grown Bluegrass (33%), Ryegrass (33%), Fescue (34%) Blend. Species Composition may vary based on seasonal availability. Blend by local Central Oregon Grower. Exact sod composition to be approved by Owner's Representative prior to construction.
  - 1. Sod shall be grown on sandy loam soil.
  - 2. Sod shall have no net or netting to remain in or under sod after installation.
  - 3. Sod shall be cut in large rolls not less than 24" wide and not less than 25' feet long. Sod shall be cut not less than 1/2" thick.
  - 4. Sod shall be dense, lush, healthy, uniform and free of weeds, including weed grasses.

## 2.3 MEADOW GRASSES AND WILDFLOWERS

- A. Meadow Grass and Wildflower Seed Mix: Fresh, clean, and dry new seed, of mixed species as follows:
  - 1. Per plan.
- B. Prairie Seed Mix: Fresh, clean, and dry new seed, of mixed species as follows:
  - 1. Per plan.
- D. Seed Carrier: Inert material, sharp clean sand or perlite.

## 2.4 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: 1 lb./1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
  - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

## 2.5 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  1. Organic Matter Content: 50 to 60 percent of dry weight.
  2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- C. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- D. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

## 2.6 PESTICIDES

- A. General: Pesticide, registered and approved by the 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 authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## 2.7 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
  1. Verify that no foreign or deleterious material or liquid such as paint, paint wash-out, 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.

2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 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 Architect and replace with new planting soil.

### 3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
  2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

### 3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
1. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Owner's Representative acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.
- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.
- D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

### 3.5 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  2. Do not use wet seed or seed that is moldy or otherwise damaged.
  3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 6 to 8 lb./1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with erosion-control mats where indicated on Drawings; install and anchor according to manufacturer's written instructions.
- F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

### 3.6 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, slow-release fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
  2. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb./acre.

### 3.7 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
  2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Irrigate or install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow Kentucky bluegrass to a height of 1-1/2 to 2 inches.
- D. Turf Post fertilization: Apply commercial fertilizer after initial mowing and when grass is dry.
1. Use fertilizer that provides actual nitrogen of at least 1 lb./1000 sq. ft. to turf area.

### 3.8 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Owner's Representative:
1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

### 3.9 MEADOW

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
1. Before sowing, mix seed with seed carrier at a ratio of not less than two parts seed carrier to one-part seed.
  2. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  3. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at a total rate of 1lb/acre.
- C. Brush seed into top 1/16 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.
- E. Water newly planted areas and keep moist until meadow is established.

### 3.10 MEADOW MAINTENANCE

- A. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
  2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  3. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  2. Water meadow with fine spray at a minimum rate of 1/2 inch per week for eight weeks after planting unless rainfall precipitation is adequate.

### 3.11 PLUGGING

- A. Plugging: Container stock must be handled by moving the container, not by grasping the crown of the plant.
1. Spread mulch compost to a depth of two inches over planting soil across the area to be plugged. Do not apply any fertilizer other than compost.
  2. Use auger or other appropriate tool to excavate planting holes. Plug stock must be planted upright and at a depth where the natural soil thinly covers the top of the plug to prevent drying out of planting medium. Firmly pack soil around roots to eliminate air pockets. Properly planted plugs should resist gentle lifting pressure. Do not fill around plugs with mulch. Irrigate plugged area until soil is moist to a depth of four inches.

### 3.12 PLUG MAINTENANCE

- A. Maintain and establish plugged area by watering, weeding, replanting, and performing other operations as required to establish a healthy, viable planting. Provide materials and installation the same as those used in the original installation.

### 3.13 SOD BID ALTERNATE

- A. Preparation:
1. Do not begin sodding work until finish grades have been approved in writing by Owner's representative.
  2. Do not lay sod on subgrades with weed growth. If a time lapse has occurred between grading and sodding allowing weeds to emerge, apply a broad spectrum non-selective contact herbicide to achieve a positive kill prior to sodding. Apply herbicides in strict accordance with manufacturer's instructions and in compliance with all laws. Ensure that herbicides will not have an adverse effect on sod.
  3. Adjust grades at edges of curbs and sidewalks so that soil is recessed so that after installation, surface of sod shall be 1/4" to 3/4" below adjacent curbs and sidewalks.

4. Preparation for Sodding: After fine grading has been completed, moisten the soil.
- B. Delivery, Storage and Handling
1. Deliver sod no later than the day after it is cut.
  2. Protect sod after delivery from sun exposure, and drying.
  3. Install sod on the day of delivery.
- C. Installation:
1. Remove netting, if any, from sod during installation leaving no netting in or under sod.
  2. Apply sod to prepared moistened soil so that edges of sod are pressed firmly together.
  3. Lay sod with a sod laying machine manufactured for that purpose.
  4. Gaps between strips of sod shall not exceed 1/4".
  5. Stagger end seams between adjacent rows.
  6. Press sod to soil by rolling with a roller.
  7. Contractor shall be responsible for irrigation of sod to insure healthy and vigorous growth.

### 3.14 SOD BID ALTERNATE MAINTENANCE

A. Lawn Maintenance:

1. Irrigate lawn areas to keep moist.
2. Do not walk on lawn areas to irrigate, weed, or replace seed, plugs or sod. When required use plywood protection boards to reach lawn areas.
3. Apply lawn fertilizer as per manufacturer's recommendations and thoroughly water on 14<sup>th</sup> day of maintenance period.
4. Maintain lawn areas until final acceptance of entire project.
5. First mowing at 2-1/2" maximum grass height, cut grass to 1-1/2 inches and remove clippings.

### 3.15 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### 3.16 CLEANUP AND PROTECTION



- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

### 3.17 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
  - 1. Seeded Turf: 90 days from date of Substantial Completion.
    - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
- B. Meadow Grass and Wildflower Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Meadow Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than maintenance period below.
  - 1. Maintenance Period: 90 days from date of Substantial Completion.
- C. Plug Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Plug Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than maintenance period below.
  - 1. Maintenance Period: 90 days from date of Substantial Completion.

END OF SECTION 329200

## **PART 1 GENERAL**

### **1.01 SCOPE OF WORK**

- A. The contractor shall furnish all labor, material and equipment required to complete the work described herein, in strict accordance with the drawings and/or terms of the contract.

### **1.02 ALTERNATES:**

- A. This Section is affected by Alternates. Refer to the Drawings, the Bid Form and Section 01 23 00 Alternates for requirements.

### **1.03 WORK IN OTHER SECTIONS**

- A. Topsoil and Soil Amendments: Section 32 18 23.26 Natural Athletic Field Surfacing.
- B. Fine Grading: 32 18 23.26 Natural Athletic Field Surfacing
- C. Field Drainage: 33 46 13 Natural Turf Field Storm Drainage

### **1.04 SUBMITTALS**

- A. Maintenance Notification: Notify Owner's Representative in writing 14 days minimum prior to Owner's assumption of maintenance responsibility for lawn areas. Owner will accept maintenance responsibility for lawn and grass areas after final acceptance of entire project.
- B. Submit sod grower's certification of seed blend, certification that netting is not used or can be removed without harm or other deleterious effects.
- C. Submit order invoice.

### **1.05 SITE CONDITIONS**

- A. Do not place sod when ground is frozen or has snow or ice on surface.

### **1.06 QUALITY CONTROL**

- A. Moisture Content: Turfgrass sod shall not be harvested or transplanted when its moisture content (excessively dry or wet) may adversely affect its survival.
- B. Installer Qualifications: Installer shall be an experienced operator of sod laying machines having installed at least 100,000 square feet of sod in athletic fields and golf courses.

### **1.07 WARRANTY**

- A. Installer shall guarantee sodding of lawn areas to produce vigorous, healthy and weed free growth as specified. Installer will replace bare, unhealthy or dead areas within the period of the contract at no additional cost. Otherwise conform to the warranty provisions of the General Requirements.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Water: Furnished by Owner.
- B. Sod: Sod shall be a blend of 60% Kentucky bluegrass, and 40% perennial ryegrass.
  - 1. Sod shall be grown on sandy loam soil.
  - 2. Sod shall not have netting or shall have netting that can be removed.
  - 3. Sod shall be cut in large rolls not less than 24" wide and not less than 25' feet long. Sod shall be cut not less than 1/2" thick
  - 4. Sod shall be dense, lush, healthy, uniform and free of weeds, including weed grasses.
- C. Fertilizer: 16-16-16, slow release

## **PART 3 EXECUTION**

### **3.01 SOD AREAS**

- A. Preparation:
  - 1. Do not begin sodding work until finish grades have been approved in writing by Owner's representative.
  - 2. Do not lay sod on subgrades with weed growth. If a time lapse has occurred between grading and sodding allowing weeds to emerge, apply a broad spectrum non-selective contact herbicide to achieve a positive kill prior to sodding. Apply herbicides in strict accordance with manufacturer's instructions and in compliance with all laws. Ensure that herbicides will not have an adverse effect on sod.
  - 3. Adjust grades at edges of curbs and sidewalks so that soil is recessed so that after installation, surface of sod shall be 1/4" to 3/4" below adjacent curbs and sidewalks.
  - 4. Preparation for Sodding: After fine grading has been completed, moisten the soil.

- B. Delivery, Storage and Handling
  - 1. Deliver sod no later than the day after it is cut.
  - 2. Protect sod after delivery from sun exposure, and drying.
  - 3. Install sod on the day of delivery.
- C. Installation:
  - 1. Remove netting, if any, from sod during installation leaving no netting in or under sod..
  - 2. Apply sod to prepared moistened soil so that edges of sod are pressed firmly together.
  - 3. Lay sod with a sod laying machine manufactured for that purpose.
  - 4. Gaps between strips of sod shall not exceed 1/4".
  - 5. Stagger end seams between adjacent rows.
  - 6. Press sod to soil by rolling with a roller.
  - 7. Contractor shall be responsible for irrigation of sod to insure healthy and vigorous growth.

### **3.02 ADJUSTING AND CLEANING**

- A. Adjusting: Repair grades, and reseed lawn areas where soil erosion or poor germination cause bare areas or "wash-outs". Contractor is responsible for producing a thick, even turf in lawn areas.
- B. Cleaning: At completion of Work in each area, remove debris, equipment and surplus materials. Wash walks, walls and paving areas adjacent to seeded areas to remove seed, fertilizer, mulch and soil materials.

### **3.03 MAINTENANCE**

- A. Lawn Maintenance:
  - 1. Irrigate lawn areas to keep moist..
  - 2. Do not walk on lawn areas to irrigate, weed, or replace seed, plugs or sod. When required use plywood protection boards to reach lawn areas.
  - 3. Apply lawn fertilizer as per manufacturer's recommendations and thoroughly water on 14th day of maintenance period.
  - 4. Maintain lawn areas until final acceptance of entire project.
  - 5. First mowing at 2-1/2" maximum grass height, cut grass to 1-1/2 inches and remove clippings.

6. Repeat for second mowing two weeks after first mowing and continue mowings weekly or as needed until final acceptance.
7. Continue care 60 days from date of Substantial Completion.

**END OF SECTION**

## SECTION 329300 – PLANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Plants.
  - 2. Tree stabilization.
  - 3. Tree-watering devices.
- B. Related Requirements:
  - 1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
  - 2. Section 329200 "Turf and Grasses" for turf and meadow planting, hydroseeding, and erosion-control materials.

#### 1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were brown, with a ball size not less than sizes indicated; 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.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.
- 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. Container-Grown Stock: 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.
- F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- G. Finish Grade: Elevation of finished surface of planting soil.

- H. 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.
- I. 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.
- J. Planting Area: Areas to be planted.
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to comply with soil fertility report recommendations. On-site soils shall be tested for soil fertility by a certified testing lab prior to preparation of Planting Soil.
- L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. 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.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials. Substitutions will be considered only with proof of non-availability from five nurseries.
  - 2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 50 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
- B. Samples for Verification: For each of the following:
  - 1. Trees and Shrubs: Three Samples of each variety and size delivered to site for review. Maintain approved Samples on-site as a standard for comparison.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
  - 1. Manufacturer's certified analysis of standard products.
  - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- D. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
  - 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 landscape installation in addition to requirements in Section 014000 "Quality Requirements."
  - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 4. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
  - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
  - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Owner's Representative may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Owner's Representative may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
  - 1. Notify Owner's Representative of sources of planting materials seven days in advance of delivery to site.



## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of 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. Accompany each delivery of bulk materials with appropriate certificates.
- C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bareroot 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.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Store bulbs, corms, and tubers in a dry place at 60 to 65 degrees F until planting.
- G. Apply anti-desiccant 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 anti-desiccant at nursery before moving and again two weeks after planting.
- H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
  - 1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
  - 2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  - 3. Do not remove container-grown stock from containers before time of planting.
  - 4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

## 1.9 FIELD 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. 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.

#### 1.10 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
    - b. Structural failures including plantings falling or blowing over.
    - c. Faulty performance of tree stabilization.
    - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Periods: From date of Substantial Completion.
    - a. Trees, Shrubs, and Ornamental Grasses: 1 years.
    - b. Ground Covers, Biennials, Perennials, and Other Plants: 1 years.
  - 3. Include the following remedial actions as a minimum:
    - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
    - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
    - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

### PART 2 - PRODUCTS

#### 2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  - 1. Nursery grown plants shall be grown locally or be acclimatized to the High Desert region for a minimum of 90 days before delivery to site.
  - 2. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.

3. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery except as harvested from site.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Owner's Representative, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

## 2.2 MULCHES

- A. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  1. Organic Matter Content: 50 to 60 percent of dry weight.
  2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

## 2.3 PESTICIDES

- A. General: Pesticide registered and approved by the 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 authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## 2.4 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
  1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
  2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or compression springs.

## 2.5 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

- B. Burlap: Non-synthetic, biodegradable.
- C. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb. of vesiculararbuscular mycorrhizal fungi and 95 million spores per lb. of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint wash-out, 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.
  - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
  - 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. 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 Owner's Representative and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner's Representative's acceptance of layout before excavating or planting. Make minor adjustments as required.

### 3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.
- C. Before planting, obtain Owner's Representative's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
  2. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
  3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock per plan sheet details.
  4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
  5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  7. Maintain supervision of excavations during working hours.
  8. Keep excavations covered or otherwise protected after working hours.
  9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Owner's Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Owner's Representative if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

### 3.5 TREE AND SHRUB PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
  1. Backfill: Planting soil. For trees, use excavated soil for backfill.
  2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly

- before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
1. Backfill: Planting soil. For trees, use excavated soil for backfill.
  2. Carefully remove root ball from container without damaging root ball or plant.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  4. Continue backfilling process. Water again after placing and tamping final layer of soil.
  5. Backfill: Planting soil. For trees, use excavated soil for backfill.
  6. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  7. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  8. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

### 3.6 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Owner's Representative.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Owner's Representative, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

### 3.7 TREE STABILIZATION

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
  1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

2. Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet high and 2 1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

### 3.8 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

### 3.9 PLANTING AREA MULCHING

- A. Compost Mulch backfilled surfaces of planting areas and other areas indicated.
  1. Compost Mulch in Planting Areas: Apply 3-inch average thickness of organic compost mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems.
  2. Compost Mulch in Plug Planting Areas: Apply 2-inch average thickness of organic compost mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems.

### 3.10 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

### 3.11 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### 3.12 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Owner's Representative.
  - 1. Submit details of proposed pruning and repairs.
  - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
  - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Owner's Representative.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Owner's Representative determines are incapable of restoring to normal growth pattern.

### 3.13 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- 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.

### 3.14 MAINTENANCE SERVICE

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:



1. Maintenance Period: 12 months from date of Owner Acceptance.
- B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance". Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
  1. Maintenance Period: 12 months from date of Owner Acceptance.

END OF SECTION 329300

## SECTION 329310 – LANDSCAPE MAINTENANCE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Scope of Work.
- 2. Supervision
- 3. Subcontractors
- 4. Plant Maintenance
- 5. Irrigation (hand watering)
- 6. Weed Control

- B. Related Requirements:

- 1. Section 015639 "Temporary Tree and Plant Protection".
- 2. Section 329113 "Soil Prep".
- 3. Section 329219 "Seeding".
- 4. Section 329300 "Plants".

#### 1.3 SCOPE OF WORK

- A. These specifications ("Specifications") establish the scope, service level and frequency under which the Contractor will provide landscape maintenance service ("Service") for a period of one full year from the date of Substantial Completion
- B. The Contractor acknowledges that the Services specified in this document are not intended to express every detail of the Service to be provided by Contractor and Contractor hereby represents that it is experienced and competent in providing Service that meets or exceeds generally accepted practices commensurate with those provided by other companies that provide such Service.
  - 1. In general terms such Service includes labor, supplies and equipment as needed to assure optimum maintenance of landscape area, plant material and irrigation equipment.."

- C. Services include, but are limited to:
1. Weeding
  2. Watering
  3. Pruning of damaged limbs and for proper growth
  4. Trash removal
  5. Additional work as needed to achieve establishment of specified plantings. "Establishment" shall be determined by an 80% survival rate of all plantings at the end of the maintenance period.

#### 1.4 RIGHT OF INSPECTION AND RISK MITIGATION

- A. Contractor acknowledges that it has inspected or was able to inspect the work sites and that it understands the Service requirements and conditions under which the Service is to be performed. No allowances shall be made due to the Contractor's error, negligence or failure to have adequately inspected the sites where Service is to be performed. Contractor acknowledges, understands and agrees that the cost of the Service is intended to cover foreseeable work, risks, hazards and difficulties inherent to the Service of this nature.

#### 1.5 MAINTENANCE OF SERVICE RECORDS AND DISCLOSURE

- A. The Contractor shall prepare and maintain records for Services provided and chemicals applied to the property in order substantiate charges to Owner's Representative for such Services. Contractor shall retain such records for a period of thirty-six (36) months from the date of performance of the Service. Contractor may be called upon periodically by Owner's Representative to perform work not herein specified. Such work will be classified as contract extras or extra Service.

#### 1.6 DAMAGES FROM CONTRACTOR OPERATIONS

- A. Contractor is responsible for repair or replacement for all damage to Owner's property caused by equipment or employees of the Contractor.
- B. Trees, shrubs, paths, hardscapes, signage, fencing or ground covers that are damaged or destroyed due to the Contractor's operations, negligence or misuse of chemicals shall be replaced at Contractor's expense within thirty (30) days of discovery. Replacement plants shall be comparable in size to the lost plant, or shall be approved by Owner, if smaller. The Contractor will repair grades and other work necessitated due to planting and removal and replacements.
- C. Irrigation equipment that is damaged or destroyed due to the Contractor's operations shall be repaired or replaced by the Contractor promptly at no expense.

## 1.7 STAGING OF MAINTENANCE OPERATIONS

- A. Contractor shall restrict all operations to hardscapes and pathways as directed by the Owner. The Contractor shall be responsible, at no additional cost to the Owner for repairing, restoring or replacing soils, plantings and other manmade or natural features of the site damaged by the Contractor's operations

## 1.8 STANDARDS FOR REPAIR OR REPLACEMENT WORK

- A. All repair, restoration or replacement work shall be done to the same specifications required of the original work.
  - 1. Substitution of materials or other changes in the work must be submitted following specified procedures for substitution requests and approved by the Owner's Representative prior to be incorporated into site work.

## 1.9 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site.
  - 1. The contractor shall walk the site with the Owner's Representative to discuss conditions, schedules and items of concern prior to starting work of this section.

## PART 2 - PRODUCTS

- A. All products used shall conform to specifications of this and other related sections of the Work.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Growing Season – April 15 through October 31 perform maintenance schedule as specified in paragraph C below.
- B. Non-Growing Season – November 1 through April 14 perform modified maintenance including monthly site visits, inspect plantings and seeded areas, replace mulch, water, weed as necessary for weather conditions.
- C. Minimum Maintenance Schedule Required
  - 1. Contractor shall visit the site at least once weekly for the first six months of the maintenance period to maintain and further the establishment of the landscape plantings.
  - 2. Contractor shall increase frequency as necessary and dictated by weather conditions
    - a. Contractor shall submit a written site report to the Owner's Representative including, but not limited to:

- 1) Date of site visit
  - 2) Areas of the site visited
  - 3) Weather conditions
  - 4) Conditions observed on site
  - 5) Actions taken as part of this scope of work
  - 6) Actions recommended, but not included in this scope of work
3. Contractor shall visit the site at least twice monthly for the second 6 months of the maintenance period to maintain and further the establishment of the landscape plantings.
  4. Contractor shall increase frequency as necessary and dictated by weather conditions
    - a. Contractor shall continue to submit written site reports as outlined above.

### 3.2 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- D. Over seed seeded areas where gaps and holes appear, seed with mulch and sand, bring areas back to surrounding grade.
- E. Keep planting areas, seeded areas, and other areas of native vegetation repair free from noxious weeds.

### 3.3 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### 3.4 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees, plants, seeded areas or other native areas that are damaged by construction operations, in a manner approved by Owner's Representative.
  - 1. Submit details of proposed pruning and repairs.
  - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
  - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Owner's Representative.

### 3.5 EQUIPMENT

- A. The equipment requirements are not intended to be restrictions of specific manufacturers or models unless so stated. All equipment necessary to provide the specified services will be provided and maintained by the Contractor.

### 3.6 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. Debris and damaged materials caused by normal seasonal weather will be removed from site.
- E. After installation and 30 days prior to end of maintenance period, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION 329310

SECTION 33 11 16  
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. City of Bend Standards and Specifications apply to water service installation from City main line to water meter. Comply with City of Bend Standards.

1.2 SUMMARY

- A. This Section includes materials, methods, accessories and labor necessary to completely execute piping and specialties for the installation of underground, potable water distribution systems and water services.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressures: The following are minimum pressure requirements for piping unless otherwise indicated:
  - 1. Domestic Water System: 160 psi.

1.4 SUBMITTALS

- A. Product Data and Shop Drawings: For the following:
  - 1. Pipe and fittings
  - 2. Yard hydrants
  - 3. Pipe warning and identification tape.
- B. Purging and Disinfecting Reports.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of water service piping specialties and are based on specific types and models indicated.
- B. Comply with standards of authorities having jurisdiction for water service piping including materials, hose threads, installation, and testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves and yard hydrants according to the following:

1. Ensure that valves and hydrants are dry and internally protected against rust and corrosion.
  2. Protect valves and hydrants against damage to threaded ends and flange faces.
  3. Set valves and hydrants in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves and yard hydrants according to the following:
1. Do not remove end protectors, unless necessary for inspection; then reinstall for storage.
  2. Protect from weather. Store indoors and maintain temperature higher than ambient dew- point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- 1.7 SITE CONDITIONS
- A. Perform site survey, research Authority utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
  - B. Verify that water-service piping may be installed to comply with original design and referenced standards.

## PART 2 - PRODUCTS

### SITE CONDITIONS

#### 2.1 MATERIALS

- A. Available Manufacturers: Subject to compliance with requirements, or as acceptable to the Authority, provide product indicated on Drawings or comparable product. Products may be provided by, but are not limited to, one of the following:
  1. Yard Hydrants:
    - a. Zurn Industries, Inc.

#### 2.2 PIPES

- A. PEX Distribution System: ASTM F877, ASTM F1960, SDR 9 tubing.
- B. Fittings for PEX Tube: ASTM F1807, metal-insert type with copper or stainless-steel crimp



rings and matching PEX tube dimensions.

### 2.3 YARD HYDRANTS

- A. Hydrant shall be non-freeze post type yard hydrant with 1 inch inlet and outlet connections, bronze casing, neoprene plunger, removable bronze operating parts and T-handle operating key. Hydrant shall be equipped with a tapped chain port in valve housing.
- B. Yard hydrant shall be located where shown on the drawings.

### 2.4 PIPE WARNING AND IDENTIFICATION TAPE

- A. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick. Include solid blue background with continuously printed caption in black letters.
  - 1. Caption "CAUTION--BURIED WATER LINE BELOW."

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Refer to Division 31 for excavation, bedding, and back filling. Trenching shall be as indicated.

### 3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications:
  - 1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
  - 2. Remove scale and dirt, on inside and outside, before assembly.
  - 3. Prepare piping connections to equipment with flanges or unions.
  - 4. Provide non-conducting dielectric connections wherever joining dissimilar metals.
  - 5. Route piping in orderly manner and maintain gradient.
  - 6. Establish elevations of buried piping to ensure not less than 3 feet of cover for the water distribution and domestic service lines.
  - 7. Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

### 3.3 JOINT CONSTRUCTION

- A. Underground water service piping: Soft copper tube, ASTM B88, Type K: wrought-copper, solder-joint fittings; and brazed joints.

#### 3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. See Section 33 05 00 "Common Work Results For Utilities"
- B. Locations and Arrangements: Drawings indicate location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install components with pressure rating equal to or greater than system operating pressure.
- D. Install piping free of sags and bends.

#### 3.5 PIPING INSTALLATION

- A. Water-Main Connection: Connect to existing water main with mechanical joints and valves at locations shown on the plans. Hot taps, wet taps, saddle taps or service taps are not permitted.
- B. Inspect pipe for cracks and defects before lowering into the trench. Faulty pipe and fittings shall be removed from the site.
- C. Pipes shall be installed in accordance with the profiles and grades shown on the contract plans, with top at least 12 inches below level of maximum frost penetration. All pipe, fittings, valves and yard hydrants shall be carefully lowered into the trench in such a manner as to prevent damage to the materials, protective coatings and linings.
- D. At the end of each work day, the installed water mains shall be protected so that line remains free of dirt, mud and debris. At the start of the next work day, the line shall be inspected for tracked dirt, mud and debris. All lines failing the inspection shall be removed, cleaned, and replaced.

#### 3.6 YARD HYDRANT INSTALLATION

- A. Install post type non-freeze yard hydrant where shown on the drawings.

#### 3.7 PIPE WARNING AND IDENTIFICATION TAPE INSTALLATION

- A. Install continuous plastic underground warning and identification tape during back-filling of trench for underground water piping. Place the tape 18 inches directly above the piping.

### 3.8 TESTING

- A. Piping Tests: Conduct piping tests before joints are covered. Use only potable water. Testing shall be completed prior to connection to the existing water mains.
- B. Water mains, appurtenances and materials shall be tested for leakage after installation. The Contractor shall provide all backflow device, hydrant double check, plugs, equipment, tools, labor, materials and incidentals necessary to perform the testing. Water for testing is provided by the Authority through existing hydrants. In the event any section of main under test shows leakage in excess of that specified, the Contractor shall, at no additional cost to the Authority, make such repairs or replacements as are required and testing shall be repeated until satisfactory results are obtained. All visible leaks shall be repaired regardless of the amount of allowable leakage.
  - 1. Hydrostatic Tests shall be conducted in accordance with NFPA 24, Chapter 10.10 "Testing of Pipe" and the following:
    - a. Test at not less than 225 psig pressure for 2 hours.
    - b. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0 psig. Slowly increase pressure again to test pressure and hold for one more hour. The allowable pressure drop during a 2 hour test shall not exceed 0 psig. Remake leaking joints with new materials and repeat test until accepted.
  - 2. In addition to hydrostatic test, the contractor shall meet requirements of the local water provider.
- C. Prepare and submit reports for testing activities.
- D. Test gauges used for testing shall be as follows:
  - 1. Tests requiring a pressure 10 psi or less shall utilize a testing gauge having increments of 0.10 psi or less.
  - 2. Tests requiring a pressure greater than 10 psi but less than or equal to 100 psi or less shall utilize a testing gauge having increments of 1.0 psi or less.
  - 3. Tests requiring a pressure greater than 100 psi shall utilize a testing gauge having increments of 2.0 psi or less.

### 3.9 DISINFECTING WATER MAINS

- A. Except as otherwise specified, all new, relocated, or modified water mains and accessories shall be disinfected prior to tie-ins in accordance with AWWA C651, which includes the following requirements:
  - 1. Preliminary Flushing of Mains: All mains shall be flushed prior to disinfection except when the tablet method of disinfection is used (AWWA C651, Section 7.3). The mains shall be flushed at a minimum velocity of 10.0 feet/second and all

points in the main shall receive a minimum of five consecutive minutes of flushing at this velocity, until the water runs clear. The Authority shall furnish water, unless otherwise specified.

2. Form of Chlorine to be used: Liquid chlorine, calcium hypochlorite or sodium hypochlorite may be used for disinfection. Liquid chlorine shall be used only when suitable equipment is available and only under the direct supervision of a person familiar with the physiological, chemical and physical properties of this material and who is properly trained and equipped to handle any emergency that may arise. Calcium hypochlorite and sodium hypochlorite shall be added to water to form a chlorine water solution before being used.
3. Methods of Application: The chlorine shall be applied by continuous feed method or the tablet method and performed as specified hereinafter.

a. Continuous Feed Method:

- 1) The rate of water and chlorine shall be proportioned so that the chlorine concentration of water in the pipe is maintained at a minimum of 50 milligrams per liter available chlorinate. To assure that this concentration is maintained, the chlorine residual shall be measured at regular intervals.
- 2) During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main is filled with the chlorine solution.
- 3) The chlorinated water shall be retained in the main for at least 24 hours during which time all valves and hydrants, in the section treated, shall be operated in order to disinfect the appurtenances.
- 4) At the end of this 24-hour period, the treated water shall contain no less than 25 milligrams per liter of chlorine throughout the length of the main.

b. Tablet Method:

- 1) Tablet disinfection is best suited to extensions up to 2,500 feet and mains up to 12 inches in diameter; however, tablet method shall not be used if trench water or foreign material has entered the main or if the water is below 40°F.
- 2) When used, tablets shall be placed in each section of pipe and also in hydrant branches and other appurtenances. They shall be attached by an adhesive, except for the tablets placed in hydrants and in the joints between the pipe sections.
- 3) All the tablets within the main shall be at the top of the main. If the tablets are fastened before the pipe section is placed in the trench, their position shall be marked on the section to assure that there will be no rotation. In placing tablets in joints, they shall be crushed and placed on the inside annular space, or if the type of assembly does not permit, they shall be rubbed like chalk on the butt ends of the sections to coat them with calcium hypochlorite.
- 4) When installation has been completed, the main shall be filled with

water at a velocity of less than one foot per second. This water shall remain in the pipe for at least 24 hours. Valves shall be manipulated so that the strong

chlorine solution in the line being treated will not flow back into the line supplying the water.

4. Bacteriological Test:

- a. After the chlorination and final flushing and before the water main is placed in service, a certified laboratory shall collect and analyze two water samples for bacteriological testing. The samples shall be collected at least 24 hours apart. The results of these samples must indicate no coliform contamination before the pipe, tanks, or equipment can be utilized as part of the waterworks. If contamination is indicated the disinfection procedure and bacteriological test shall be repeated and accepted before the system can be placed into service. Samples shall be collected in duplicate at the opposite end of the line from where the pipe was filled with water and at approximately one thousand foot intervals. Samples shall be taken using a sample tap. The sample tap shall consist of a corporation cock and a copper tub gooseneck assembly.
- b. After samples are collected, the gooseneck assembly shall be removed. Samples shall be collected in sterile bottles treated with sodium thiosulfate. The treated bottles shall not be rinsed. The samples shall be collected by the following procedure: Flame the outlet of the sample tap; flame the mouth of the sample bottle; take the sample, being careful not to bring the mouth of the sample bottle in contact with the sample tap; flame the mouth of the sample bottle again and seal the bottle.
- c. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained.

PART 4 - CONTRACTOR'S QUALITY CONTROL

4.1 FIELD QUALITY CONTROL

- A. Conform to the requirements specified in Division 01 Section "Quality Requirements".
- B. Contractor shall submit as-built documentation in the form of a plan for review and approval.

END OF SECTION 33 11 16

## **SECTION 33 4000 - STORM UTILITY DRAINAGE PIPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Work consists of complete installation of drainage pipe including trench excavation, backfill, compaction, ductile iron pipe, and all appurtenances, including but not limited to outfall protection.
- B. Related Sections
  - 1. Section 31 2000 – Earth Moving
  - 2. Section 31 2333 – Trenching and Backfilling for Utilities
  - 3. Section 32 1216 – Asphalt Paving

#### **1.2 SUBMITTALS**

- A. Product Data.
  - 1. Pursuant to Section 01 3300- Submittal Procedures.
  - 2. Manufacturer's data for each item specified in PART 2 PRODUCTS.
  - 3. General catalog data showing the following (if applicable):
    - a. Pipe and wall thickness
    - b. Gaskets
    - c. Push-on joints
    - d. Shop coating and lining

#### **1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Packing, Shipping, Handling, and Unloading:
  - 1. Materials shall be shipped to the site by means that do not cause damage.
  - 2. Unload pipe only by approved means. Do not unload pipe of any size by dropping to the ground.
  - 3. Do not distribute more than one week's supply of material in advance of laying.
  - 4. Materials stored at the site for more than 10 days shall be protected from the effects of weathering.
  - 5. Inspect pipe and fittings prior to installation, checking for cracked, broken, or otherwise defective materials. Acceptance of delivered materials does not preclude final acceptance of completed Work.
  - 6. Damaged or defective materials shall not be installed. Costs for removal and replacement of defective materials will be borne by the Contractor.

- B. Acceptance at Site
  - 1. Materials shipped to the job site will be checked for certification of conformance by the manufacturer. Pipe or fittings found to not match the certification shall be immediately removed from the site.
- C. Storage and Protection
  - 1. Materials shall be stored in such a manner as to preclude damage.
  - 2. Pipe and fittings that have become rusty or otherwise damaged shall not be installed.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General
  - 1. Pipe shall be new, free of cracks, holes, foreign inclusions or other injurious defects.
  - 2. Each piece of pipe shall be clearly identified as to strength, class, and date of manufacture.
  - 3. Unless otherwise shown on the Contract Documents, minimum length of pipe shall be 3.5 feet.
  - 4. Do not coat pipe internally or externally with any substance of any type in an attempt to improve its performance when air or hydrostatically tested.
  - 5. Use pipe and fittings of one type of material throughout. No interchanging of pipe and fittings will be allowed, unless otherwise shown on the Contract Documents.
  - 6. Crushed rock material shall be hard, durable rock with angular fractured faces.
- B. Storm Drain Pipe
  - 1. Pipe: Polyvinyl Chloride (PVC) pipe shall be ANSI/ASTM D3034, SDR 35, bell and spigot style with rubber gaskets.
  - 2. Fittings: Shall be of the same material as the pipe, molded or formed to suit the pipe size and design, in required tees, bends, elbows, etc. as required.
- C. Ductile Iron Pipe
  - 1. Pipe: Ductile Iron in accordance with ASTM A 746, for push-on joints. Pressure class 250.
  - 2. Fittings: AWWA C110, ductile or gray iron, for push-on joints.
  - 3. Gaskets: AWWA C111, rubber

## PART 3 - EXECUTION

### 3.1 PREPARATION

#### A. Surface Preparation

1. Excavate to the lines and grades shown on the plans.
2. If material in bottom of excavation is unsuitable for pipes and other water appurtenances, excavate below subgrade as directed and backfill to required grade with  $\frac{3}{4}$ " – 0 crushed rock compacted to 95% of maximum density per AASHTO T-99.

#### B. Material Preparation

1. Clean the interior of pipe and fittings of foreign matter prior to installation. Before jointing, wire brush joint contact surfaces if necessary, wipe clean, and keep clean until jointing is completed.

### 3.2 INSTALLATION

#### A. General:

1. Cutting and jointing to be completed per manufacturer's recommendations.
2. Trenching and backfilling shall be performed in accordance with section 31 23 33 Trenching and Backfilling for Utilities.
3. Line and Grade for drainage pipe
  - a. Do not deviate from line or grade more than 1/2-inch for line and 1/4-inch for grade, provided that such variation does not result in a level or reverse sloping invert.
  - b. Measure for grade at the pipe invert, not at the top of the pipe.
  - c. Establish line and grade for pipe by the use of approved lasers or by transferring the cut from the offset stakes to batter boards at maximum intervals of 25 feet. If batter boards prove impractical because of trench conditions, submit other methods of grade and alignment control for approval by the Project Engineer.
  - d. When installed under concrete sidewalk pavement maintain a minimum 12" of cover over pipe unless otherwise specified by the manufacturer.

#### B. Rock Outfall

1. Over excavate as needed to place rounded rock as shown on plans.

#### C. Pipe and Fittings

1. Proceed with pipe laying upgrade with spigot or tongue ends pointing in direction of flow.
2. Place pipe in such a manner as to ensure solid bearing between the pipe and the full cross sectional accordance with the recommendations of the manufacturer.
3. Take care to properly align the pipe before joints are forced entirely home.
4. Gaps at pipe joints shall not exceed that allowed by the manufacturer's recommendations.
5. After installation prevent movement from any cause including uplift or floating.



6. Take special care to prevent movement of the pipe, compacted pipe bedding and pipe zone after installation when laid within a movable trench shield.
7. When laying operations are not in progress, protect the open end of the pipe from entry of foreign material and block the pipe to prevent movement or creep of gasketed joints.
8. Provide all sewer pipes, 36 inches or smaller in diameter, entering or leaving ditch inlet or other structures, with flexible joints within 18 inches of the exterior wall. Pipes larger than 36 inches in diameter shall have this flexible joint within a distance from the exterior wall equal to 1-half the inside pipe diameter.
9. When shown or approved to deflect pipe from a straight line, either in the vertical or horizontal plane, or when long-radius curves are shown, the amount of deflection allowed shall not exceed that specified. The pipe manufacturer's recommendations will serve as a guide but the decision of the Owner shall be final.

D. Push-on Joints

1. Follow pipe manufacturer's instructions and recommendations for proper jointing procedures.
  - a. Provide lubricant suitable for use in potable water, stored in closed containers, and kept clean. Prepare pipe ends for restrained joint pipe in accordance with the pipe manufacturer's recommendations.

3.3 TESTING

- A. Testing shall be in accordance with the Uniform Plumbing Code and/or Deschutes County requirements, as applicable.
- B. Deflection Testing of Plastic Drainage and Sewer Pipe:
  1. The Contractor shall conduct deflection tests of storm drains constructed of plastic pipe to ensure pipe has maintained its shape after compaction.
  2. The testing shall be conducted by pulling an approved mandrel through the completed pipeline.
    - a. The diameter of the mandrel shall be 95 percent of the pipe initial diameter.
  3. Pipe with deflection exceeding 5 percent of the inside diameter shall have backfill removed and replaced to provide a deflection of less than 5 percent.
    - a. Any repaired pipe shall be retested.

3.4 REPAIR/RESTORATION

- A. Pipe, fittings, gaskets, and fasteners damaged during placement shall be replaced prior to backfilling. Do not attempt to repair these items. Damaged items shall be replaced at the Contractor's expense.

3.5 CLEANING

- A. Including work of other trades, clean, repair and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by work of this Section.
- B. Remove debris from project site upon work completion or sooner, if directed.

- C. Before completion of any underdrain system and prior to backfilling, remove any silt, debris, and foreign matter that may have collected in the system.
- D. Remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system.
- E. Foreign matter still present in the system upon Project Engineer's final manhole-to-manhole inspection of the sewer system shall be removed before acceptance of that Section.

END OF SECTION

**SECTION 33 46 13**  
**NATURAL TURF FIELD STORM DRAINAGE**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Furnish all labor, materials, equipment, and services necessary for, but not limited to, perforated storm drains and drainage sand backfill in athletic fields and connection to storm system as shown on plans and specified herein.

**1.02 REFERENCES**

- A. American Association of State Highway and Transportation Officials (AASHTO)
- B. American Society for Testing and Materials (ASTM).
- C. Oregon State Plumbing Specialty Code (OSPSC).

**1.03 TESTING**

- A. Submit sieve test of drainage sand from independent testing laboratory.

**1.04 SUBMITTALS**

- A. General: Submit the following in accordance with Section 01300 Submittals.
  - 1. Product data for drainage piping specialties.
  - 2. Submit imported aggregate samples to Independent Testing Laboratory for sieve analysis for each aggregate type as directed by Owner's Representative.
  - 3. Submit with each aggregate sample, a written statement indicating the source and character of each aggregate sample.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Perforated Pipe for Natural Grass Fields:
  - 1. Perforated 4" single wall corrugated HDPE Tubing (ASTM F667)
  - 2. Material Properties: Conforming to minimum requirements of cell classification 323410C or 333410C as defined in the latest version of ASTM D3350.
  - 3. Fittings shall conform to ASTM F667.
  - 4. Joints shall be made with split or snap couplings. Standard connections shall meet the requirements of ASTM F667.
  - 5. Use pipe without filter fabric.
- B. Tracer wire: Single strand, copper, Type UF, UL approved for direct burial in NEC Class II circuits, minimum AWG size no. 14. Jacket color: blue
- C. Drainage Sand. Drainage sand shall conform to ASTM C-33 or USGA and meet the sieve analysis below:

Sieve Size	% Passing
#4	95-100
#8	65-85
#16	50-75
#30	40-60
#50	10-20
#100	2-8
#200	0-4

## **PART 3 EXECUTION**

### **3.01 SEQUENCING**

- A. Coordinate work with trades performing the work of sections 32 84 00 Planting Irrigation and 32 18 23.26 Natural Athletic Field Surfacing.

### **3.02 EXAMINATION**

- A. Examine the areas and conditions under which storm drainage system work is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Locate and flag all irrigation heads in fields. Note head and nozzle types. Coordinate concerning locations of mainlines and laterals.

### **3.03 INSTALLATION**

- A. Install pipe in accordance with ASTM D2321 and manufacturers recommended installation guidelines for athletic field applications.
  - 1. Inspect pipe before installation to detect any apparent defects. Mark defective materials with white paint and promptly remove from site.
  - 2. Lay pipe beginning at the low point of a system, true to the grades and alignment indicated with unbroken continuity of invert.
  - 3. Install soil tight connectors per manufacturer's recommendations.
- B. Connections:
  - 1. Make connections to storm system per plans and as specified on other Sections.
- C. Tracer Wire: Place tracer wire in all trenches.
- D. Natural Grass Athletic Field drainage.
  - 1. Use a trencher which is specifically designed for trenching of sports fields such as those manufactured by Shelton or ATF. It shall be capable of cutting a clean trench to a specified depth while simultaneously removing trench spoils and depositing them into a hopper while minimizing damage to lawns.
  - 2. Trench width shall be 3" for 2" tubing and 5" for 4" tubing. Trench width shall not exceed 6.5".
  - 3. Trencher shall be laser-guided, machine controlled. It shall be capable of cutting trenches with a bottom that slopes uniformly regardless of the slope of the surface.
  - 4. All trenchers, hoppers, pipelaying and backfill equipment and any other vehicles to be driven on fields shall have large float tires which are capable of minimizing compaction and damage to lawns.
  - 5. Slope tubing at 0.25% minimum. In no case shall the pipe depth exceed 22". Make repairs to any irrigation pipes encountered if trench depth exceeds 22".
  - 6. Lay tubing in bottom of trench and pin tubing to bottom at intervals of 20' or more often when necessary to keep tubing in place such as in short runs or at angles.
  - 7. Use drainage sand for backfill of perforated tubing. Backfill to finish grade. All trenches shall be flush with adjacent lawns. Tolerance shall be plus or minus 1/4". If trenches settle, add drainage sand as needed.
  - 8. Do not place sod over trenches.
  - 9. Comply with Section 32 92 00 Lawns and Grasses for reestablishing turf over trenches.
  - 10. Protect trenches from contamination with soil or other construction debris. Protect trenches from vehicular or other traffic which could displace sand until turf is re-established.

### **3.04 REPAIRS**

- A. Remove any rocks larger than 2" in any dimension brought to surface by trenching operations.
- B. Make repairs to all paving, curbs, lawns, utilities, irrigation systems, and other existing improvements damaged in the course of the work. Restore to previous condition.

### **3.05 CLEANING**

- A. Place plugs in the end of uncompleted conduit at the end of the day or whenever work stops.
- B. Flush lines, if required, to remove collected debris.

### **3.06 FIELD QUALITY CONTROL**

- A. Interior Inspections:
  - 1. Make the inspection after the lines between cleanout locations, have been installed and backfill is in place and at completion of the project.
  - 2. Inspect the interior of conduit to determine whether line displacement or other damage has occurred.
  - 3. If the inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, take whatever steps are necessary to correct such defects to the satisfaction of the Architect.
- B. Tests: Perform testing of completed conduit lines in accordance with local authorities having jurisdiction.

**END OF SECTION**

SECTION 33 49 00  
STORM DRAINAGE STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stormwater inlets

B. Related Requirements:

1. Section 33 41 00 – Stormwater Piping
2. Section 03 30 00 – Cast-in-Place Concrete
3. Section 31 23 33 – Trenching and Backfilling for Utilities.

1.2 REFERENCES

A. ASTM International:

1. ASTM A 536 - Standard Specification for Ductile Iron Castings
2. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
3. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Section Precast Concrete Water and Wastewater Structures.
4. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
5. ASTM C 913 - Standard Specification for Precast Concrete Water and Wastewater Structures

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit data for inlet tops, grade adjustment rings, grates.

C. Shop Drawings: Indicate structure locations, elevations, sections, equipment supports, and sizes and elevations of penetrations.

1.4 QUALITY ASSURANCE

A. Regulatory Compliance:

1. Comply with applicable portions of federal, state and local environmental agency regulations pertaining to storm drainage systems.
2. Comply with local municipal and county regulations and standards pertaining to storm drainage systems in accordance with approved plan.

- B. Source Quality Control:
  - 1. Precast concrete supplier plant shall be registered and certified under either the Prestressed Concrete Institute (PCI) or the National Precast Concrete Association (NPCA) plant certification program.
  - 2. Maintain uniform quality of products and component compatibility by using the products of one manufacturer in the case of precast reinforced concrete structures.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with Section 01 61 00 Product Requirements
- B. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing and moving precast structures.
- C. Store precast concrete structures to prevent damage to public or private property. Repair property damaged from materials storage.

## PART 2 PRODUCTS

### 2.1 INLETS

- A. Precast Concrete Inlets: precast reinforced concrete, of depth indicated. The top section shall match the frame and grate for the inlet type specified.
  - 1. Materials
    - a. Base Section: 6" minimum thickness for floor slab and 6" minimum thickness of walls and base riser section for rectangular structures and 5" minimum thickness of walls and base riser section for 48" circular structures and having a separate base slab or a base section with integral floor.
    - b. Riser Sections: 6" minimum thickness for rectangular structures and 5" minimum thickness for 48" circular structures and lengths required to provide the depth indicated.
    - c. Top Section: Flat slab type with opening to match grade rings and frame and grate.
    - d. Grade Rings: Provide maximum of 2 reinforced concrete rings as required and necessary. Match dimensions of frame and grate.
    - e. Gaskets: ASTM C 443, rubber.
    - f. Pipe Connectors: ASTM C 270-91a, "Standard Specification for Mortar for Unit Masonry" requirements. Mortar joints shall be smooth and flush with manhole walls.
    - g. Channel and Bench: Concrete.
    - h. Corner intersections of pipes and structures are prohibited.
- B. Frames and Grates: As shown on the Drawings, either structural steel, or gray, malleable, or ductile iron.
  - 1. Materials
    - a. Coat structural steel with bituminous paint in the shop or in the field, prior to placement. Cover frames and grates completely with no pin holes or voids.
    - b. All grates shall be bicycle safe.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Coordinate placement of inlet and outlet pipe required by other sections.
- B. Inspect precast concrete structures immediately prior to placement in excavation to verify are internally clean and free from damage. Remove and replace damaged units.

### 3.2 INSTALLATION

- A. Excavation and Backfill:
  - 1. Excavate for utility structure in accordance with Section 31 23 33 in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.
  - 2. When groundwater is encountered, prevent accumulation of water in excavations.
  - 3. Place structure in dry trench.
- B. Install structure supported at proper grade and alignment on compacted 3/4" - minus bedding (min. 6" depth).
- C. Lift precast concrete structures at lifting points designated by manufacturer.
- D. Install precast concrete base to elevation and alignment indicated on Drawings.
- E. Locate pipe(s) as indicated on plan and cut pipe to finish flush with concrete face. Connect pipe(s) to inlets and manhole structures with watertight connection.
  - 1. When using prefabricated pipe opening seals (i.e., A-LOK, etc.) for connecting pipes into manholes, fill such annular spaces with preformed plastic sealing compound.
  - 2. For other pipe connections: grout all pipe entries flush to interior walls for watertight connection.
- F. Inlet Frame and Grate Installation: Where required, make final adjustment of frame to elevation using precast grade rings. Frame and Covers installed within paved areas shall be set at 1/8" below final pavement elevation. Frame and Covers installed in all other areas shall be set within 1/8" of final grade elevations, with exception of manholes with rim elevations identified above final grade elevations.
  - 1. Waterproof Mortar. Mortar thickness not to exceed 1/2-inch maximum and 3/8- inch minimum. Wet, but do not saturate precast grade rings immediately before laying.

END OF SECTION



# Carlson Geotechnical

A division of Carlson Testing, Inc.

Phone: (541) 330-9155

Fax: (541) 330-9163

Bend Office (541) 330-9155  
Eugene Office (541) 345-0289  
Salem Office (503) 589-1252  
Tigard Office (503) 684-3460



**Report of  
Limited Geotechnical Investigation &  
Infiltration Testing  
Pacific Crest Middle School Soccer Fields  
19150 Skyliners Road  
Bend, Oregon**

**CGT Project Number G1804966**

Prepared for

BECON

Attn: Mr. Erik Huffman, P.E.

549 SW Mill View Way, Suite 105

Bend, Oregon 97702

March 19, 2019

# Carlson Geotechnical

A division of Carlson Testing, Inc.  
Phone: (541) 330-9155  
Fax: (541) 330-9163

Bend Office (541) 330-9155  
Eugene Office (541) 345-0289  
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Tigard Office (503) 684-3460



March 19, 2019

BECON

Attn: Mr. Erik Huffman, P.E.  
549 SW Mill View Way, Suite 105  
Bend, Oregon 97702

**Report of**  
**Limited Geotechnical Investigation & Infiltration Testing**  
**Pacific Crest Middle School Soccer Fields**  
**19150 NW Skyliners Road**  
**Bend, Oregon**

CGT Project Number G1804966

Dear Mr. Huffman:

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our limited geotechnical investigation for the proposed Pacific Crest Middle School Soccer Fields project. The site is located at the northwest quadrant of the intersection of NW Skyliners Road and NW Skyline Ranch Road in Bend, Oregon. We performed our work in general accordance with CGT Proposal BCG.122.R1, dated October 29, 2018. Written authorization for our services was received on October 30, 2018. A draft version of this report was submitted on December 12, 2018.

We appreciate the opportunity to work with you on this project. Please contact us at 503.601.8250 if you have any questions regarding this report.

Respectfully Submitted,  
**CARLSON GEOTECHNICAL**

Melissa L. Lehman, GIT  
Geotechnical Project Manager  
[mlehman@carlsontesting.com](mailto:mlehman@carlsontesting.com)



EXPIRES: 6/30/2020

Brad M. Wilcox, P.E., G.E.  
Principal Geotechnical Engineer  
[bwilcox@carlsontesting.com](mailto:bwilcox@carlsontesting.com)

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## **1.0 INTRODUCTION**

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our geotechnical investigation and infiltration testing for the proposed Pacific Crest Middle School Soccer Fields project. This report is considered "limited" as this assignment did not include an evaluation of seismic hazards at the site or development of seismic design parameters. The site is located at 19150 NW Skyliners Road in Bend, Oregon, as shown on the attached Site Location, Figure 1.

### **1.1 Project Information**

CGT developed an understanding of the proposed project based on our correspondence and review of a provided site plans. Based on our review, we understand the project will include:

- Construction of two new, natural- (grass)-surfaced, soccer fields at the site.
- Construction of a new, asphalt-paved, entrance drive lane and parking lot at the west portion of the site.
- Although no grading plans have been provided, we anticipate permanent grade changes at the site will be minimal, with cuts and fills limited to less than 2 feet in depth.
- We understand stormwater runoff from new impervious areas at the site will be collected and discharged into an onsite stormwater collection facility(ies). Six infiltration tests were conducted at the site as part of our investigation as requested by BECON Engineering.

### **1.2 Scope of Services**

Our scope of work included the following:

- Contact the Oregon Utilities Notification Center to mark the locations of public utilities within a 30-foot radius of our explorations at the site.
- Explore subsurface conditions at the site by excavating fourteen test pits to depths of up to about 10½ feet below ground surface (bgs). Details of the subsurface investigation are presented in Appendix A.
- Conduct infiltration testing at a total of six locations at the site. Results of the infiltration testing are presented in Appendix B.
- Classify the soils and rock encountered in the test pits in general accordance with American Society for Testing and Materials (ASTM) D2488 (Visual-Manual Procedure) and the ODOT Rock Classification Criteria, respectively.
- Provide a technical narrative describing surface and subsurface deposits, and local geology of the site, based on the results of our explorations and published geologic mapping.
- Provide geotechnical recommendations for site preparation and earthwork.
- Provide geotechnical recommendations for subgrade preparation for soccer fields and pavements.
- Provide this written limited geotechnical report summarizing the results of the field investigation and recommendations for the project.

## **2.0 SITE DESCRIPTION**

### **2.1 Site Geology**

Based on available geologic mapping<sup>1</sup> of the area, the site is located on a contact between two tuff units. The mapping shows the northern one-third of the site is underlain by (Pleistocene) Tumalo Tuff of Taylor (Qtu) that consists of pink, rhyolitic, ash-flow tuff. This unit originated as multiple pyroclastic flow deposits that formed a single cooling unit. The tuff is partially welded in the lower part and exhibits vapor phase crystallization (post-depositional hardening) in the upper part, with subangular or subrounded pumice lapilli and basaltic lithic fragments. The maximum unit thickness is approximately 80 feet.

The mapping shows the southern two-thirds of the site is underlain by Shevlin Park Tuff (Qs), which is a dark gray, ash flow tuff and is the youngest of the Pleistocene pyroclastic deposits mapped in the area, with an age of approximately 170,000 years. Comprised of two pyroclastic flows, the Shevlin Park Tuff consists of a lower, densely welded, ash-rich deposit overlain by upper, pumice-rich deposits that exhibit vapor phase crystallization. A maximum thickness of about 150 feet is indicated in the literature.

### **2.2 Site Surface Conditions**

The site is bounded by NW Skyline Ranch Road to the east, NW Skyliners Road to the south, NW Elwood Lane to the west, and NW Lolo Drive to the north. At the time of our investigation, the site was undeveloped and surfaced with sandy and gravelly soils and sparse vegetation (grasses). In terms of topography, the majority of the site was relatively level to very gently descending to the west/northwest. The north margin of the site descended abruptly to the north at a gradient visually estimated at about 1H:1V (horizontal:vertical). The east margin and the northwest corner of the site exhibited concaved conditions and were surfaced with basalt cobbles, and resembled drainage swales. In each of those areas, an 8-inch diameter, steel casing (with plastic cap) was present and exhibited a “stickup” of about 2 feet. Site conditions at the time of our field investigation are shown on the attached Site Plan (Figure 2) and Site Photographs (Figure 3).

### **2.3 Subsurface Conditions**

#### **2.3.1 Subsurface Investigation & Laboratory Testing**

Our subsurface investigation consisted of fourteen test pits (TP-1 through TP-14) completed on October 24, 2018. The approximate exploration locations are shown on the Site Plan, attached as Figure 2. In summary, the test pits were excavated to depths ranging from about 2 to 10½ feet bgs. Details regarding the subsurface investigation, logs of the explorations, and results of laboratory testing are presented in Appendix A. Subsurface conditions encountered during our investigation are summarized below.

#### **2.3.2 Subsurface Materials**

Logs of the explorations are presented in Appendix A. The following describes each of the subsurface materials encountered at the site.

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<sup>1</sup> Mimura, Koji, 1992, Reconnaissance Geologic Map of the West Half of the Bend and the East Half of the Shevlin Park 7.5-minute Quadrangles, Deschutes County, Oregon, United States Department of the Interior, United States Geological Survey, Map MF-2189..

Undocumented Poorly Graded Gravel and Poorly Graded Gravel with Sand Fill (GP Fill)

Undocumented poorly graded gravel and poorly graded gravel with sand fill was encountered at the surface in test pits TP-5 through TP-11. Undocumented fill refers to materials placed without (available) records of subgrade conditions or evaluation of compaction. The poorly graded gravel fill was typically light gray to gray, angular, moist, and up to  $\frac{3}{4}$  inch in diameter. Fine-grained sand was included in test pits TP-5 through TP-8. This soil extended to depths of about  $\frac{1}{2}$  foot bgs. Significant digging effort was required to penetrate the fill material using the referenced excavator, indicating dense relative densities.

Undocumented Silty Sand Fill (SM Fill)

Undocumented silty sand fill was encountered below the poorly graded gravel with sand fill in TP-5, and extended to a depth of  $3\frac{1}{2}$  feet bgs. The silty sand fill was encountered at the surface in TP-1 through TP-4, and extended to the depths excavated in those test pits, approximately 2 feet bgs. This material was generally light brown to gray, dry, fine-grained, and included some subrounded, weathered basalt and tuff gravel up to 3 inches in diameter. Significant digging effort was required to penetrate the fill material using the referenced excavator, indicating dense relative density.

Undocumented Silty Sand with Gravel and Cobbles Fill (SM Fill)

Undocumented silty sand with gravel and cobbles fill was encountered below the above referenced fill in test pits TP-6 through TP-14. The fill extended to depths ranging from  $2\frac{1}{2}$  to  $10\frac{1}{4}$  feet bgs, and to the depth explored in TP-12, approximately  $10\frac{1}{2}$  feet bgs. This material was generally orange to brown, dry to moist, medium-to coarse-grained, and included subrounded pumice and tuff gravel and cobbles up to 6 inches in diameter. Test pit TP-11 included boulders up to 4 feet in diameter in the upper 3 feet of this material. Significant digging effort was required to penetrate the fill material using the referenced excavator, indicating dense relative density.

Silty Sand and Silty Sand with Gravel (SM)

Silty sand and silty sand with gravel was encountered below the silty sand with gravel fill in TP-8 and TP-13, and extended to depths of about  $6\frac{1}{2}$  and 9 feet bgs, respectively. This material was generally, medium dense to dense (based on digging effort), dark and light brown to dark gray, moist, fine-to medium-grained, and included angular, pumice and tuff gravel up to 2 inches in diameter.

Tuff (RX)

Tuff was encountered below undocumented fill in test pits TP-5 through TP-7, TP-9 through TP-11, and TP-14. This material was encountered below sandy silt and sandy silt with gravel in test pits TP-8 and TP-13. The tuff extended to the depths explored in the aforementioned test pits, approximately  $2\frac{1}{2}$  to  $10\frac{1}{2}$  feet bgs. In general, the tuff was medium hard (R3), slightly weathered, and pink, orange, and dark gray. This material was consistent with the Tumalo Tuff of Taylor and Shelvin Park Tuff described in Section 2.1 of this report.

The soils encountered during our subsurface investigation included varying amounts of undocumented poorly graded gravel fill (GP Fill), poorly graded gravel with sand fill (GP Fill), silty sand fill (SM Fill), and silty sand with gravel and cobbles fill (SM Fill). These materials are referred to as “coarse-grained fill” throughout the remainder of this report.

### 2.3.3 Groundwater

Groundwater was not encountered within the depths explored on October 24, 2018. To determine approximate regional groundwater levels in the area, we researched well logs available on the Oregon Water Resources Department (OWRD)<sup>2</sup> website for wells located within Section 35, Township 17 South, Range 11 East, Willamette Meridian. Our review indicated that groundwater levels in the area generally ranged from about 390 to 440 feet bgs. It should be noted groundwater levels vary with local topography. In addition, the groundwater levels reported on the OWRD logs often reflect the purpose of the well, so water well logs may only report deeper, confined groundwater, while geotechnical or environmental borings will often report any groundwater encountered, including shallow, unconfined groundwater. Therefore, the levels reported on the OWRD well logs referenced above are considered generally indicative of local water levels and may not reflect actual groundwater levels at the project site. We anticipate that groundwater levels will fluctuate due to seasonal and annual variations in precipitation, changes in site utilization, or other factors.

### 2.4 **Infiltration Testing**

Six infiltration tests (IT-1 through IT-6) were conducted at the site between October 24, 2018, and November 6, 2018. The results of the infiltration tests are presented in the attached Appendix B.

## 3.0 **CONCLUSIONS**

Based on the results of our field explorations and analyses, the site may be developed as described in Section 1.1 of this report, provided the recommendations presented in this report are incorporated into the design and development.

As indicated in Section 2.3.2 of this report, we encountered undocumented coarse-grained fill materials (GP Fill, SM Fill) in our test pits. As shown on the attached Site Plan, Figure 2, the existing fill materials varied from about ½ to 10½ feet in depth across the site, with fill depths generally increasing as one progresses north. Based on our correspondence and review of historical aerial imagery, we understand the fill materials were derived from grading (cuts) associated with construction of the nearby Pacific Crest Middle School in the early 2010s. To the best of our knowledge, there is no documentation available related to the placement and compaction of the existing fill materials at the site. In the absence of review of earthwork/construction records, the test pits showed the existing fill materials were generally free of organic and compressible materials and were dense in terms of relative density. No organics or organic-laden materials were encountered at the interface of the fill materials and underlying native soils (SM, RX). Based on the results of our explorations, we conclude the existing coarse-grained fill materials may be relied upon for subgrade support of the proposed soccer fields, pavement areas, and appurtenant features. Proof roll testing is recommended to confirm the existing fill materials are stable and non-yielding and suitable for placement and compaction of landscaping fill (e.g. field areas) and structural fill (e.g. in pavement and hardscaping areas). Geotechnical recommendations for site preparation are presented in Section 4.1 of this report.

As indicated in select test pit logs, we encountered practical refusal of the excavating equipment (Bobcat E35 mini-excavator) on the tuff bedrock at depths of about 2½ to 10¼ feet bgs. The presence of shallow

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<sup>2</sup> Oregon Water Resources Department, 2018. Well Log Records, accessed December 2018, from OWRD web site: [http://apps.wrd.state.or.us/apps/gw/well\\_log/](http://apps.wrd.state.or.us/apps/gw/well_log/).

bedrock should be factored when considering site grading (i.e. permanent cuts) and temporary excavations necessary to install below-grade features (e.g. utilities) at the site. We do not anticipate that excavation of the tuff using conventional excavation equipment will be feasible. Depending on finalized elevations, we anticipate hydraulic hammering of the tuff will likely be required to facilitate their removal. Hydraulic hammering, if required, will likely result in increased cost and should be factored in planning. Geotechnical recommendations for temporary excavations are presented in Section 4.2 of this report.

## **4.0 RECOMMENDATIONS**

The recommendations presented in this report are based on the information provided to us, results of our field investigation and analyses, laboratory data, and professional judgment. CGT has observed only a small portion of the pertinent subsurface conditions. The recommendations are based on the assumptions that the subsurface conditions do not deviate appreciably from those found during the field investigation. CGT should be consulted for further recommendations if the design of the proposed development changes and/or variations or undesirable geotechnical conditions are encountered during site development.

### **4.1 Site Preparation**

#### **4.1.1 Stripping**

Existing vegetation and rooted soils should be removed from within, and for a minimum 5-foot margin around, proposed structural fill and pavement areas. Based on the results of our field explorations, stripping of rooted soils are anticipated to be less than ¼-foot bgs. Existing surficial cobble fills (located in east margin and northwest portion of site) should also be removed from within, and for a minimum 5-foot margin around, proposed structural fill and pavement areas. Although no explorations were conducted in those areas, we anticipate the cobble fills are on the order of ½- to 1-foot in depth. The geotechnical engineer or his representative should provide recommendations for actual stripping depths based on observations during site stripping. Stripped surface vegetation and rooted soils should be transported off-site for disposal, or stockpiled for later use in landscaped areas. Stripped cobble fills should be transported off-site for disposal, or may be stockpiled for inclusion into structural fill as described in Section 4.4 of this report.

#### **4.1.2 Grubbing**

Grubbing of trees and shrubs (where slated for removal) should include the removal of the root mass and roots greater than 1-inch in diameter. Grubbed materials should be transported off-site for disposal. Root masses from larger trees may extend greater than 3 feet bgs. Where root masses are removed, the resulting excavation should be properly backfilled with structural fill in conformance with Section 4.4 of this report.

#### **4.1.3 Test Pit Backfills**

The test pits conducted at the site were loosely backfilled during our field investigation. Where test pits are located within finalized soccer field, structural fill, or pavement areas, the loose backfill materials should be re-excavated. The resulting excavations should be backfilled with structural fill in conformance with Section 4.4 of this report.



#### 4.1.4 Existing Utilities & Below-Grade Structures

All existing utilities at the site should be identified prior to excavation. Abandoned utility lines beneath the new fields, pavements, and hardscaping features should be completely removed or grouted full. Soft, loose, or otherwise unsuitable soils encountered in utility trench excavations should be removed and replaced with structural fill in conformance with Section 4.4 this report. Buried structures (i.e. footings, foundation walls, retaining walls, slabs-on-grade, tanks, etc.), if encountered during site development, should be completely removed and replaced with structural fill in conformance with Section 4.4 of this report.

#### 4.1.5 Subgrade Preparation – Soccer Fields & Pavement Areas

##### 4.1.5.1 *Dry Weather Construction*

After site preparation as recommended above, but prior to placement of structural fill and/or aggregate base, the geotechnical engineer or his representative should observe a proof roll test of the exposed subgrade soils in order to identify areas of excessive yielding. Proof rolling of subgrade soils is typically conducted during dry weather conditions using a fully-loaded, 10- to 12-cubic-yard, tandem-axle, tire-mounted, dump truck or equivalent weighted water truck. Areas that appear too soft and wet to support proof rolling equipment should be prepared in general accordance with the recommendations for wet weather construction presented in Section 4.3 of this report. If areas of soft soil or excessive yielding are identified, the affected material should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill in conformance with Section 4.4.2 of this report.

##### 4.1.5.2 *Wet Weather Construction*

Preparation of subgrade soils during wet weather should be in conformance with Section 4.3 of this report. As indicated therein, increased base rock sections and a geotextile separation fabric may be required in wet conditions in order to support construction traffic and protect the subgrade. Cement amendment may also be considered to help stabilize subgrade soils during wet weather.

#### 4.1.6 Erosion Control

Erosion and sedimentation control measures should be employed in accordance with applicable City, County, and State regulations.

## 4.2 **Temporary Excavations**

### 4.2.1 Overview

Conventional earthmoving equipment in proper working condition should be capable of making necessary excavations for the anticipated site cuts as described earlier in this report. All excavations should be in accordance with applicable OSHA and state regulations. It is the contractor's responsibility to select the excavation methods, to monitor site excavations for safety, and to provide any shoring required to protect personnel and adjacent improvements. A "competent person", as defined by OR-OSHA, should be on-site during construction in accordance with regulations presented by OR-OSHA. CGT's current role on the project does not include review or oversight of excavation safety.

#### 4.2.2 OSHA Soil Type

##### 4.2.2.1 *Existing Fills (GP FILL, SM FILL) & Native Silty Sands (SM)*

Conventional earthmoving equipment in proper working condition should be capable of making necessary excavations into the on-site silty sand soils. For use in the planning and construction of temporary excavations at the site, an OSHA soil type "C" should be used for these coarse-grained materials. Some caving or sloughing of the sidewalls may occur in dry, cohesionless soils. In the event that caving of the sidewalls is observed, the sidewalls should be flattened or shored.

##### 4.2.2.2 *Tuff Bedrock (RX)*

The tuff bedrock encountered in the test pits was slightly weathered and medium hard (R4). An OSHA soil type "stable rock" may be used for the bedrock during planning and construction of temporary excavations at the site extending into this material. We anticipate that excavation of the tuff bedrock using conventional excavation equipment will not be feasible. Hydraulic hammering will likely be required to facilitate excavation of the bedrock. Blasting of the bedrock is not recommended due to the site's proximity to offsite development. If the contractor proposes blasting, the geotechnical engineer should be engaged early in the design process to review pre-construction surveys, design, and monitoring plans.

#### 4.2.3 Utility Trenches

Temporary trench cuts should stand near vertical to depths of approximately 4 feet in the existing coarse-grained fills (GP FILL, SM FILL), native silty sands (SM), and tuff (RX) encountered at the site. If groundwater seepage undermines the stability of the trench, or if sidewall caving is observed during excavation, the sidewalls should be flattened or shored. Depending on the time of year trench excavations occur, trench dewatering may be required in order to maintain dry working conditions. Pumping from sumps located within the trench will likely be effective in removing water resulting from seepage. If groundwater is encountered, we recommend placing trench stabilization material at the base of the excavations. Trench stabilization material should be in conformance with Section 4.4.3.

#### 4.2.4 Excavations Near Foundations

Excavations near footings should not extend within a 1H:1V (horizontal:vertical) plane projected out and down from the outside, bottom edge of the footings. In the event excavation needs to extend below the referenced plane, temporary shoring of the excavation and/or underpinning of the subject footing may be required. The geotechnical engineer should be consulted to review proposed excavation plans for this design case to provide specific recommendations.

### 4.3 **Wet Weather Considerations**

Notwithstanding the generally arid conditions of the Bend area, soil conditions should be evaluated in the field by the geotechnical engineer or his representative at the initial stage of site preparation to determine whether the recommendations within this section should be incorporated into construction.

#### 4.3.1 Overview

The on-site silty sand soils (SM FILL, SM) are moisture sensitive and susceptible to disturbance during wet weather. Trafficability of these soils may be difficult, and significant damage to subgrade soils could occur, if earthwork is undertaken without proper precautions at times when the exposed soils are more than a few percentage points above optimum moisture content. For construction that occurs during wet

weather, site preparation activities may need to be accomplished using track-mounted equipment, loading removed material onto trucks supported on granular haul roads, or utilizing other methods to limit soil disturbance. The geotechnical engineer or his representative should evaluate the subgrade during excavation by probing rather than proof rolling. Soils that have been disturbed during site preparation activities, or soft or loose areas identified during probing, should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill.

#### 4.3.2 Geotextile Separation Fabric

We recommend a geotextile separation fabric be placed to serve as a barrier between the prepared subgrade and granular fill/base rock in areas of repeated or heavy construction traffic. The geotextile fabric should meet the requirements presented in the current Oregon Department of Transportation (ODOT) Standard Specification for Construction, Section 02320.

#### 4.3.3 Granular Working Surfaces (Haul Roads & Staging Areas)

Haul roads subjected to repeated heavy, tire-mounted, construction traffic (e.g. dump trucks, concrete trucks, etc.) will require a minimum of 18 inches of imported granular material. For light staging areas, 12 inches of imported granular material should be sufficient. Additional granular material or geo-grid reinforcement may be recommended based on site conditions and/or loading at the time of construction. The imported granular material should be in conformance with Section 4.4.2 and have less than 10 percent material passing the U.S. Standard No. 200 Sieve. The prepared subgrade should be covered with geotextile fabric (Section 4.3.2) prior to placement of the imported granular material. The imported granular material should be placed in a single lift (up to 24 inches deep) and compacted using a smooth-drum, non-vibratory roller until well-keyed.

### 4.4 **Structural Fill**

The geotechnical engineer should be provided the opportunity to review all materials considered for use as structural fill (prior to placement). Samples of the proposed fill materials should be submitted to the geotechnical engineer a minimum of 5 business days prior their use on site<sup>3</sup>. The geotechnical engineer or their representative should be contacted to evaluate compaction of structural fill as the material is being placed. Evaluation of compaction may take the form of in-place density tests and/or proof roll tests with suitable equipment. Structural fill should be evaluated at intervals not exceeding every 2 vertical feet as the fill is being placed.

#### 4.4.1 On-Site Soils – General Use

##### 4.4.1.1 *Poorly Graded Gravel Fill (GP FILL)*

Re-use of this material as structural fill is feasible, provided they can be kept free of debris, deleterious materials, and particles larger than 4 inches in diameter. If used as structural fill, these materials should be prepared in conformance with Section 4.4.2 of this report.

##### 4.4.1.2 *Silty Sand Soils (SM FILL, SM)*

Re-use of these soils as structural fill may be difficult because they are sensitive to small changes in moisture content and difficult, if not impossible, to adequately compact during wet weather. Depending on the time of year construction occurs, moisture conditioning (drying or wetting) may be required in order

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<sup>3</sup> Laboratory testing for moisture density relationship (Proctor) is required. Tests for gradation may be required.

to achieve adequate compaction. If used as structural fill, these soils should be kept (or processed) free of organic matter, debris, and particles larger than 4 inches. Processing (removal) of large cobbles and boulders will be necessary in the area of TP-11 and should be factored. When used as structural fill, these materials should be placed in lifts with a maximum thickness of about 8 inches at moisture contents within -1 and +3 percent of optimum, and compacted to at least 90 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor).

#### 4.4.1.3 Tuff Bedrock (RX)

Re-use of excavated tuff bedrock (RX) as structural fill is feasible, provided it can be processed (crushed, or blended with imported granular material) to achieve a fill that is fairly well graded between coarse and fine. If used as structural fill, the processed material should be prepared in conformance with that recommended for imported granular structural fill in Section 8.4.2 of this report.

If the on-site materials cannot be properly moisture-conditioned and/or processed, we recommend using imported granular material for structural fill.

#### 4.4.2 Imported Granular Structural Fill – General Use

Imported granular structural fill should consist of angular pit or quarry run rock, crushed rock, or crushed gravel that is fairly well graded between coarse and fine particle sizes. The granular fill should contain no organic matter, debris, or particles larger than 4 inches, and have less than 10 percent material passing the U.S. Standard No. 200 Sieve. For fine-grading purposes, the maximum particle size should be limited to 1½ inches. The percentage of fines can be increased to 20 percent of the material passing the U.S. Standard No. 200 Sieve if placed during dry weather, and provided the fill material is moisture-conditioned, as necessary, for proper compaction. Imported granular fill material should be compacted to not less than 90 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor). Proper moisture conditioning and the use of vibratory equipment will facilitate compaction of these materials.

Granular fill materials with high percentages of particle sizes in excess of 1½ inches are considered non-moisture-density testable materials. As an alternative to conventional density testing, compaction of these materials should be evaluated by proof roll test observation (deflection tests), where accepted by the geotechnical engineer.

#### 4.4.3 Trench Base Stabilization Material

If groundwater is present at the base of utility excavations, trench base stabilization material should be placed. Trench base stabilization material should consist of a minimum of 1-foot of well-graded granular material with a maximum particle size of 4 inches and less than 10 percent material passing the U.S. Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material, placed in one lift (up to 24 inches thick), and compacted until well-keyed.

#### 4.4.4 Trench Backfill Material

Trench backfill for the utility pipe base and pipe zone should consist of granular material as recommended by the utility pipe manufacturer. Trench backfill above the pipe zone should consist of well-graded granular material containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 10 percent material passing the U.S. Standard No. 200 Sieve. As a guideline,

trench backfill should be placed in maximum 12-inch-thick lifts. The earthwork contractor may elect to use alternative lift thicknesses based on their experience with specific equipment and fill material conditions during construction in order to achieve the required compaction. The following table presents recommended relative compaction percentages for utility trench backfill.

**Table 1 Utility Trench Backfill Compaction Recommendations**

Backfill Zone	Recommended <u>Minimum</u> Relative Compaction	
	Structural Areas <sup>1</sup>	Landscaping Areas
Pipe Base and Within Pipe Zone	88% ASTM D1557 or pipe manufacturer's recommendation	85% ASTM D1557 or pipe manufacturer's recommendation
Above Pipe Zone	90% ASTM D1557	88% ASTM D1557
Within 3 Feet of Design Subgrade	90% ASTM D1557	88% ASTM D1557

<sup>1</sup>Includes proposed pavement areas, structural fill areas, exterior hardscaping, etc.

#### 4.4.5 Controlled Low-Strength Material (CLSM)

CLSM is a self-compacting, cementitious material that is typically considered when backfilling localized areas. CLSM is sometimes referred to as "controlled density fill" or CDF. Due to its flowable characteristics, CLSM typically can be placed in restricted-access excavations where placing and compacting fill is difficult. If chosen for use at this site, we recommend the CLSM be in conformance with Section 00442 of the most recent, State of Oregon, Standard Specifications for Highway Construction. The geotechnical engineer's representative should observe placement of the CLSM and obtain samples for compression testing in accordance with ASTM D4832. As a guideline, for each day's placement, two compressive strength specimens from the same CLSM sample should be tested. The results of the two individual compressive strength tests should be averaged to obtain the reported 28-day compressive strength. If CLSM is considered for use on this site, please contact the geotechnical engineer for site-specific and application-specific recommendations.

### 4.5 Permanent Slopes

#### 4.5.1 Overview

Permanent cut or fill slopes constructed at the site should be graded at 2H:1V or flatter. Constructed slopes should be overbuilt by a few feet depending on their size and gradient so that they can be properly compacted prior to being cut to final grade. The surface of all slopes should be protected from erosion by seeding, sodding, or other acceptable means. Adjacent on-site and off-site structures should be located at least 5 feet from the top of slopes. *In the event plans include constructing (or leaving) permanent slopes slightly steeper than 2H:1V, and/or the recommended setback cannot be achieved, the geotechnical engineer should be contacted to review the proposed construction.*

#### 4.5.2 Placement of Fill on Slopes

New fill should be placed and compacted against horizontal surfaces. Where slopes exceed 5H:1V (horizontal to vertical), the slopes should be keyed and benched prior to structural fill placement in general accordance with the attached Fill Slope Detail, Figure 4. If subdrains are needed on benches, subject to the review of the geotechnical representative, they should be placed as shown on the attached

Fill Slope Detail. In order to achieve well-compacted slope faces, slopes should be overbuilt by a few feet and then trimmed back to proposed final grades. The geotechnical engineer or his representative should observe the benches, keyways, and associated subdrains, if needed, prior to placement of structural fill.

#### **4.6 Flexible Pavements**

Pavement subgrade preparation should be in conformance with Section 4.1.5 of this report. Pavement subgrade surfaces should be crowned (or sloped) for proper drainage in accordance with specifications provided by the project civil engineer. Pavement section design was not part of this current assignment. We would be pleased to provide recommendations for design section(s) for new pavements at the site, upon request, for an additional fee.

#### **4.7 Additional Considerations**

##### **4.7.1 Drainage**

Subsurface drains should be connected to the nearest storm drain, on-site infiltration system (to be designed by others) or other suitable discharge point. Surface water from paved surfaces and open spaces should be collected and routed to a suitable discharge point.

##### **4.7.2 Expansive Potential**

The near surface native soils consist of non-plastic, silty sand (SM), poorly graded gravel with sand (GP), and tuff (RX), and are not considered susceptible to appreciable movements from changes in moisture content. Accordingly, no special considerations are required to mitigate expansive potential of the near surface soils at the site.

#### **5.0 RECOMMENDED ADDITIONAL SERVICES**

##### **5.1 Design Review**

Geotechnical design review is of paramount importance. We recommend the geotechnical design review take place prior to releasing bid packets to contractors.

##### **5.2 Observation of Construction**

Satisfactory earthwork, soccer field, and pavement performance depends to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during subsurface explorations, and recognition of changed conditions often requires experience. We recommend that qualified personnel visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those observed to date and anticipated in this report. We recommend the geotechnical engineer or their representative attend a pre-construction meeting coordinated by the contractor and/or developer. The project geotechnical engineer or their representative should provide observations and/or testing of at least the following earthwork elements during construction:

- Site stripping
- Subgrade preparation for soccer fields and pavements
- Compaction of structural fill and utility trench backfill

- Compaction of base rock for pavements
- Compaction of asphalt concrete for pavements

It is imperative that the owner and/or contractor request earthwork observations and testing at a frequency sufficient to allow the geotechnical engineer to provide a final letter of compliance for the earthwork activities.

## **6.0 LIMITATIONS**

We have prepared this report for use by the owner/developer and other members of the design and construction team for the proposed development. The opinions and recommendations contained within this report are not intended to be, nor should they be construed as a warranty of subsurface conditions, but are forwarded to assist in the planning and design process.

We have made observations based on our explorations that indicate the soil conditions at only those specific locations and only to the depths penetrated. These observations do not necessarily reflect soil types, strata thickness, or water level variations that may exist between or away from our explorations. If subsurface conditions vary from those encountered in our site explorations, CGT should be alerted to the change in conditions so that we may provide additional geotechnical recommendations, if necessary. Observation by experienced geotechnical personnel should be considered an integral part of the construction process.

The owner/developer is responsible for ensuring that the project designers and contractors implement our recommendations. When the design has been finalized, prior to releasing bid packets to contractors, we recommend that the design drawings and specifications be reviewed by our firm to see that our recommendations have been interpreted and implemented as intended. If design changes are made, we request that we be retained to review our conclusions and recommendations and to provide a written modification or verification. Design review and construction phase testing and observation services are beyond the scope of our current assignment, but will be provided for an additional fee.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

Geotechnical engineering and the geologic sciences are characterized by a degree of uncertainty. Professional judgments presented in this report are based on our understanding of the proposed construction, familiarity with similar projects in the area, and on general experience. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared; no warranty, expressed or implied, is made. This report is subject to review and should not be relied upon after a period of three years.

**FIGURE 1**  
**Site Location**

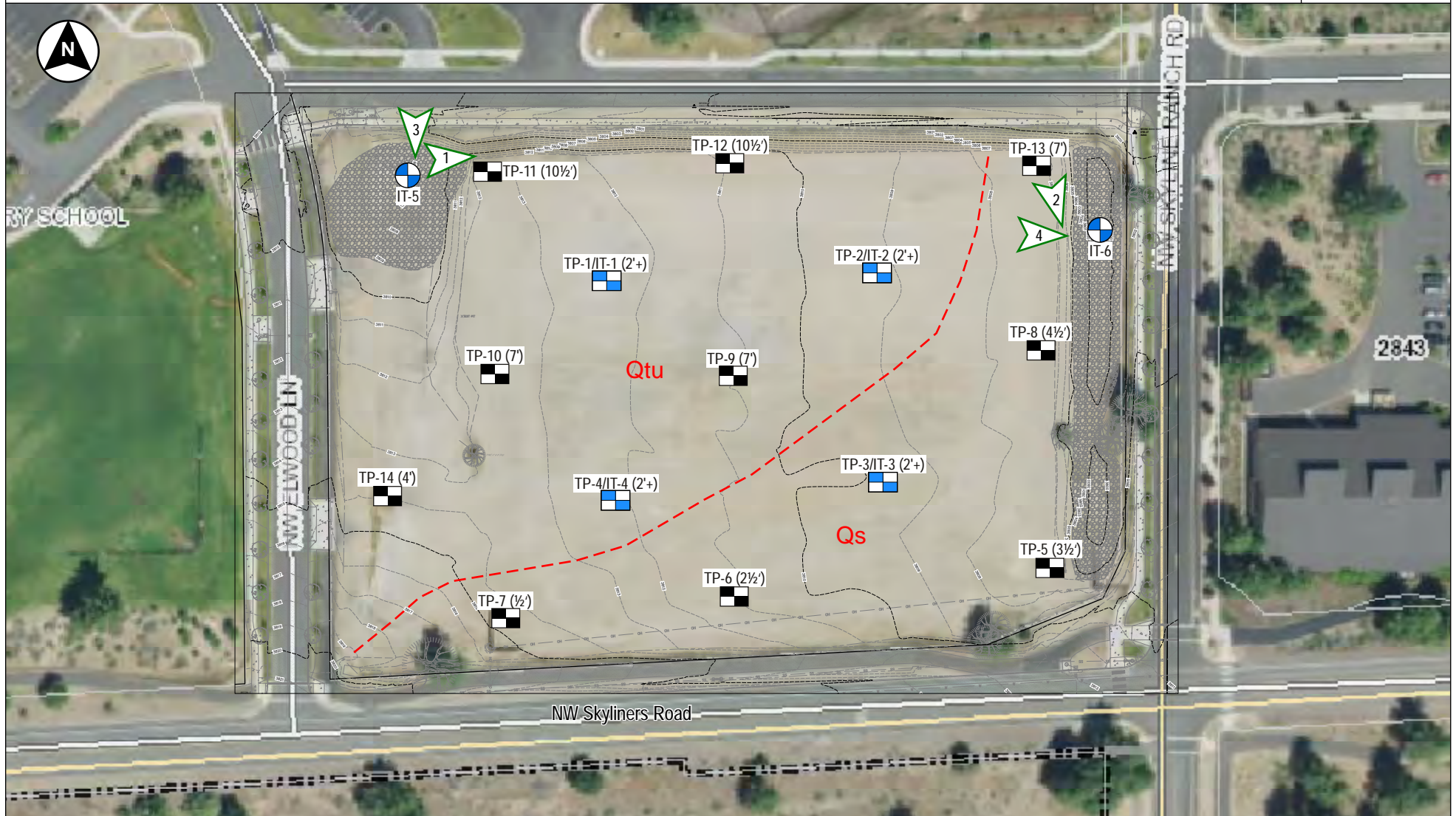


Map created with ArcGIS Pro 2.2.3, copyright 2018 Esri, Inc.  
Township 17 South, Range 11 East, Section 35, Willamette Meridian



**PACIFIC CREST MIDDLE SCHOOL SOCCER FIELDS - BEND, OREGON**  
**Project Number G1804966**

**FIGURE 2**  
**Site Plan**



**LEGEND**

- |           |   |      |   |
|-----------|---|------|---|
| TP-1      | Test pits. Depth of existing fill indicated in ( ). | IT-5 | Drilled hole infiltration test (see text) |
| TP-1/IT-1 | Test pits with infiltration test                    |      | Mapped geologic unit boundary             |
|           | Orientation of site photographs shown on Figure 3   |      |   |

1 Inch = 100 Feet

NOTES: 2016 aerial photograph from Bend Oregon Online Mapper (BOOM), <https://maps.ci.bend.or.us/html5viewer/?viewer=publicviewer#>. Topographic Survey provided by client. All locations are approximate.



Drafted by: ALS





Photograph 1 - Looking along north edge of site from near northwest corner.



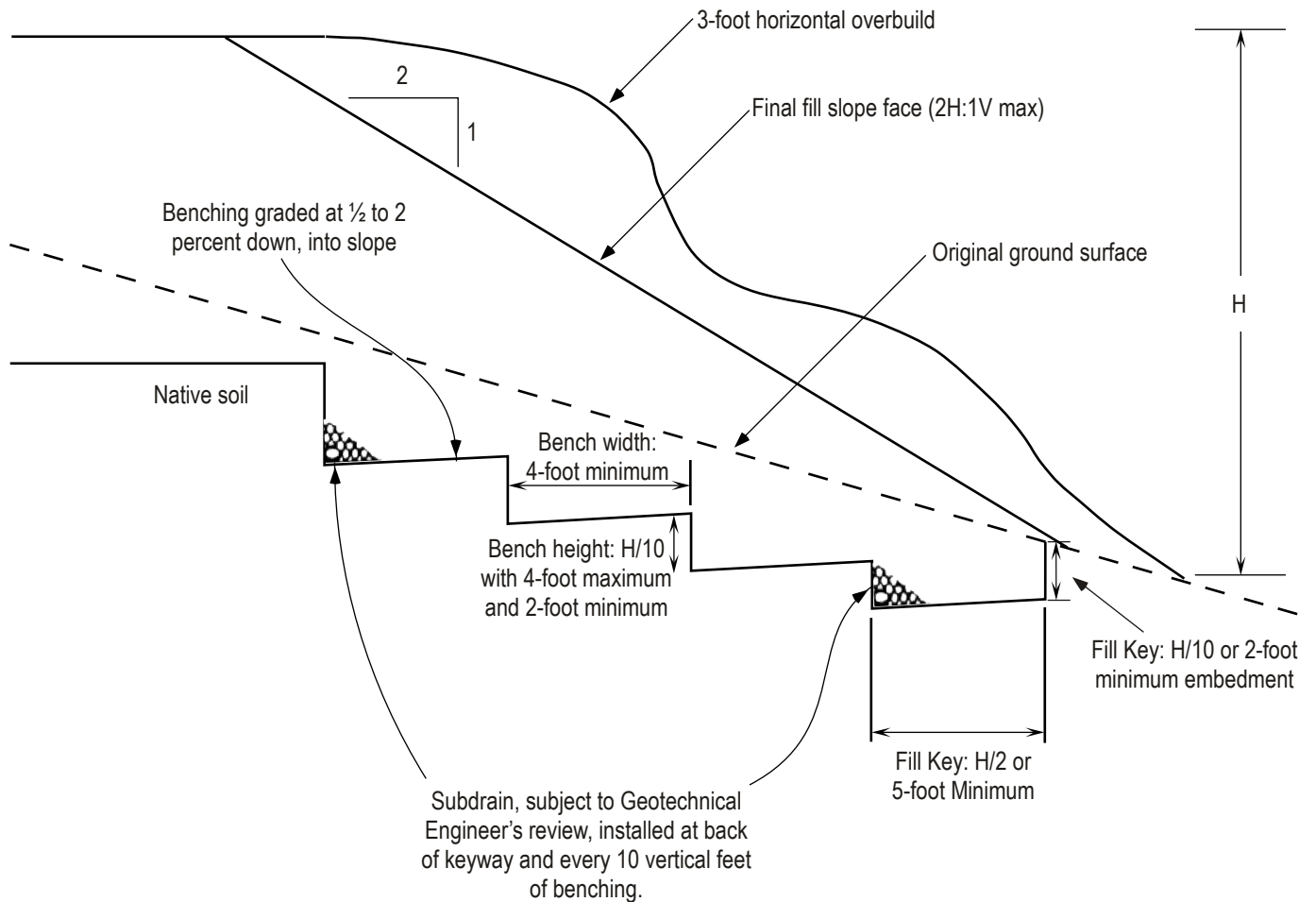
Photograph 2 - Looking south along east edge of site from near northeast corner.



Photograph 3 - Looking south from near northwest corner.



Photograph 4 - Looking east from near northeast corner.



# Carlson Geotechnical

A division of Carlson Testing, Inc.  
Phone: (541) 330-9155  
Fax: (541) 330-9163

Bend Office (541) 330-9155  
Eugene Office (541) 345-0289  
Salem Office (503) 589-1252  
Tigard Office (503) 684-3460



## Appendix A: Subsurface Investigation & Laboratory Testing

**Pacific Crest Middle School Soccer Fields  
NW Skyliners Road & NW Skyline Ranch Road  
Bend, Oregon**

**CGT Project Number G1804966**

March 19, 2019

*Prepared For:*

Becon  
Attn: Mr. Erik Huffman, P.E.  
549 SW Mill View Way, Suite 105  
Bend, Oregon 97702

*Prepared by*  
**Carlson Geotechnical**

Exploration Key.....	Figure A1
Soil Classification.....	Figure A2
ODOT Rock Classification .....	Figure A3
Exploration Logs .....	Figures A4 – A17

### **A.1.0 SUBSURFACE INVESTIGATION**

Our field investigation consisted of fourteen test pits completed in late October 2018. The approximate exploration locations are shown on the Site Plan, attached to the geotechnical report as Figure 2. The exploration locations shown therein were determined based on measurements from existing site features (property corners, etc.) and should be considered approximate. Surface elevations indicated on the logs were estimated based on the topographic contours as shown on the Site Plan attached to the geotechnical report (Figure 2) and should be considered approximate. A key for symbols and in-situ test methods shown on the logs is attached as Figure A1.

#### **A.1.1 Test Pits**

CGT observed the excavation of fourteen test pits (TP-1 through TP-14) at the site on October 24, 2018, to depths of about 2 to 10½ feet bgs. The test pits were excavated using a Bobcat E35 mini-excavator provided and operated provided by CGT. The test pits were loosely backfilled with the excavated materials upon completion.

#### **A.1.2 Material Classification & Sampling**

Representative grab samples were obtained at select intervals within the test pits, detailed on Figure A1. Qualified members of CGT's geotechnical staff collected the samples and logged the soils and intact rock (bedrock) in general accordance with the Visual-Manual Procedure (ASTM D2488) and ODOT Rock Classification Criteria, respectively. Explanations of these classification systems are attached as Figures A2 and A3. The grab samples were stored in sealable plastic bags and transported to our soils laboratory for further examination and testing. Our geotechnical staff visually examined all samples in order to refine the initial field classifications.

#### **A.1.3 Subsurface Conditions**

Subsurface conditions are summarized in Section 2.3 of the geotechnical report. Detailed logs of the explorations are presented on the attached exploration logs, Figures A4 through A17.

### **A.2.0 LABORATORY TESTING**

Laboratory testing was performed on samples collected in the field to refine our initial field classifications and determine in-situ parameters. Laboratory testing included eleven moisture content determinations (ASTM D2216). Results of the laboratory tests are shown on the exploration logs.



**PACIFIC CREST MIDDLE SCHOOL SOCCER FIELDS - BEND, OREGON**  
**Project Number G1804966**

**FIGURE A1**  
**Exploration Key**



Atterberg limits (plasticity) test results (ASTM D4318): PL = Plastic Limit, LL = Liquid Limit, and MC= Moisture Content (ASTM D2216)

□ FINES CONTENT (%) Percentage passing the U.S. Standard No. 200 Sieve (ASTM D1140)

**SAMPLING**



GRAB

Grab sample



BULK

Bulk sample



SPT

**Standard Penetration Test (SPT)** consists of driving a 2-inch, outside-diameter, split-spoon sampler into the undisturbed formation with repeated blows of a 140-pound, hammer falling a vertical distance of 30 inches (ASTM D1586). The number of blows (N-value) required to drive the sampler the last 12 inches of an 18-inch sample interval is used to characterize the soil consistency or relative density. The drill rig was equipped with an cat-head or automatic hammer to conduct the SPTs. The observed N-values, hammer efficiency, and  $N_{60}$  are noted on the boring logs.



MC

**Modified California** sampling consists of 3-inch, outside-diameter, split-spoon sampler (ASTM G3550) driven similarly to the SPT sampling method described above. A sampler diameter correction factor of 0.44 is applied to calculate the equivalent SPT  $N_{60}$  value per Lacroix and Horn, 1973.



CORE

**Rock Coring** interval



SH

**Shelby Tube** is a 3-inch, inner-diameter, thin-walled, steel tube push sampler (ASTM D1587) used to collect relatively undisturbed samples of fine-grained soils.

WDCP

**Wildcat Dynamic Cone Penetrometer (WDCP)** test consists of driving 1.1-inch diameter, steel rods with a 1.4-inch diameter, cone tip into the ground using a 35-pound drop hammer with a 15-inch free-fall height. The number of blows required to drive the steel rods is recorded for each 10 centimeters (3.94 inches) of penetration. The blow count for each interval is then converted to the corresponding SPT  $N_{60}$  values.

DCP

**Dynamic Cone Penetrometer (DCP)** test consists of driving a 20-millimeter diameter, hardened steel cone on 16-millimeter diameter steel rods into the ground using a 10-kilogram drop hammer with a 460-millimeter free-fall height. The depth of penetration in millimeters is recorded for each drop of the hammer.

POCKET  
PEN. (tsf)

**Pocket Penetrometer** test is a hand-held instrument that provides an approximation of the unconfined compressive strength in tons per square foot (tsf) of cohesive, fine-grained soils.

**CONTACTS**



Observed (measured) contact between soil or rock units.

Inferred (approximate) contact between soil or rock units.

Transitional (gradational) contact between soil or rock units.

**ADDITIONAL NOTATIONS**

*Italics*


Notes drilling action or digging effort

{ Braces }

Interpretation of material origin/geologic formation (e.g. { Base Rock } or { Columbia River Basalt })



*All measurements are approximate.*

PACIFIC CREST MIDDLE SCHOOL SOCCER FIELDS - BEND, OREGON							FIGURE A2		
Project Number G1804966							Soil Classification		
Classification of Terms and Content				Grain Size				U.S. Standard Sieve	
NAME: Group Name and Symbol Relative Density or Consistency Color Moisture Content Plasticity Other Constituents Other: Grain Shape, Approximate Gradation Organics, Cement, Structure, Odor, etc. Geologic Name or Formation				Fines				<#200 (0.075 mm)	
				Sand		Fine		#200 - #40 (0.425 mm)	
						Medium		#40 - #10 (2 mm)	
						Coarse		#10 - #4 (4.75)	
				Gravel		Fine		#4 - 0.75 inch	
						Coarse		0.75 inch - 3 inches	
				Cobbles				3 to 12 inches	
				Boulders				> 12 inches	
Coarse-Grained (Granular) Soils									
Relative Density			Minor Constituents						
SPT N <sub>60</sub> -Value		Density	Percent by Volume		Descriptor		Example		
0 - 4		Very Loose	0 - 5%		"Trace" as part of soil description		"trace silt"		
4 - 10		Loose	5 - 15%		"With" as part of group name		<b>"POORLY GRADED SAND WITH SILT"</b>		
10 - 30		Medium Dense	15 - 49%		Modifier to group name		<b>"SILTY SAND"</b>		
30 - 50		Dense							
>50		Very Dense							
Fine-Grained (Cohesive) Soils									
SPT N <sub>60</sub> -Value	Torvane tsf Shear Strength	Pocket Pen tsf Unconfined	Consistency	Manual Penetration Test			Minor Constituents		
<2	<0.13	<0.25	Very Soft	Thumb penetrates more than 1 inch			Percent by Volume	Descriptor	Example
2 - 4	0.13 - 0.25	0.25 - 0.50	Soft	Thumb penetrates about 1 inch					
4 - 8	0.25 - 0.50	0.50 - 1.00	Medium Stiff	Thumb penetrates about ¼ inch			0 - 5%	"Trace" as part of soil description	"trace fine-grained sand"
8 - 15	0.50 - 1.00	1.00 - 2.00	Stiff	Thumb penetrates less than ¼ inch			5 - 15%	"Some" as part of soil description	"some fine-grained sand"
15 - 30	1.00 - 2.00	2.00 - 4.00	Very Stiff	Readily indented by thumbnail			15 - 30%	"With" as part of group name	<b>"SILT WITH SAND"</b>
>30	>2.00	>4.00	Hard	Difficult to indent by thumbnail			30 - 49%	Modifier to group name	<b>"SANDY SILT"</b>
Moisture Content					Structure				
Dry: Absence of moisture, dusty, dry to the touch					Stratified: Alternating layers of material or color >6 mm thick				
Moist: Leaves moisture on hand					Laminated: Alternating layers < 6 mm thick				
Wet: Visible free water, likely from below water table					Fissured: Breaks along definite fracture planes				
	Plasticity	Dry Strength	Dilatancy	Toughness	Slickensided: Striated, polished, or glossy fracture planes				
ML	Non to Low	Non to Low	Slow to Rapid	Low, can't roll	Blocky: Cohesive soil that can be broken down into small angular lumps which resist further breakdown				
CL	Low to Medium	Medium to High	None to Slow	Medium	Lenses: Has small pockets of different soils, note thickness				
MH	Medium to High	Low to Medium	None to Slow	Low to Medium	Homogeneous: Same color and appearance throughout				
CH	Medium to High	High to Very High	None	High					
Visual-Manual Classification									
Major Divisions			Group Symbols	Typical Names					
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: 50% or more retained on the No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel/sand mixtures, little or no fines					
			GP	Poorly-graded gravels and gravel/sand mixtures, little or no fines					
		Gravels with Fines	GM	Silty gravels, gravel/sand/silt mixtures					
			GC	Clayey gravels, gravel/sand/clay mixtures					
	Sands: More than 50% passing the No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines					
			SP	Poorly-graded sands and gravelly sands, little or no fines					
		Sands with Fines	SM	Silty sands, sand/silt mixtures					
			SC	Clayey sands, sand/clay mixtures					
Fine-Grained Soils: 50% or more Passes No. 200 Sieve	Silt and Clays Low Plasticity Fines		ML	Inorganic silts, rock flour, clayey silts					
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays					
			OL	Organic soil of low plasticity					
	Silt and Clays High Plasticity Fines		MH	Inorganic silts, clayey silts					
			CH	Inorganic clays of high plasticity, fat clays					
Highly Organic Soils			OH	Organic soil of medium to high plasticity					
			PT	Peat, muck, and other highly organic soils					
<div> 503-601-8250</div> <div><b>References:</b> ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) Terzaghi, K., and Peck, R.B., 1948, Soil Mechanics in Engineering Practice, John Wiley &amp; Sons.</div>									

**Table 22: Scale of Relative Rock Weathering**

Designation	Field Identification
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 1-inch into rock.
Moderately Weathered	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Predominantly Weathered	Rock mass is more than 50% decomposed. Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock fabric may be evident. May be reduced to soil with hand pressure.

**Table 23: Scale of Relative Rock Hardness**

Term	Hardness Designation	Field Identification	Approximate Unconfined Compressive Strength
Extremely Soft	R0	Can be indented with difficulty by thumbnail. May be moldable or friable with finger pressure.	<100 psi
Very Soft	R1	Crumbles under firm blows with point of geology pick. Can be peeled by pocket knife. Scratched with finger nail.	100-1000 psi
Soft	R2	Can be peeled by pocket knife with difficulty. Cannot be scratched with finger nail. Shallow indentation made by firm blow of geology pick.	1000-4000 psi
Medium Hard	R3	Can be scratched by knife or pick. specimen can be fractured with a single firm blow of hammer/geology pick.	4000-8000 psi
Hard	R4	Can be scratched with knife or pick only with difficulty. Several hard blows required to fracture specimen.	8000-16000 psi
Very Hard	R5	Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.	>16000 psi

**Table 24: Stratification Terms**

Term	Characteristics
Laminations	Thin beds (<1cm)
Fissile	Tendency to break along laminations
Parting	Tendency to break parallel to bedding, any scale
Foliation	Non-depositional, e.g., segregation and layering of minerals in metamorphic rock



Tables adapted from the 1987 Soil and Rock Classification Manual, Oregon Department of Transportation.





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FIGURE A4

Test Pit TP-01

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NUMBER G1804966

DATE STARTED 10/24/18

WEATHER Cloudy

EXCAVATION CONTRACTOR CGT

EQUIPMENT Bobcat e35 Mini-Excavator

EXCAVATION METHOD 24-inch toothed bucket

PROJECT NAME Pacific Crest Soccer Fields

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

ELEVATION DATUM Figure 2 - Site Plan

LOGGED BY PBR/BMW

SEEPAGE ---

GROUNDWATER AT END ---

GROUNDWATER AFTER EXCAVATION ---

GROUND ELEVATION 3812.5 ft

SURFACE Sand

REVIEWED BY BMW

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲						
											PL	LL					
											MC						
												□ FINES CONTENT (%) □					
												0	20	40	60	80	100
3812		SM FILL	<b>SILTY SAND FILL:</b> <i>Dense</i> , light brown to gray, dry, fine-grained, with trace to some tuff fragments up to 2 inches in diameter.														
			Brown, and moist below 1 foot bgs.														
					2		GRAB 1										
3810	<ul style="list-style-type: none"><li>• Test pit terminated at 2 feet bgs.</li><li>• IT-1 conducted within test pit. See Appendix B for test results.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with excavated spoils.</li></ul>																
3808																	
3806																	
3804																	
3802																	
3800																	

CGT EXPLORATION WITH WDCP A4-A17 - TP LOGS.GPJ 12/13/18 DRAFTED BY: ALS



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## FIGURE A5

### Test Pit TP-02

PAGE 1 OF 1

CLIENT	Becon Engineering	PROJECT NAME	Pacific Crest Soccer Fields				
PROJECT NUMBER	G1804966	PROJECT LOCATION	Skyliners Rd. and NW Crossing Dr., Bend, OR				
DATE STARTED	10/24/18	GROUND ELEVATION	3809.25 ft	ELEVATION DATUM	Figure 2 - Site Plan		
WEATHER	Cloudy	SURFACE	Sand	LOGGED BY	PBR/BMW	REVIEWED BY	BMW
EXCAVATION CONTRACTOR	CGT	SEEPAGE	---				
EQUIPMENT	Bobcat e35 Mini-Excavator	GROUNDWATER AT END	---				
EXCAVATION METHOD	24-inch toothed bucket	GROUNDWATER AFTER EXCAVATION	---				

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲	
											PL	LL
					0						MC	
3808		SM FILL	<b>SILTY SAND FILL:</b> Dense, light brown to gray, dry, fine-grained, with trace to some tuff fragments up to 2 inches in diameter.  Brown, and moist below 1 foot bgs.  Gray-brown below about 1¾ feet bgs.		2	GRAB 1						
3806			<ul style="list-style-type: none"><li>• Test pit terminated at 2 feet bgs.</li><li>• IT-2 conducted within test pit. See Appendix B for test results.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with excavated spoils.</li></ul>									
3804												
3802												
3800												
3798												



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FIGURE A6

Test Pit TP-03

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NUMBER G1804966

DATE STARTED 10/24/18

WEATHER Cloudy

EXCAVATION CONTRACTOR CGT

EQUIPMENT Bobcat e35 Mini-Excavator

EXCAVATION METHOD 24-inch toothed bucket

PROJECT NAME Pacific Crest Soccer Fields

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

ELEVATION DATUM Figure 2 - Site Plan

LOGGED BY PBR/BMW

SEEPAGE ---

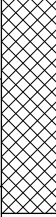
GROUNDWATER AT END ---

GROUNDWATER AFTER EXCAVATION ---

GROUND ELEVATION 3809.75 ft

SURFACE Sand

REVIEWED BY BMW

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲						
											PL	LL					
											MC						
												□ FINES CONTENT (%) □					
												0	20	40	60	80	100
3808		SM FILL	<b>SILTY SAND FILL:</b> <i>Dense</i> , light brown to gray, dry, fine-grained, with trace to some tuff fragments up to 2 inches in diameter.  Gray-brown, and moist below 1 foot bgs.		0   												

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## FIGURE A7

### Test Pit TP-04

PAGE 1 OF 1

CLIENT	Becon Engineering	PROJECT NAME	Pacific Crest Soccer Fields				
PROJECT NUMBER	G1804966	PROJECT LOCATION	Skyliners Rd. and NW Crossing Dr., Bend, OR				
DATE STARTED	10/24/18	GROUND ELEVATION	3812.25 ft	ELEVATION DATUM	Figure 2 - Site Plan		
WEATHER	Cloudy	SURFACE	Sand	LOGGED BY	PBR/BMW	REVIEWED BY	BMW
EXCAVATION CONTRACTOR	CGT	SEEPAGE	---				
EQUIPMENT	Bobcat e35 Mini-Excavator	GROUNDWATER AT END	---				
EXCAVATION METHOD	24-inch toothed bucket	GROUNDWATER AFTER EXCAVATION	---				

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲	
											PL	LL
3812			<b>SILTY SAND FILL:</b> Dense, light brown, dry, fine-grained, with trace to some tuff fragments up to 2 inches in diameter.		0							
		SM FILL	Brown, and moist below 1 foot bgs.									
3810					2	GRAB 1						
			<ul style="list-style-type: none"><li>• Test pit terminated at 2 feet bgs.</li><li>• IT-4 conducted within test pit. See Appendix B for test results.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with excavated spoils.</li></ul>									
3808												
3806												
3804												
3802												
3800												



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## FIGURE A8

### Test Pit TP-05

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3807 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

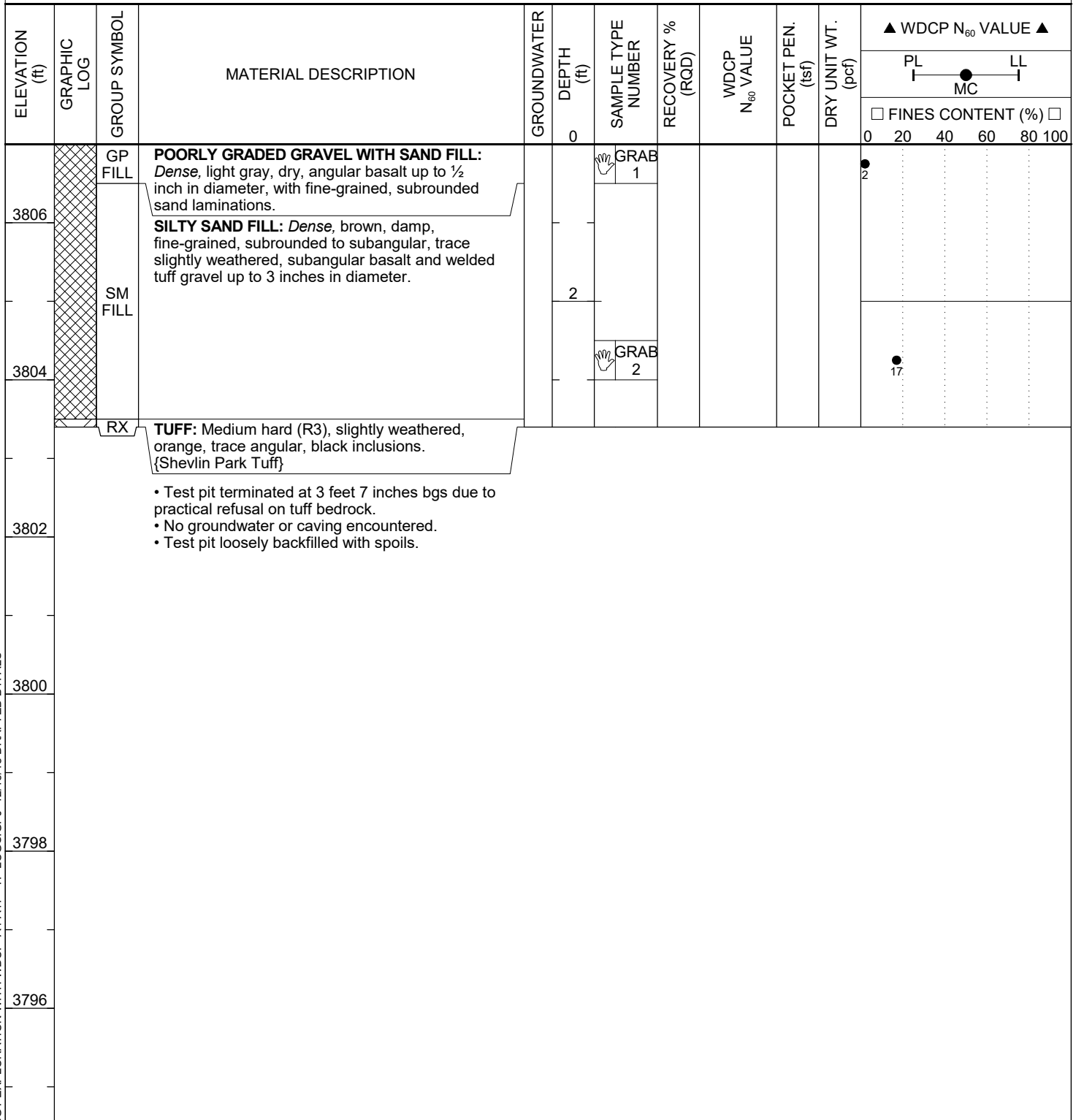
SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---





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FIGURE A9

Test Pit TP-06

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NUMBER G1804966

DATE STARTED 10/24/18

WEATHER Cloudy

EXCAVATION CONTRACTOR CGT

EQUIPMENT Bobcat e35 Mini-Excavator

EXCAVATION METHOD 24-inch toothed bucket

PROJECT NAME Pacific Crest Soccer Fields

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

ELEVATION DATUM Figure 2 - Site Plan

LOGGED BY PBR

SEEPAGE ---

GROUNDWATER AT END ---

GROUNDWATER AFTER EXCAVATION ---

GROUND ELEVATION 3811 ft

SURFACE Gravel

REVIEWED BY BMW

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲						
											PL	LL					
											MC						
												□ FINES CONTENT (%) □					
												0	20	40	60	80	100
3810		GP FILL	<b>POORLY GRADED GRAVEL WITH SAND FILL:</b> <i>Dense</i> , dark gray, dry, angular basalt up to ½ inch in diameter, with light gray, fine- to medium-grained, subrounded to subangular sand laminations.		0												
		SM FILL	<b>SILTY SAND WITH COBBLES FILL:</b> <i>Dense</i> , brown, dry to damp, fine-grained, subrounded to subangular, with slightly weathered, orange, subangular welded tuff up to 6 inches in diameter, and trace dark gray, angular, basalt gravel.		2												
3808		RX	<b>TUFF:</b> Medium hard (R3), orange, welded. {Shevlin Park Tuff}														
			<ul style="list-style-type: none"><li>• Test pit terminated at 2 feet 7 inches bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>														
3806																	
3804																	
3802																	
3800																	

CGT EXPLORATION WITH WDCP A4-A17 - TP LOGS.GPJ 12/13/18 DRAFTED BY: ALS



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# FIGURE A10

## Test Pit TP-07

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CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18

GROUND ELEVATION 3814.5 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy

SURFACE Gravel

LOGGED BY PBR

REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲	
											PL	LL
					0							
3814		GP FILL	<b>POORLY GRADED GRAVEL WITH SAND FILL:</b> <i>Dense, dark gray, dry, angular basalt up to ½ inch in diameter, with light gray, fine- to medium-grained, subrounded to subangular sand laminations.</i>									
		SM	<b>SILTY SAND WITH GRAVEL:</b> <i>Dense, orange to brown to light gray, dry, non-plastic, medium- to coarse-grained, subrounded, with very soft, black, angular, pumice gravel.</i>		2	GRAB 1					12	
3812		RX	<b>TUFF:</b> Medium hard (R3), dark gray, angular, black inclusions. {Shevlin Park Tuff}									
3810			<ul style="list-style-type: none"><li>• Test pit terminated at 3 feet bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>									
3808												
3806												
3804												
3802												



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# FIGURE A11

## Test Pit TP-08

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CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18

GROUND ELEVATION 3807.5 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy

SURFACE Gravel

LOGGED BY PBR

REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲											
											PL —●— LL MC											
											□ FINES CONTENT (%) □											
											0	20	40	60	80	100						
3806		GP FILL	<b>POORLY GRADED GRAVEL WITH SAND FILL:</b> <i>Dense, dark gray to light pink, dry, angular, up to ½ inch in diameter, with light gray, fine- to medium-grained, subangular sand.</i> <b>SILTY SAND WITH GRAVEL FILL:</b> <i>Dense, orange, dry to moist, fine- to medium-grained, subrounded, with orange, angular, tuff gravel up to ½ inch in diameter.</i> <i>Brown, moist, subrounded to subangular, with subangular gravel up to 3 inches in diameter below 1 foot bgs.</i>																			
		SM FILL		2																		
3804				GRAB 1																		
				4																		
3802		SM	<b>SILTY SAND:</b> <i>Medium dense, dark brown to dark gray, moist, fine- to medium-grained, subrounded, trace orange to black, angular, pumice and tuff gravel up to 1½ inches in diameter.</i>			GRAB 2																
				6																		
		RX	<b>TUFF:</b> Medium hard (R3), slightly weathered, dark gray with orange flecking. {Shevlin Park Tuff}																			
3800			<ul style="list-style-type: none"><li>• Test pit terminated at 6 feet 7 inches bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>																			
3798																						
3796																						





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# FIGURE A12

## Test Pit TP-09

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3811 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲	
											PL	LL
											MC	
□ FINES CONTENT (%) □												
0 20 40 60 80 100												
3810		GP FILL	<b>POORLY GRADED GRAVEL FILL:</b> Dense, light gray to gray, angular, basalt gravel up to ¾ inches in diameter.		0							
		SM FILL	<b>SILTY SAND WITH GRAVEL FILL:</b> Dense, orange to tan, dry, fine-grained, subrounded to subangular, with orange, subangular tuff gravel up to ½ inch in diameter. Light gray, with black, angular pumice gravel up to 1 inch in diameter below 1½ feet bgs. Medium brown to orange, moist, fine- to coarse-grained, subrounded, with black to orange, angular, pumice and tuff gravel up to 1½ inches in diameter below 2 feet bgs.		2							
3808				Patches of dark gray, damp fines below 4 feet bgs.		4						
				Orange, angular, tuff cobbles up to 4 inches in diameter below 6 feet bgs.		6						
3806												
3804												
		RX	<b>TUFF:</b> Medium hard (R3), slightly weathered, pink to orange. {Tumalo Tuff}									
			<ul style="list-style-type: none"><li>• Test pit terminated at 7 feet 1 inch bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>									
3802												
3800												



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# FIGURE A13

## Test Pit TP-10

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3813 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲				
											PL —●— LL MC				
					0						0 20 40 60 80 100				
3812		GP FILL	<b>POORLY GRADED GRAVEL FILL:</b> Dense, dark gray to gray, angular, basalt gravel up to ¾ inch in diameter, some light gray to tan fines.												
			<b>SILTY SAND WITH GRAVEL FILL:</b> Dense, light tan, dry, medium- to coarse-grained, subangular, with orange to pink, subangular to angular, tuff gravel up to ½ inch in diameter.												
			Dark red to dark brown, moist, fine- to medium-grained, subrounded to subangular, with red to black, angular, pumice gravel up to ¾ inch in diameter below 1 foot bgs.		2										
3810			Dark brown to brown below 3 feet bgs.			GRAB 1									18
		SM FILL			4										
3808															
					6										
3806		RX	<b>TUFF:</b> Medium hard (R3), orange with black pumice fragments. {Tumalo Tuff}												
3804			<ul style="list-style-type: none"><li>• Test pit terminated at 7 feet 1 inch bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>												
3802															



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# FIGURE A14

## Test Pit TP-11

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3813 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲	
											PL	LL
					0							
3812		GP FILL	POORLY GRADED GRAVEL FILL: <i>Dense</i> , gray, angular, and up to ½ inch in diameter.									
		SM FILL	SILTY SAND WITH GRAVEL, COBBLES, AND BOULDERS FILL: <i>Dense</i> , orange to pink to light tan, dry, fine- to medium-grained, subangular, with orange, slightly weathered to fresh, angular gravel, cobbles, and boulders up to 4 feet in diameter.		2							
3810												
		SM FILL	SILTY SAND WITH GRAVEL AND COBBLES FILL: <i>Dense</i> , brown, moist, fine- to medium-grained, with some orange, angular, tuff gravel and cobbles.		4							
3808					6							
		SM FILL	Geotextile fabric at 8 feet bgs. Dark brown, subrounded to subangular, with angular, basalt gravel up to 3 inches in diameter below 8 feet bgs.		8							
3806												
			Trace orange, angular, tuff cobbles below 9½ feet bgs.		10							
3804												
		RX	TUFF: Medium hard (R3), orange to pink, welded. (Tumalo Tuff)									
3802												
			<ul style="list-style-type: none"><li>• Test pit terminated at 10 feet 7 inches bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>									



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# FIGURE A15

## Test Pit TP-12

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CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3811 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲				
											PL —●— LL MC				
					0						0 20 40 60 80 100				
3810		SM FILL	<b>SILTY SAND WITH GRAVEL FILL:</b> Dense, dark gray, dry, fine- to medium-grained, subrounded to subangular, with dark gray, subrounded gravel up to ½ inch in diameter.												
			<b>SILTY SAND WITH GRAVEL, COBBLES, AND BOULDERS FILL:</b> Dense, dark gray to brown, moist, fine- to medium-grained, subrounded to subangular, with orange, angular, tuff gravel, cobbles, and boulders up to 1½ feet in diameter.		2										
3808															
					4										
3806															
		SM FILL			6										
			Cobbles up to 6 inches in diameter below 6 feet bgs.												
3804					8										
					10										
3802															
3800															
			<ul style="list-style-type: none"><li>• Test pit terminated at 10½ feet bgs due to digging limit of mini-excavator.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>												

CGT EXPLORATION WITH WDCP A4-A17 - TP LOGS.GPJ 12/13/18 DRAFTED BY: ALS



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# FIGURE A16

## Test Pit TP-13

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3807 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲	
											PL	LL
					0							
3806			<b>SILTY SAND WITH GRAVEL FILL:</b> <i>Dense</i> , dark brown to dark gray, moist, non-plastic, fine- to medium-grained, subrounded, with black to orange, angular to subangular, pumice and tuff gravel up to 2 inches in diameter, and trace orange, tuff cobbles up to 6 inches in diameter.		2							
3804					4							
3802					6							
3800			Dark gray below 6 feet bgs.		8							
			<b>SILTY SAND WITH GRAVEL:</b> <i>Medium dense</i> , light brown, moist, with medium hard (R3), angular, tuff gravel up to 2 inches in diameter, and trace tuff cobbles.			GRAB 1						
3798												
			<b>TUFF:</b> Medium hard (R3), slightly weathered, orange, with black, subangular inclusions, welded. {Shevlin Park Tuff}									
			<ul style="list-style-type: none"><li>• Test pit terminated at 9 feet 1 inch bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>									
3796												

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# FIGURE A17

## Test Pit TP-14

PAGE 1 OF 1

CLIENT Becon Engineering

PROJECT NAME Pacific Crest Soccer Fields

PROJECT NUMBER G1804966

PROJECT LOCATION Skyliners Rd. and NW Crossing Dr., Bend, OR

DATE STARTED 10/24/18 GROUND ELEVATION 3814 ft

ELEVATION DATUM Figure 2 - Site Plan

WEATHER Cloudy SURFACE Gravel

LOGGED BY PBR REVIEWED BY BMW

EXCAVATION CONTRACTOR CGT

SEEPAGE ---

EQUIPMENT Bobcat e35 Mini-Excavator

GROUNDWATER AT END ---

EXCAVATION METHOD 24-inch toothed bucket

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N <sub>60</sub> VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N <sub>60</sub> VALUE ▲											
											PL —●— LL MC											
											□ FINES CONTENT (%) □											
											0	20	40	60	80	100						
3812		SM FILL	<b>SILTY SAND WITH GRAVEL FILL:</b> <i>Dense</i> , light gray, dry, fine- to medium-grained, subrounded to subangular, with gray, angular, basalt gravel up to ½ inch in diameter.  With black, angular, pumice and tuff gravel up to 2 inches in diameter below 1 foot bgs.  Wire at 1½ feet bgs.		0																	
					2																	
3810						4																
		RX	<b>TUFF:</b> Medium hard (R3), orange with black pumice fragments. {Tumalo Tuff}																			
3808			<ul style="list-style-type: none"><li>• Test pit terminated at 4 feet 7 inches bgs due to practical refusal on tuff bedrock.</li><li>• No groundwater or caving encountered.</li><li>• Test pit loosely backfilled with spoils.</li></ul>																			
3806																						
3804																						
3802																						

# Carlson Geotechnical

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Phone: (541) 330-9155  
Fax: (541) 330-9163

Bend Office (541) 330-9155  
Eugene Office (541) 345-0289  
Salem Office (503) 589-1252  
Tigard Office (503) 684-3460



## Appendix B: Results of Infiltration Testing

**Pacific Crest Middle School Soccer Fields  
NW Skyliners Road & NW Skyline Ranch Road  
Bend, Oregon**

**CGT Project Number G1804966**

March 19, 2019

*Prepared For:*

Becon  
Attn: Mr. Erik Huffman, P.E.  
549 SW Mill View Way, Suite, 105  
Bend, Oregon

*Prepared by*  
**Carlson Geotechnical**

## B.1.0 INTRODUCTION

A total of six infiltration tests (IT-1 through IT-6) were conducted at the site as requested by the project civil engineer, Becon Engineering. The first four infiltration tests were conducted within shallow test pits within the central portion of the site. The other two infiltration tests were conducted within pre-drilled holes (prepared by others during previous site grading). The following paragraphs present the results of the infiltration tests.

### B.1.1 Infiltration Tests IT-1 through IT-4

Four infiltration tests (IT-1 through IT-4) were performed within the central portion of the site, as shown on the attached Site Plan, Figure 2. These infiltration tests were conducted in general accordance with Appendix 4C of the Central Oregon Stormwater Manual (COSM). The test pit method requires an approximate 2-foot by 4-foot excavation. Clean water shall then be introduced into the test pit. The water level shall be recorded in intervals not to exceed 15 minutes in length for at least two hours. Each infiltration test was conducted at depths of about 2 feet bgs in existing silty sand fill (SM FILL). Photographs of each test pit (prior to water introduction) are presented on the attached Figure B1. The water level (head) was established at 12 inches was established for the constant head portion of the infiltration tests. Results from the infiltration testing are summarized below in the following table.

**Table B1 Infiltration Test Results**

Infiltration Test	Constant Head Infiltration Rate	Falling Head Infiltration Rate <sup>1</sup>
IT-1	See Note 2	$\frac{1}{4}$
IT-2	See Note 2	$\frac{1}{4}$
IT-3	See Note 2	$\frac{3}{8}$
IT-4	See Note 2	$\frac{1}{8}$

<sup>1</sup> Please note these values are unfactored.

<sup>2</sup> Once the 12-inch water level was established in the test pit, the water inflow was shut off to allow for observation of change in water level. Very little to negligible drop of water (i.e. infiltration) was observed at 15-minute intervals during the 2-hour constant head portion of the test. Accordingly, the inflow rate during that portion of the test may be assigned as 0 gallons/minute and infiltration rate assigned as 0 inches/hour.

The relatively low rates of infiltration noted above are anticipated to be a result of the dense, silty nature of the existing silty sand fill (SM FILL). If the silty sand fill is to be relied upon for infiltration of stormwater at this site, the geotechnical engineer should be consulted. Supplemental infiltration tests at the site may be recommended.

### B.1.2 Infiltration Tests IT-5 & IT-6

Two infiltration tests (IT-5 and IT-6) were performed within pre-drilled, 8-inch diameter, cased holes, as shown on the attached Site Plan, Figure 2. Photographs of the tops of each cased hole are shown on Figure 3. As part of this assignment, CGT was provided documents related to the original installation and testing of the drilled holes at the site. Those documents have been reproduced and are attached at the end of this appendix for informational purposes.

These infiltration tests were conducted within each cased hole in general accordance with Appendix 4B of the COSM. The cap of each hole was removed and water was introduced into each hole via hose connected



to a 4,000 gallon water truck. The inflow rate was recorded at 160 to 190 gallons per minute as the full contents of the truck tank (4,000 gallons of water) were introduced into each drill hole. In both cases, we were unable to build a head of water within the upper 25 feet of each cased hole. The test results were comparable to those noted during a previous infiltration test (administered by DOWL) as indicated in their project memorandum (attached) and dated January 27, 2016.

Based on the results of the testing and review of the provided documents, the two cased holes are anticipated to be readily conducive for infiltration of stormwater at the site. Notwithstanding the preceding statement, we recommend records and logs prepared during the installation of each cased hole be sought to confirm they were installed in conformance with the "Schematic Detail", dated January 25, 2016, and prepared by The Wallace Group (reproduced and attached at end of this appendix). Records and logs should be conveyed to CGT and the project civil engineer for review, as appropriate.



Infiltration Test/Test Pit-1



Infiltration Test/Test Pit-2



Infiltration Test/Test Pit-3



Infiltration Test/Test Pit-4



*Brent Woodward, Inc.*  
CCB# 153389

307 SW 2nd Street  
REDMOND, OR 97756

541 504-5538 OFFICE  
541 548-2864 FAX  
WWW.BRENTWOODWARDINC.COM

January 25, 2016

**To:** David Henneman, Kirby Nagelhout Construction, 20635 Brinson Blvd, Bend, OR 97701 Ph 541-389-7119, Fx 541-385-5834, Email [daveh@knccbend.com](mailto:daveh@knccbend.com)

**Project Address:** Pacific Crest Middle School, 3030 NW Elwood, Bend, OR 97703

**Project Scope:** Install (5) storm water drain shafts 24" diameter x 60' deep with 8" slotted steel casing liners

Per our recent onsite visit and our recent phone and email conversations, BWI proposes to drill (5) 24" diameter x 60' deep shafts, remove spoils from site, install a solid slotted 8" diameter steel casing 60' long and centered in the shaft. We understand the KNCC will be purchasing the steel casing from Swift Steel in Redmond and the BWI will pick up the steel, manufacture it as discussed, and install it into the drilled shafts as one piece 60' long. BWI also understands the KNCC will be purchasing the small crushed rock backfill material and line up a CAD truck for placement of it around the steel liners. KNCC will finish the top of the shafts per the owner's design. BWI will handle overhead clearance with existing Midstate Electric Cooperative conductor and any safety watch or line costs will be a pass through from MEC to KNCC.

**Inclusions:** BWI will be providing labor, equipment, steel fabrication, and expertise to perform the above work scope. BWI will remove spoils from site and arrange for mitigation of overhead clearance conflicts. BWI will leave the worksites in a workman-like finish. Oregon BOLI wages and fringes to be paid to all project employees.

**Exclusions:** Final top catch basin or finishing of top of shaft. No restoration of sod, irrigation systems, curbing, or asphalt. Traffic plans/controls, permits, environmental MIT's/BMP's, access improvements to worksites, testing.

**Notes:** Any cost to BWI by Midstate Electric Coop for mitigation of existing overhead lines will be passed through to KNCC in addition to our bid price. KNCC is purchasing the steel liner pipe. KNCC is purchasing the backfill material and the CAD truck for its placement.

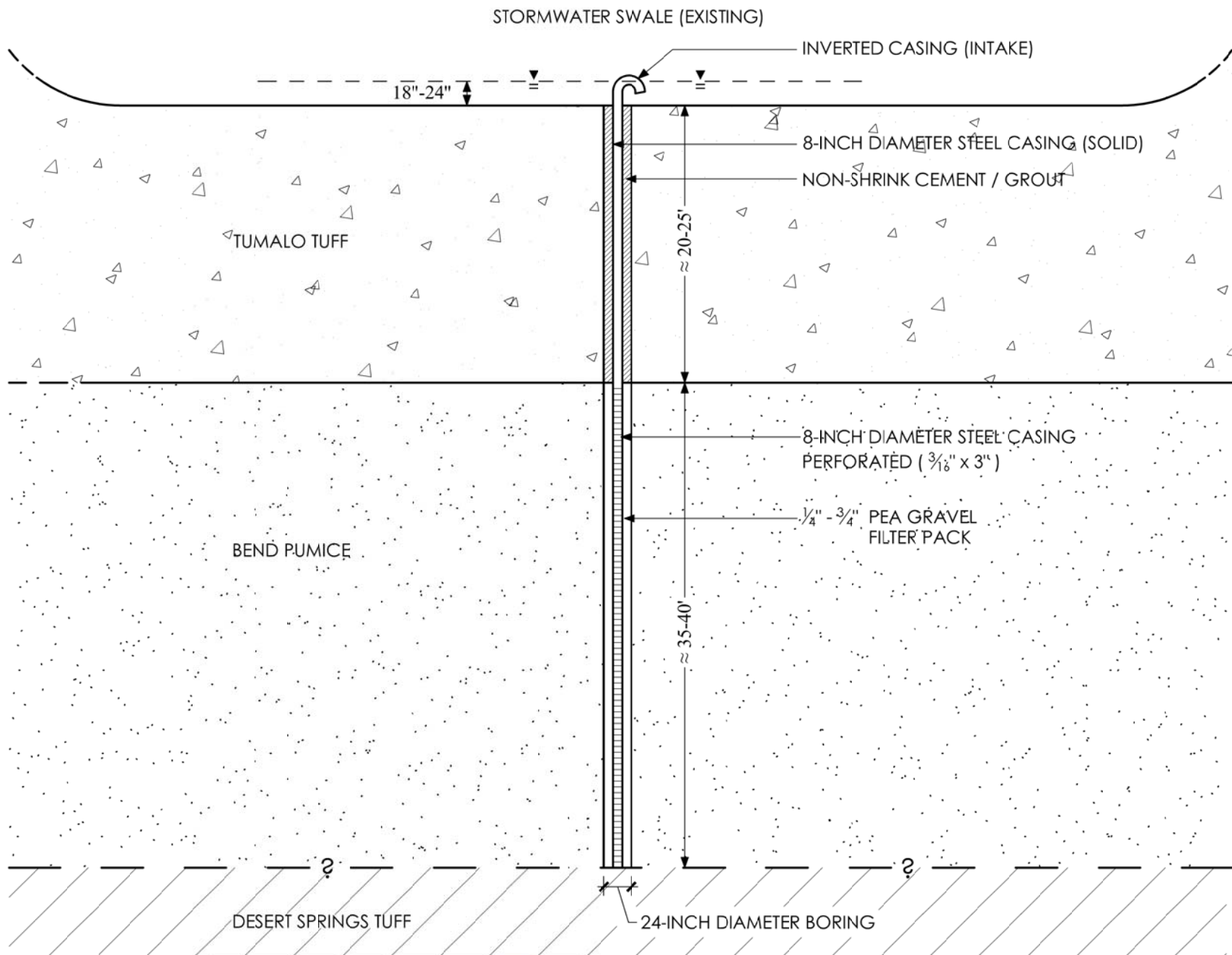
For the above work scope and given the specific inclusions/exclusions/notes above BWI is offering the unit price of \$7,500.00 (MOB included) per shaft. Total bid price is \$37,500.00.

Please let me know if you have any questions regarding our bid and thank you for your time in consideration of our services.

Sincerely,

Shaun Hannay, Vice President of Sales  
Brent Woodward, Inc.  
541-504-5538 (office) / 541-420-6070 (cell)  
[shannay@bwidrilling.us](mailto:shannay@bwidrilling.us)





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**STORMWATER DRAINAGE SYSTEM  
DRILL HOLE SCHEMATIC  
MILLER ELEMENTARY & PACIFIC CREST  
MIDDLE SCHOOL CAMPUS  
BEND LAPINE SCHOOLS  
BEND, OREGON**

PROJECT No.:	10540 (4)
DRAWN:	Jan. 25, 2016
DRAWN BY:	DTJ
CHECKED BY:	RSW
FILE NAME:	10540 (4)_FIGURE_1.DWG

FIGURE

1



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## MEMORANDUM

**TO:** Angus Eastwood, BLPS  
Mark Leavitt, KNCC  
Kevin Shaver, BBT  
Amber Hudspeth, Farallon Consulting  
Mark Herbert, The Wallace Group

**FROM:** Adam Conway  
Steve Hannas

**DATE:** January 27, 2016

**SUBJECT:** Drill Hole Test – Pacific Crest Middle School

---

Following the drilling of an augered hole and placement of a steel casing, generally following The Wallace Group January 25, 2016 Drill Hole Schematic detail, DOWL observed the testing of the drill hole. A summary of the drill hole and testing follows:

- Drill hole location: Southeast corner of Elwood and Lolo intersection, within the future soccer field area.
- Drill hole section:
  - 24" diameter x 60' depth with 8" casing full depth.
  - Tumalo Tuff from surface to 23' depth; Bend Pumice from 23' to 51' depth; transition zone from 51' to 53' depth; Desert Tuff from 53' to 60' depth (per contractor and Amber Hudspeth).
- 4,000 gallon water truck was used for test.
- Began filling operations at 3:55.
- Reached steady state and continued filling at approximately 60 gpm (based on two calibration tests using a 5 gallon bucket).
- Ended filling operation at 4:55 (3,500 to 4,000 gallons placed into drill hole).
- Standing water level was 9'-6" from top of casing pipe at the end of testing from the water truck.
- One minute after stopping the flow from the water truck, the water level was not measureable with 25' tape (had dropped to a level below 25').
- The water level within the drill hole continued to drawdown at similar rate based on visual inspection.