



# **City of Sherwood Urban Renewal Agency (URA) Festival Plaza**

**BID SET  
August 2022**

**Project Number: 901  
Bidding and General Requirements, Contract Forms,  
Project Special Provisions, Specifications and Contract Plans**

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**Owner**  
City of Sherwood  
Urban Renewal Agency (URA)  
22560 SW Pine Street  
Sherwood, OR 97140  
(503) 925-2309

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# **Division One**

## **Bidding Requirements**

**INVITATION TO BID**  
**City of Sherwood/Urban Renewal Agency (URA)**  
**Sherwood Festival Plaza**

Sealed bids for furnishing all materials, equipment, labor, and services for the construction of the **Sherwood Festival Plaza** for the City of Sherwood Urban Renewal Agency will be received at City of Sherwood, Public Works Department 15527 SW Willamette Drive, Sherwood, Oregon 97140 (Attn: Kristen Switzer, Project Manager) until the **Bid Closing at 2:00 PM (Local Time) on Tuesday, September 20, 2022**. Please title the envelope Sherwood Festival Plaza. Bids will then be publicly opened and read aloud after 2:00 PM at the Public Works Department 15527 SW Willamette Drive, Sherwood, Oregon. No bids will be accepted after the **BID CLOSING** time.

First-Tier Subcontractor Disclosure forms must be received at the above-mentioned location and date no later than **4:00 PM (Local Time)**. Proposals without a completed First-Tier Subcontractor Disclosure form submitted will be considered non-responsive.

**A mandatory Pre-Bid meeting will be held for General Contractors on-site on Tuesday September 6, 2022 at 9:00 am.**

**Project Description**

The Work to be done under this Contract consists of construction of the following items:

1. Decorative and vehicular concrete paving
2. Brick paving
3. Stone walls
4. Utilities including electrical, stormwater and water
5. Fencing and furnishings.
6. Landscaping and irrigation
7. Engineer's Estimate (\$1,250,000 to \$1,500,000)

Bidding Documents and Contract Drawings are available for free download on the City's website, [www.sherwoodoregon.gov](http://www.sherwoodoregon.gov), under the "Business and Development" pull down under "Bids and RFP's" and are acceptable for Bid Submittal.

Other locations Bidding Documents may be examined:

- DJC Plan Center (Electronic only), 503-224-0624, Email: [plancenter@djcoregon.com](mailto:plancenter@djcoregon.com)
- Oregon Contractors Plan Center (Electronic only), 5468 SE International Drive, Milwaukie, OR 97222

Parties downloading Bidding Documents from the City's website can request to be included on the official Planholders list by sending an email to [switzerk@sherwoodoregon.gov](mailto:switzerk@sherwoodoregon.gov). Bidders are not required to be on Planholders list to submit a Bid for this project.

Addenda, clarifications and notices will be posted online on the City's website. Potential Bidders are responsible for checking the website on a daily basis. Each addendum must be signed and submitted with the Bid to be considered a responsive bid offer. The City is not responsible for failure of bidders to receive notifications of changes or corrections made by the City and posted as stated above.

All questions or requests for clarification must be submitted **by 5:00 PM (Local Time) on Tuesday, September 13, 2022**, seven (7) days prior to bid opening to receive responses. All final responses will be posted on the City's website no later than three (3) days prior to Bid Opening.

This is a local public works project subject to BOLI prevailing wages (ORS 279C.800 to ORS 279C.870).

Bids shall be accompanied by a certified check, cashier's check or bid bond payable to the City of Sherwood in an amount equal to ten percent (10%) of the amount bid.

The City of Sherwood may reject a bid that does not comply with prescribed public contracting procedures and requirements, including the requirement to demonstrate the bidder's responsibility under ORS 279C.375(3)(b), and that the City may reject for good cause, all bids after finding that doing so is in the public interest. City reserves the right to waive minor informalities in any bid.

For more information regarding this project, contact Kristen Switzer, at 503-625-4210 or by e-mail at [switzerk@sherwoodoregon.gov](mailto:switzerk@sherwoodoregon.gov).

PUBLISH: Portland Daily Journal of Commerce, August 29 and 31

## **BIDDER'S CHECKLIST**

### **SHERWOOD FESTIVAL PLAZA**

- Bid Statement including signed signature page
- Bid Schedule
- First Tier Subcontractor Disclosure Form
- Bid Bond
- Certification of Non-Collusion
- Certification of Compliance with ORS 279C.840
- Certification of Asbestos Abatement
- Certification of Non-Discrimination
- Customer Service Acknowledgment
- Prequalification Acknowledgement
- Bidder Responsibility Form
- All Applicable Addenda

## BID STATEMENT

The undersigned Bidder declares:

That Bidder has carefully examined and incorporates in this Bid, by this reference all documents included in the Bid Booklet of Contract Documents and Specifications for this job, which includes but is not limited to the Plans, Standard Specifications and Standard Drawings, Supplemental Specifications and Special Provisions, Addenda, Bid Schedule, Prevailing Wage Rates, Contract form, Bond forms, and Conditions of the Contract for:

### **Sherwood Festival Plaza**

That Bidder has made an examination of the site of the proposed work and has made such investigations as are necessary to determine the character of the material and the conditions to be encountered, independently of the indication on the plans; and that if the Proposal is accepted, Bidder will contract with the City of Sherwood as provided in the Contract form, will to the extent of this bid, provide the necessary machinery, tools, apparatus, and other means of construction, and will furnish all material and labor as specified, or called for by the Plans or as necessary to complete the work in the manner specified and in accordance with the requirements of the Engineer.

The undersigned has checked carefully all the bid schedule figures, and understands that the City will not be responsible for any errors or omissions on the part of the undersigned in making this bid.

That Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site which have been identified in the Solicitation Documents. Bidder acknowledges that such reports and drawings are not Contract Documents and may not be complete for Bidder's purposes. Bidder acknowledges that City and Architect/Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site.

That Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and underground facilities) at or contiguous to the site which may affect cost, progress, or performance of the work and which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

That Bidder does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance furnishing of the work in accordance with the times, price and other terms and conditions of the Contract Documents.

Bidder has given Architect/Engineer written notice of all conflicts, errors, ambiguities or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by Architect/Engineer is acceptable to Bidder, and the Contract Documents are generally sufficient to and convey understanding of all terms and conditions for performing and furnishing the work for which this Bid is submitted.



The undersigned also agrees that Bidder will order all material and equipment included under this contract and will commence work within ten (10) days after receipt of Notice to Proceed and that Bidder will complete the work in all respects after commencement and will have the project completed by the date specified in the special provisions and that Bidder will pay as liquidated damages to the City for any delay, the sum of **Eight Hundred and No/100 Dollars (\$800.00)** per day for each Calendar Day required beyond that period.

Accompanying this proposal is a Certified Check, Cashier's Check, or Bidder's Bond

from \_\_\_\_\_ of \_\_\_\_\_  
(Name of Surety) (City/State)

in the amount of \_\_\_\_\_ dollars

(\$ \_\_\_\_\_), being 10% of the amount bid according to the conditions of the Call for Bids and Specifications.

If this proposal should be accepted by the City and the undersigned should fail to executed a satisfactory contract and bond within ten (10) days from the date of notification, then the City may, as stated in the specifications, determine that the undersigned has abandoned the contract and thereupon this proposal shall be null and void, and the certified check, cashier's check or Bidder's bond accompanying this proposal shall be forfeited to and become the property of the City. Otherwise, the certified check, cashier's check or Bidder's bond accompanying this proposal shall be returned to the undersigned.

The full name and residence of all parties and persons interested in this bid as principals are as follows:

NAME	RESIDENCE
_____	_____
_____	_____

The name and business address of the surety company which will furnish the required performance and payments bonds is

\_\_\_\_\_  
(Name of Surety Company) (Number and Street Address) (City / State / Zip)

All General and Specialty Construction Contractors must have a valid Certificate of Registration with the Construction Contractors Board/State Landscape Contractors Board in order to submit a Bid or offer to undertake any Construction Work in the State of Oregon (ORS 701.026/ORS 671.530).

**REGISTRATION NO.** \_\_\_\_\_ **EXPIRATION DATE** \_\_\_\_\_

The undersigned Bidder has heretofore completed the following work of a similar nature to that contemplated.

JOB	LOCATION	DATE

The undersigned Bidder acknowledges that the amount of damages City might suffer by reason of a failure to complete the project by the Completion Date noted above would be difficult or impossible to compute, and therefore agrees that the stipulated amount of liquidated damages set forth above for such delay is a fair and reasonable measure of damages, and therefore Bidder agrees that it will not contest such sum as being other than a true measure of damages in the event of a failure to complete the project by the stipulated Completion Date. Bidder hereby declares and agrees:

- (1) that this is a local public works project subject to the state prevailing rates of wage under ORS 279C.800 to 279C.870, no bid will be considered without statement by the bidder that the bidder will comply with ORS 279C.838 or 279C.840;
- (2) that Bidder is \_\_\_\_\_ is not \_\_\_\_\_ a Resident of Oregon Bidder, as defined by ORS 279A.120. "Resident Bidder" means a Bidder that has paid unemployment taxes or income taxes in this state during the 12-calendar months immediately preceding submission of the bid, has a business address in this state, and has stated in the bid whether the Bidder is a "Resident Bidder;"
- (3) that City of Sherwood may reject a bid that does not comply with prescribed public contracting procedures and requirements, including the requirement to demonstrate the bidder's responsibility under ORS 279C.375(3)(b), and the City of Sherwood may reject for good cause all bids after finding that doing so is in the public interest;
- (4) that no Bid will be considered unless the Bidder is registered with the Construction Contractors Board as required by OAR 137-049-230.
- (5) that where asbestos abatement is required the abatement shall be done by Department of Environmental Quality licensed contractor (ORS 468A.720) and the abatement shall be performed in conformity with DEQ and OSHA regulations and other standards related to work place safety;
- (6) that Bidder shall comply with and cause its subcontractors to comply with all applicable provisions of federal, state and local statutes, ordinances, rules and regulations;
- (7) that each Bidder must provide certification of non-discrimination in obtaining required subcontractors in accordance with ORS 279A.110(4).
- (8) that Bidder must also possess either a Metro license or a City of Sherwood business license at the time of construction.
- (9) that all principal individuals in your organization assigned to the project (superintendent, project manager, and/or lead on-site contact) shall be listed on the Bidder

Responsibility Form submitted to the City. Any personnel changes during the Project must be preceded by the submittal of the new individual's experience, and written acceptance by the City, as required on the Bidder Responsibility Form.

This bid is incomplete and shall not be considered unless there is attached hereto a signed and dated complete original of each of the following: Bid Statement, Bid Schedule, First-Tier Subcontractor Disclosure Form, a Certified Check, Cashier's Check or Bid Bond, Certification of Non-collusion, Certification of Compliance with ORS 279C.840, Certification of Asbestos Abatement, Certification of Non-Discrimination, Customer Service Acknowledgement, Prequalification Acknowledgment, Bidder Responsibility Form and all applicable Addenda.

Submitted By:  
Name of Bidder: \_\_\_\_\_  
Signature of  
Authorized Agent: \_\_\_\_\_  
Title: \_\_\_\_\_  
Business Address of  
Bidder: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Date: \_\_\_\_\_

**BID SCHEDULE  
 SHERWOOD FESTIVAL PLAZA**

Item No.	Spec Section	Description	Unit	Quantity	Unit Price	Unit Total Cost
1	00210	Mobilization	LS	1		
2	00220	Accommodations for Public Traffic	LS	1		
3	00280	Erosion and Sediment Control	LS	1		
4	044300	Stone Seat Walls	LF	156		
5	044300	Freestanding Stone Walls	LF	20		
6	260000	Electrical Work	LS	1		
7	311000	Site Clearing	LS	1		
8	312000	Earth Moving	LS	1		
9	321313	Vehicular Concrete Paving	SF	4,792		
10	321313	Concrete Curb	LF	312		
11	321313	Concrete Brick Subslab	SF	1,810		
12	321313	Exposed Aggregate Concrete Paving	SF	1,310		
13	321419	Brick Paving	SF	1,810		
14	321723	Pavement Marking	LS	1		
15	328400	Irrigation	LS	1		
16	329119	Soil Preparation	CF	5,358		
17	329300	Trees Shrubs and Groundcover	LS	1		
18	329400	Site Furnishings	LS	1		
19	329400	Decorative Screen, including concrete wall	LS	1		
20	329400	Canopy, Poles, and Pole Foundations	LS	1		
21	331100	Water Distribution	LS	1		
22	334100	Storm Utility Drainage	LS	1		
<b>TOTAL BID</b>						

**BID WRITTEN IN WORDS:**

\_\_\_\_\_ DOLLARS AND \_\_\_\_\_ CENTS

In the event of discrepancy, the amount in words shall dictate.

In accordance with the provisions of the Oregon Standard Specifications for Construction, 2021 Edition as modified by these bid documents, the undersigned Bidder submits the following Bid Schedule with the understanding that City reserves the right to increase, decrease, or completely eliminate quantities as set forth in 00120.20. Also, the Bidder offers to do the work, whether quantities area changed (increased or decreased) in accordance with 00195.20, or not changed, at the unit rate price stated in the following Bid Schedule:

\_\_\_\_\_  
Signature of Authorized Agent

\_\_\_\_\_  
Company Name

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

\_\_\_\_\_  
Date

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**FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM**  
(OAR 137-049-0360)

**Bids which are submitted by Bid Closing, but for which a required disclosure submittal has not been made by the specified Disclosure Deadline, are not responsive and shall not be considered for Contract award.**

PROJECT NAME: **Festival Plaza**

BID CLOSING: Date: **September 20, 2022** Time: **2:00 PM (Local Time)**  
FIRST-TIER DISCLOSURE Date: **September 20, 2022** Time: **4:00 PM (Local Time)**

Deliver Form To (Agency): City of Sherwood

Designated Recipient (Person): Kristen Switzer Phone #: 503-625-4210

Agency's Address: City of Sherwood, City Hall  
22560 SW Pine Street  
Sherwood, OR 97140

**INSTRUCTIONS:**

The contracting agency will insert "N/A" above if the contract value is not anticipated to exceed \$100,000. Otherwise this form must be submitted either with the bid or within two (2) working hours after the advertised bid closing date and time; but no later than the DISCLOSURE DEADLINE stated above.

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 bid number and project name clearly marked, at the location indicated by the specified disclosure deadline. See "Instructions to Bidders".

List below the Name, Category of Work and Dollar Value for each first-tier subcontractor that would be furnishing labor, or labor and material, for which disclosure is required. Enter the word "NONE" if there are no first-tier subcontractors subject to disclosure. ATTACH ADDITIONAL SHEETS IF NECESSARY.

**BIDDER DISCLOSURE:**

	SUBCONTRACTOR NAME	CATEGORY OF WORK	DOLLAR VALUE
1			
2			
3			
4			
5			

The above listed first-tier subcontractor(s) are providing labor, or labor and material, with a Dollar Value equal to or greater than:

- a) 5% of the total Contract Price, but at least \$15,000. [If the Dollar Value is less than \$15,000 do not list the subcontractor above] or;
- b) \$350,000 regardless of the percentage of the total Contract Price.

Form Submitted By (Bidder Name): \_\_\_\_\_

Contact Name: \_\_\_\_\_ Phone #: \_\_\_\_\_

**BID BOND**

We, \_\_\_\_\_, as "Principal,"  
(Name of Principal)

and \_\_\_\_\_, an \_\_\_\_\_ Corporation,  
(Name of Surety)

authorized to transact Surety business in Oregon, as "Surety," hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns to pay unto the City of Sherwood ("Obligee") the sum of (\$ \_\_\_\_\_)

\_\_\_\_\_ dollars.

WHEREAS, the condition of the obligation of this bond is that Principal has submitted its proposal or bid to an agency of the Obligee in response to Obligee's procurement document for the project identified as:

**Sherwood Festival Plaza**

which proposal or bid is made a part of this bond by reference, and Principal is required to furnish bid security in an amount equal to ten (10%) percent of the total amount of the bid pursuant to the procurement document and ORS 279C.365(4) for competitive bidding or 279C.400(5) for competitive proposals.

NOW, THEREFORE, if the proposal or bid submitted by Principal is accepted, and if a contract pursuant to the proposal or bid is awarded to Principal, and if Principal enters into and executes such contract within the time specified in the procurement document and executes and delivers to Obligee its good and sufficient performance and payment bonds required by Obligee, as well as any required proof of insurance, within the time fixed by Obligee, then this obligation shall be void; otherwise, it shall remain in full force and effect.

IN WITNESS WHEREOF, we have caused this instrument to be executed and sealed by our duly authorized legal representatives this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

**PRINCIPAL:** \_\_\_\_\_ **SURETY:** \_\_\_\_\_

By \_\_\_\_\_  
Signature

BY ATTORNEY-IN-FACT:

\_\_\_\_\_  
Official Capacity

\_\_\_\_\_  
Name

Attest: \_\_\_\_\_  
Corporation Secretary

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
Phone Fax



**CERTIFICATION OF NON-COLLUSION**

**PROJECT NAME: SHERWOOD FESTIVAL PLAZA**

**TO: CITY OF SHERWOOD, A MUNICIPAL CORPORATION OF THE STATE OF OREGON**

**STATE OF OREGON            )  
  ) SS  
COUNTY OF WASHINGTON)**

\_\_\_\_\_  
**(Bidder's Firm Name)**

I, the undersigned, as [circle one]:

- sole owner
- a partner
- officer of the foregoing corporation
- agent of the above bidder

being first duly sworn on oath, depose and say:

That the attached bid has been arrived at by the bidder, independently, and has been submitted without collusion with, and without any agreement, understanding or planned course of action with, any other contractor, bidder, or vendor on materials, supplies, equipment or services, described in the invitation to bid, designed to limit independent bidding or competition.

The contents of the bid herein presented and made have not been communicated by the bidder or (his) (their) or (its) employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid, and will not be communicated to any such person prior to the official opening of the bid.

I have fully informed myself regarding the accuracy of the foregoing statements, and the same are made by me based on my personal information.

I have read and understood the Bid Booklet and the Specifications for the attached Bid.

Signature \_\_\_\_\_

Title \_\_\_\_\_

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

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public for Oregon

**CERTIFICATION OF COMPLIANCE WITH ORS 279C.840  
(PREVAILING WAGES)**

FOR

**Project Name: Sherwood Festival Plaza**

The undersigned confirms that the provisions of ORS 279C.840 shall be complied with for personnel working on this project.

A copy of the Prevailing Wage Rates is available on-line at the Bureau of Labor and Industries website at:

<https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx>

When a contractor or subcontractor is a party to a statewide collective bargaining agreement in effect with any labor organization, the rate of wages provided for in such agreement shall be considered to be the prevailing rate of wage to be paid to the workers on this project.

Date \_\_\_\_\_  
Signature of Bidder \_\_\_\_\_  
Title \_\_\_\_\_  
Business Name \_\_\_\_\_

## CERTIFICATION OF ASBESTOS ABATEMENT

FOR

**Project Name: Sherwood Festival Plaza**

The undersigned confirms that if asbestos abatement is required the abatement shall be done by Department of Environmental Quality licensed contractor (ORS 468A.720) and the abatement shall be performed in conformity with DEQ and OSHA regulations and other standards related to work place safety.

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

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

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

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

**CERTIFICATION OF NON-DISCRIMINATION  
[ORS 279A.110(4) & OAR 137-049-0440(3)]**

FOR

**Project Name: Sherwood Festival Plaza**

The undersigned certifies that it has not discriminated against minority, women or emerging small business enterprises in the obtaining of subcontracts for this project and shall not discriminate against minority, women or emerging small business enterprises in awarding of subcontracts for this project.

Date \_\_\_\_\_

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

Title \_\_\_\_\_

Business Name \_\_\_\_\_

## CUSTOMER SERVICE ACKNOWLEDGMENT

FOR

**Project Name: Sherwood Festival Plaza**

Bid Closing: Date: \_\_\_\_\_ Time: \_\_\_\_\_ AM\_\_ PM\_\_

Note: This form is part of the inquiry concerning bidder responsibility and must be submitted with the other proposal forms as specified in Section 00120.40(h) of Division Four – Special Provisions.”

Bidder, by his/her signature below, hereby signifies that s/he has read and understands the construction specifications, including but not limited to the following sections of Division Four – Special Provisions, relating to customer service. These sections include, but are not limited to, the sections listed below:

- Section 00160, Source of Materials
- Section 00180.40, Limitation of Operations
- Section 00225, Work Zone Traffic Control

Bidder further acknowledges that s/he understands their terms, fully acknowledges their importance to successful completion of the project, and agrees to be bound thereby if awarded this contract. Bidder further assures the City that, if awarded this contract, s/he will promptly, efficiently and courteously carry out his/her responsibilities under the aforementioned specifications.

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Date

## BIDDER RESPONSIBILITY FORM

FOR

**Project Name: Sherwood Festival Plaza**

All information shall be typed or printed legibly

Note: Information provided in this form is part of the inquiry concerning bidder responsibility, and this form must be submitted with the other proposal forms as specified in Section 00120.40(g) of DIVISION FOUR - SPECIAL PROVISIONS."

### Part A

Submitted by: \_\_\_\_\_  
Signature Date

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

Name of Firm: \_\_\_\_\_

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

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

Fax: \_\_\_\_\_

1. How many years has your organization done business as a General Contractor under the present business name? \_\_\_\_\_

How many years under (a) different name(s)? \_\_\_\_\_

List different names, if any, and dates of operation:

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

2. How many years has your organization been in business under its present business name?

\_\_\_\_\_

How many years under (a) different name(s)? \_\_\_\_\_

List different names, if any, and dates of operation:

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

**Part B** – Complete the appropriate Portion Below

1. Bidder is an **INDIVIDUAL**:

Name of individual \_\_\_\_\_

Doing Business as \_\_\_\_\_

2. Bidder is a **CORPORATION**:

Name of Corporation as registered with the state of Oregon:

\_\_\_\_\_

Date of Incorporation: \_\_\_\_\_ State of Incorporation: \_\_\_\_\_

Name of President \_\_\_\_\_

Name of Secretary \_\_\_\_\_

Name of Treasurer \_\_\_\_\_

Name of Manager \_\_\_\_\_

3. Bidder is a **LIMITED PARTNERSHIP**:

Name of Limited Partnership as registered with the state of Oregon:

\_\_\_\_\_

Name of persons or parties composing the Limited Partnership (indicate whether an individual or corporation):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Bidder is a **GENERAL PARTNERSHIP**:

Name of General Partnership as registered with the state of Oregon:

\_\_\_\_\_

Name of persons or parties composing the General Partnership (indicate whether an individual or corporation):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5. Bidder is a **JOINT VENTURE**:

Name of Joint Venture as registered with the state of Oregon:

\_\_\_\_\_

Name of persons or parties composing the Joint Venture (indicate whether an individual or corporation):

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

**Part C**

1. What percent of the work do you normally perform with you own forces? \_\_\_\_\_

List Trades directly employed by you:

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

2. List the Construction Equipment you own or lease long-term:

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

3. Have you ever failed to complete any work awarded to you? \_\_\_\_\_  
(Answer yes or no)

If so, indicate when, where, and why.

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

4. A. Have you ever defaulted on a contract? \_\_\_\_\_ If so, indicate when, where and why.  
(Answer yes or no)

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

B. What result: Lawsuit? Judgment? Arbitration? Settled? Other?  
*Circle the one that most applies*

If other, explain: \_\_\_\_\_



\_\_\_\_\_

C. Are there currently any unpaid judgments against the business or any of its principals?

\_\_\_\_\_  
(Answer yes or no)

If so, describe: \_\_\_\_\_

\_\_\_\_\_

5. Has any Officer or Partner of your organization ever been an Officer or Partner of another Organization that failed to complete a construction contract? \_\_\_\_\_

(Answer yes or no)

If so, describe circumstances below:

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

6. List major construction projects your organization currently has under contract as the general contractor:

Project name \_\_\_\_\_

City / Contact Name & phone #: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contract Amount / Contract Date: \_\_\_\_\_

% Complete / Schedule Complete: \_\_\_\_\_

Project name \_\_\_\_\_

City / Contact Name & phone #: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contract Amount / Contract Date: \_\_\_\_\_

% Complete / Schedule Complete: \_\_\_\_\_

Project name \_\_\_\_\_

City / Contact Name & phone #: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contract Amount / Contract Date: \_\_\_\_\_

% Complete / Schedule Complete: \_\_\_\_\_

**Add additional sheets listing projects as required**

7. List major construction projects, similar to the one being bid, that your organization completed in the past 5 years as the general contractor if not shown on the State of Oregon Department of Administrative Services' Contractor's Prequalification Application:

Project name \_\_\_\_\_  
City / Contact Name & phone #: \_\_\_\_\_  
Architect/Engineer: \_\_\_\_\_  
Contract Amount / Date Awarded: \_\_\_\_\_  
Percent Completed with own forces: \_\_\_\_\_

Project name \_\_\_\_\_  
City / Contact Name & phone #: \_\_\_\_\_  
Architect/Engineer: \_\_\_\_\_  
Contract Amount / Date Awarded: \_\_\_\_\_  
Percent Completed with own forces: \_\_\_\_\_

Project name \_\_\_\_\_  
City / Contact Name & phone #: \_\_\_\_\_  
Architect/Engineer: \_\_\_\_\_  
Contract Amount / Date Awarded: \_\_\_\_\_  
Percent Completed with own forces: \_\_\_\_\_

***Add additional sheets listing projects as required***

8. List the construction experience of the principal individuals in your Organization; which ones will be assigned to this project (including the percentage of their time to be assigned to this project):

Individual's Name \_\_\_\_\_  
Construction experience - years: \_\_\_\_\_  
Present position & years with organization: \_\_\_\_\_  
Percentage of individual's time to be assigned to project: \_\_\_\_\_

Individual's Name \_\_\_\_\_

Construction experience - years: \_\_\_\_\_

Present position & years with organization: \_\_\_\_\_

Percentage of individual's time to be assigned to project: \_\_\_\_\_

Individual's Name \_\_\_\_\_

Construction experience - years: \_\_\_\_\_

Present position & years with organization: \_\_\_\_\_

Percentage of individual's time to be assigned to project: \_\_\_\_\_

A. Have any of the principal individuals in your Organization been convicted under state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, or receiving stolen property? \_\_\_\_\_ If so, describe circumstances below:

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

B. Have any of the principal individuals in your Organization been the subject to a civil judgment for fraud? \_\_\_\_\_ If so, describe circumstances below:

*(Answer yes or no)*

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

9. Bank References:

_____	_____
_____	_____
_____	_____

10. Trade References:

_____	_____
_____	_____
_____	_____

11. List names of Bonding and Insurance Companies, name and address of agents, and maximum bonding capacity.

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

What portion remains on this Bonding Capacity at the time of submittal of the Bid?

\_\_\_\_\_

12. The bidder agrees to furnish, upon request by the City, within 5-days after the Bid Opening, a current Statement of Financial Conditions, including Contractor's latest regular dated financial statement or balance sheet which must contain the following items:

- Current assets: (cash, joint venture accounts, accounts receivable, notes receivable, accrued interest on notes, deposits, and materials and prepaid expenses), net fixed assets and other assets.
- Current liabilities: (Accounts payable, notes payable, accrued interest on notes, provisions for income taxes, advances received from owners, accrued salaries accrued payroll taxes), other liabilities, and capital (capital stock, authorized and outstanding shares per values, earned surplus).

Date of statement or balance sheet: \_\_\_\_\_

Name of firm preparing statement: \_\_\_\_\_

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

**Bidder's Initials:** \_\_\_\_\_

**Bid Closing: Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_ **AM** \_\_\_ **PM** \_\_\_



## Sherwood Festival Plaza

DATE

**ADDENDUM NO. 1**

### Addition/Change to the Contract Documents

The work provided for in this addendum shall become a part of the drawings and specifications for this project.

- 1.
- 2.

This ADDENDUM shall be signed and attached to the Bidder's Proposal and shall subsequently become part of the Contract Documents.

Company Name	
Contractor Name	
Contractor Signature	
Date	

# **Division Two**

## **Contract Forms**

**Sherwood Urban Renewal Agency**

22560 SW Pine St.  
Sherwood, OR 97140  
503-925-2308

**CONTRACT FOR CONSTRUCTION SERVICES**

**PROJECT NAME:** Sherwood Festival Plaza

**CONTRACT PARTIES:** Sherwood Urban Renewal Agency [hereafter called URA] and [hereafter called Contractor]

**URA PROJECT MANAGER:**

**ACCOUNT #:**      **FUND #:**      **DEPT:**      **JOB #:**

**VENDOR #:**

**SCOPE of WORK:** Attached as Exhibit A       **FEE SCHEDULE:** Attached as Exhibit B

**SCHEDULE of WORK:** effective date: \_\_\_\_\_ expiration date: \_\_\_\_\_

**PAYMENT:** URA agrees to pay Contractor based on \_\_\_\_\_ \$ \_\_\_\_\_ for the Scope of Work.

A performance bond and a payment bond, each in the amount of 100% of the maximum contract payment amount set forth immediately above, and a maintenance bond effective for two years from the date of project completion in the amount of 10% of the maximum contract payment amount set forth immediately above,  are  are not required for this Contract.

This Contract  is  is not subject to State of Oregon prevailing wage requirements. Workers must be paid not less than the applicable prevailing wage rates in accordance with ORS 279C.838 and 279C.840. Federal funds  are  are not being used for this project. If federal funds are being used, workers must be paid not less than the higher of the applicable state or federal rate.

**CONTRACTOR DATA, REGISTRATION, and SIGNATURE**

**CONTRACTOR FIRM:** \_\_\_\_\_ **CCB #:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**VOICE:** \_\_\_\_\_ **FAX:** \_\_\_\_\_

**CONTACT:** \_\_\_\_\_ **TITLE:** \_\_\_\_\_

I, the undersigned, agree to perform the work outlined in this Contract in accordance with the terms and conditions listed on pages 2-7 and made part of this Contract, and in accordance with the exhibits attached and made part of this Contract. I certify, under penalty of perjury, that I/my business is not in violation of any Oregon tax laws; and certify that I am an independent contractor as defined in ORS 670.600.

**CONTRACTOR:** \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

**URA APPROVALS (consult the URA's Delegation of Contracting Authority policy for requirements)**

**URA ENGINEER:** \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

**DEPARTMENT DIRECTOR:** \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

**FINANCE DIRECTOR:** \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

**URA MANAGER:** \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

**URA ATTORNEY**  
*Approved as to Form:* \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

# **STANDARD CONTRACT PROVISIONS**

*(These provisions not to be altered without approval of the URA Attorney.)*

## **1. Access to Records**

The Contractor shall maintain, and the Sherwood Urban Renewal Agency ("URA") and its duly authorized representatives shall have access during normal business hours to the books, documents, papers, and records of the Contractor which are directly pertinent to the specific Contract for the purpose of making audit, examination, excerpts, and transcripts for a period of three years after final payment. Copies of applicable records shall be made available upon reasonable request. Payment for cost of copies is reimbursable by the URA.

## **2. Audits**

(a) The URA, either directly or through a designated representative, at URA's expense except as provided in subsection 2(b), may conduct financial and performance audits of the billings and services specified in this Contract at any time in the course of the Contract and during the three (3) year period established by section 1, **Access to Records**. Audits will be conducted in accordance with generally accepted auditing standards as promulgated in Government Auditing Standards by the Comptroller General of the United States General Accounting Office.

(b) If an audit discloses that payments to the Contractor were in excess of the amount to which the Contractor was entitled, then the Contractor shall repay the amount of the excess to the URA. If the payments to the Contractor were in excess of the amount to which the Contractor was entitled by five percent (5%) or more, then Contractor shall additionally repay to the URA the reasonable costs of the audit performed under subsection 2(a).

(c) If any audit shows performance of services is not efficient in accordance with Government Auditing Standards, or that the program is not effective in accordance with Government Auditing Standards, the URA may pursue remedies provided under section 5, **Early Termination of Contract** and section 7, **Remedies**.

## **3. Effective Date and Duration**

The passage of the Contract expiration date, or early termination of this Contract, shall not extinguish, prejudice, or limit either party's right to enforce this Contract with respect to any default or defect in performance that has not been cured.

## **4. Payments**

URA agrees to pay Contractor based on the fee schedule in Exhibit B, attached hereto and incorporated herein by reference, in a total sum not to exceed the amount indicated on the cover page of this Contract, for the scope of work identified in Exhibit A, attached hereto and incorporated herein by reference. Contractor shall submit detailed written invoices to URA for work performed, referencing the work performed and the fee schedule in Exhibit B, at a frequency not to exceed one invoice per calendar month, and no later than sixty (60) calendar days after performance of the work referenced in the invoice. Within thirty (30) calendar days of receipt of each invoice, URA shall submit payment to Contractor or shall notify Contractor in writing of any dispute with regard to such invoice.

## **5. Early Termination of Contract**

(a) The URA and the Contractor, by mutual written agreement, may terminate this Contract at any time.

(b) The URA, by written notice to the Contractor, may terminate this Contract for any reason deemed appropriate in its sole discretion, such termination to be effective thirty (30) calendar days after the effective date of such notice or at such later date as specified in such notice.

(c) URA may terminate this Contract by written notice to Contractor, such termination to be effective immediately upon the effective date of such notice or at such later date as specified in such notice, upon the occurrence of any of the following events:

(1) URA fails to receive funding, or appropriations, limitations, or other expenditure authority at levels sufficient to pay for Contractor's work;

(2) Federal or state laws, regulations, or guidelines are modified or interpreted in such a way that either the work under this Contract is prohibited or URA is prohibited from paying for such work from the planned funding source;

(3) Contractor no longer holds any license or certificate that is required to perform the work, or any license or certificate required by statute, rule, regulation, or other law to be held by the Contractor to provide the services required by this Contract is for any reason denied, revoked, suspended, not renewed, or changed in such a way that Contractor no longer meets requirements for such license or certificate.

(4) URA determines, in its sole discretion, that Contractor has violated section 25, **Information Technology**.

(d) Either the URA or the Contractor may terminate this Contract in the event of a breach of the Contract by the other. Prior to such termination, however, the party seeking the termination shall give to the other party written notice of the breach and of the party's intent to terminate. If the party has not entirely cured the breach within fifteen (15) calendar days of the notice, then the party giving the notice may terminate the Contract at any time thereafter by giving a written notice of termination.

(e) Upon receiving a written notice of termination of this Contract, Contractor shall immediately cease all activities under this Contract, unless URA expressly directs otherwise in such notice. Upon termination of this Contract, Contractor shall deliver to URA all documents, information, works in progress, and other property that are or would be deliverables had the Contract been completed.

## **6. Payment on Early Termination**

(a) In the event of termination under subsection 5(a) or 5(b), **Early Termination of Contract** hereof, the URA shall pay the Contractor for work performed in accordance with the Contract prior to the termination date.



- (b) In the event of termination under subsection 5(d), **Early Termination of Contract** hereof, by the Contractor due to a breach by the URA, the URA shall pay the Contractor as provided in subsection (a) of this section.
- (c) In the event of termination under subsection 5(d), **Early Termination of Contract** hereof, by the URA due to a breach by the Contractor, the URA shall pay the Contractor as provided in subsection (a) of this section, subject to set off of excess costs, as provided for in section 7(a), **Remedies**.
- (d) In the event of early termination, all of the Contractor's work product will become and remain property of the URA.

**7. Remedies**

- (a) In the event of termination under subsection 5(d), **Early Termination of Contract**, hereof, by the URA due to a breach by the Contractor, the URA may complete the work itself, by contract with another contractor, or by a combination thereof. In the event the cost of completing the work exceeds the remaining unpaid balance of the total compensation provided under this Contract, then the Contractor shall pay to the URA the amount of the excess.
- (b) The remedies provided to the URA under section 5, **Early Termination of Contract** and section 7, **Remedies** for a breach by the Contractor shall not be exclusive. The URA also shall be entitled to any other equitable and legal remedies that are available.
- (c) In the event of breach of this Contract by the URA, the Contractor's remedy shall be limited to termination of the Contract and receipt of payment as provided in section 5(d), **Early Termination of Contract** and section 6(b), **Payment on Early Termination** hereof.

**8. Subcontracts and Assignment**

Contractor shall not subcontract, assign or transfer any of the work scheduled under this Contract, without the prior written consent of the URA. Notwithstanding URA approval of a sub-contractor, the Contractor shall remain obligated for full performance hereunder, and the URA shall incur no obligation other than its obligations to the Contractor hereunder. The Contractor agrees that if sub-contractors are employed in the performance of this Contract, the Contractor and its sub-contractors are subject to the requirements and sanctions of ORS Chapter 656, Workers' Compensation. Contractor further agrees that Contractor will be solely responsible for ensuring any sub-contractors fully comply with the terms of this Contract, and that Contractor will be solely liable for actions or omissions of sub-contractors under this Contract. URA reserves the right to review the subcontractors proposed, and the Contractor shall not retain a subcontractor to which URA has a reasonable objection.

**9. Compliance with Applicable Law**

In connection with its activities under this Contract, Contractor shall use the standard of care in its profession to comply with all applicable federal, state and local laws and regulations.

**10. Indemnity - Standard of Care**

If Contractor's services involve engineering or planning consulting, the standard of care applicable to Contractor's service will be the degree of skill and diligence normally employed by professional engineers or planning contractors performing the same or similar services at the time such services are performed. Contractor will re-perform any services not meeting this standard without additional compensation. URA has relied upon the professional ability and training of Contractor as a material inducement to enter into this Contract. Contractor represents that all of its work will be performed in accordance with generally accepted professional practices and standards as well as the requirements of applicable federal, state, and local laws, it being understood that acceptance of Contractor's work by URA will not operate as a waiver or release.

Contractor acknowledges responsibility for liability arising out of the performance of this Contract and shall defend, indemnify, and hold harmless URA and its officers, agents, volunteers, and employees, and the City of Sherwood and its officers, agents, volunteers, and employees, against any and all liability, settlements, loss, damage, costs, and expenses (including attorney's fees and witness costs at both trial and on appeal, whether or not a trial or appeal ever takes place, including any hearing before federal or state administrative agencies) arising from or in connection with any action, suit, demand, or claim resulting or allegedly resulting from, attributable in whole or in part to, or in any way connected with Contractor's and Contractor's officers', agents', volunteers', and employees' acts, omissions, activities, or services in the course of performing this Contract, to the fullest extent permitted by law, and except to the extent otherwise void or unenforceable under ORS 30.140. Contractor's activities are deemed to include those of subcontractors. The URA and the City may, at any time at their respective elections, assume their respective own defenses and settlements in the event that they respectively determine that Contractor is not adequately defending the URA's or City's interests, or that an important governmental principle is at issue, or that it is in the best interests of the URA or City to do so. If any aspect of this indemnity is found to be illegal or invalid for any reason whatsoever, such illegality or invalidity does not affect the validity of the remainder of this indemnification.

This section will survive the termination or revocation of this Contract, regardless of cause.

**11. Insurance**

Contractor shall obtain at its expense, and maintain for the term of this contract, occurrence form commercial general liability and commercial automobile liability insurance, including coverage for all owned, hired, and non-owned automobiles, for the protection of Contractor, the URA, its Board Members, officers, agents, volunteers, and employees, and the City of Sherwood, its Councilors, officers, agents, volunteers, and employees. Such coverage shall be primary and non-contributory. Coverage shall include personal injury, bodily injury, including death, and broad form property damage, including loss of use of property, occurring in the course of or in any way related to Contractor's operations, in an amount not less than \$2,000,000 combined single limit per occurrence and \$2,000,000 aggregate. Such insurance shall name the URA and City as an additional insured. Contractor, its subcontractors, if any, and all employers providing work, labor, or materials under this Contract, who are

subject employers under the Oregon Workers' Compensation Law, shall comply with ORS 656.017, which requires them to provide workers compensation coverage that satisfies Oregon law for all their subject workers. Out-of-state employers must provide workers' compensation coverage for their workers that complies with ORS 656.126. Employers' Liability Insurance with coverage limits of not less than \$1,000,000 each accident shall be included. Contractor shall obtain, at Contractor's expense, and keep in effect until final acceptance by the URA, "all risk" Builder's Risk Insurance (including earthquake and flood) covering the real and personal property of others in the care, custody, and control of the Contractor. Coverage shall include theft and damage to building interiors, exterior, in transit and offsite storage. The minimum amount of coverage to be carried shall be equal to the maximum compensation under this Contract, as specified on the cover page of this Contract. Contractor shall be financially responsible for any deductible applied to loss. This insurance shall include the URA, the Contractor, and its sub-contractors as their interests may appear. All policies will provide for not less than thirty (30) calendar days' written notice to the URA before they may be canceled. Prior to commencing work under this Contract, and thereafter upon request, Contractor shall furnish the URA certificates of insurance and necessary endorsements evidencing the effective dates, amounts, and types of insurance required by this Contract.

**12. Ownership of Work Product**

All work products of the Contractor, which result from this Contract, are the exclusive property of the URA; provided, that Contractor is hereby granted an irrevocable, royalty free, worldwide, perpetual license to use, reproduce, copy, distribute and make derivatives of its work product, regardless of whether Contractor has resigned, this Contract has been terminated, Contractor's scope of services has been modified, or Contractor's services under this Contract have been completed.

**13. Nondiscrimination**

Contractor agrees to comply with all applicable requirements of federal and state civil rights and rehabilitation statutes, rules, and regulations. Contractor also shall comply with the Americans With Disabilities Act of 1990 (Pub L. No. 101-336) including Title II of that Act, ORS 659A.142, and all regulations and administrative rules established pursuant to those laws.

**14. Successors in Interest**

The provisions of this Contract shall be binding upon and shall inure to the benefit of the parties hereto, and their respective successors and approved assigns.

**15. Severability**

The parties agree that if any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular term or provision held to be invalid.

**16. Waiver**

The failure of the URA to enforce any provision of this Contract shall not constitute a waiver by the URA of that or any other provision.

**17. Errors**

The Contractor shall perform such additional work as may be necessary to correct errors in the work required under this Contract without undue delays and without additional cost.

**18. Governing Law; Forum**

The provisions of this Contract shall be construed in accordance with the provisions of the laws of the State of Oregon, without regard to conflicts of law principles. Any action or suits involving any question arising under this Contract must be brought in the appropriate court in Washington County, Oregon or, only if there is no Oregon state court jurisdiction, the United States District Court for the District of Oregon, and each party hereby submits to the exclusive jurisdiction of those courts for purposes of any such proceeding. Any trial will be to the court without a jury.

**19. Amendments**

The URA and the Contractor may amend this Contract at any time only by written amendment executed by the URA and the Contractor.

**20. License**

Prior to beginning work under this Contract, the Contractor shall provide a Construction Contractor's Board (CCB) license number in the space provided on page one of this Contract.

**21. Payment to Vendors and Sub-contractors**

Contractor must promptly pay any persons supplying services, material, or equipment to Contractor in its performance of the work under this Contract. The Contractor shall not take or fail to take any action in a manner that causes the URA or any materials that the Contractor provides hereunder to be subject to any claim or lien of any person without the URA's prior written consent.

**22. Exhibits**

Each document that is attached to this Contract as an Exhibit shall be labeled with an Exhibit letter and listed below. Provisions and covenants contained in Exhibits are hereby incorporated by reference and shall become a part of this Contract as if fully set forth herein. If any item in an Exhibit contradicts this Contract, this Contract shall take precedence over the conflicting item in the Exhibit.

## List of Exhibits

Exhibit A – Scope of Work/Contract Drawings

Exhibit B – Fee Schedule

### 23. Merger Clause

This Contract and attached exhibits constitutes the entire agreement between the parties. No waiver, consent, modification, or change of terms of this Contract shall bind either party unless in writing and signed by both parties. Such waiver, consent, modification, or change, if made, shall be effective only in specific instances and for the specific purpose given. There are no understandings, agreements, or representations, oral or written, not specified herein regarding this Contract. Contractor, by the signature of its authorized representative, hereby acknowledges that he or she has read this Contract, understands it and agrees to be bound by its terms and conditions.

### 24. Mediation

- (a) Should any dispute arise between the parties to this Contract it is agreed that such dispute will be submitted to a mediator prior to any litigation and the parties hereby expressly agree that no claim or dispute arising under the terms of this Contract shall be resolved other than first through mediation and only in the event said mediation efforts fail, through litigation.
- (b) The parties shall exercise good faith efforts to select a mediator who shall be compensated equally by both parties. Mediation will be conducted in Portland, Oregon, unless both parties agree in writing otherwise. Both parties agree to exercise good faith efforts to resolve disputes covered by this section through this mediation process. If a party requests mediation and the other party fails to respond within ten (10) calendar days, or if the parties fail to agree on a mediator within ten (10) calendar days, a mediator shall be appointed by the presiding judge of the Washington County Circuit Court upon the request of either party. The parties shall have any rights at law or in equity with respect to any dispute not covered by this Section.

### 25. Information Technology

If Contractor access to URA's information technology systems is necessary for the performance of this Contract:

- (a) Contractor agrees to sign and be bound by the terms of the URA's then-current Contractor Security Policy, as it may be amended by URA from time to time during the course of this Contract.
- (b) Contractor shall use the standard of care in its profession to safeguard any and all usernames, passwords, and other confidential information relating to accessing said systems; will limit access to such information to the smallest number of Contractor's employees and/or subcontractors as is reasonably practical; and will provide URA with the names of all such employees and/or subcontractors who will be provided such information;
- (c) Contractor will not attempt to access any URA information technology resources beyond those necessary for performance of this Contract; and
- (d) Contractor will be solely liable for any damages to URA's information technology systems, data breaches, and any other losses or damages relating to Contractor's access to URA's information technology systems.

### 26. Notice

Any notice required to be provided to URA under this Contract shall be provided to the URA Project Manager specified on the cover page of this Contract at the address for the URA specified on the cover page of this Contract. Any notices required to be provided to Contractor under this Contract shall be provided to the Contractor Contact specified on the cover page of this Contract at the address for the Contractor specified on the cover page of this Contract. Notices shall be made by personal service, in which case they are effective on the date of service, or by certified mail, in which case they are effective on the date of delivery, or if delivery is refused, upon the date of delivery refusal. Either party may alter the person designated for receipt of notices under this Contract by written notice to the other party.

### 27. Miscellaneous Terms

- (a) Contractor Identification. Contractor shall furnish Contractor's employer identification number to URA, as designated by the Internal Revenue Service, or, if the Internal Revenue Service has designated no employer identification number, Contractor's Social Security number.
- (b) Duty to Inform. Contractor shall give prompt written notice to URA if, at any time during the performance of this Contract, Contractor becomes aware of actual or potential problems, faults, or defects in the project, any nonconformance with the Contract, or with any federal, state, or local law, rule, or regulation, or has any objection to any decision or order made by URA. Any delay or failure on the part of URA to provide a written response to Contractor shall constitute neither agreement with nor acquiescence in Contractor's statement or claim, and shall not constitute a waiver of any of URA's rights.
- (c) Independent Contractor. Contractor is an independent contractor for all purposes and shall be entitled to no compensation other than the compensation expressly provided by this Contract.
- (d) Time is of the Essence. Time is of the essence under this Contract.
- (e) Authority. The parties signing this Contract are authorized to sign and to bind their respective contracting parties to the terms of the Contract.
- (f) Conflict of Interest. Except with URA's prior written consent, Contractor shall not engage in any activity, or accept any employment, interest or contribution that would, or would reasonably appear, to compromise Contractor's professional judgment with respect to this Contract, including, without limitation, concurrent employment on any project in direct competition with the subject of this Contract.
- (g) No Third-Party Beneficiaries. URA and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this Contract gives, is intended to give, or shall be construed to give or provide, any benefit or right, whether directly or indirectly or otherwise, to third persons unless such third persons are individually

identified by name herein and expressly described as intended beneficiaries of the terms of this Contract. The City of Sherwood is an intended beneficiary of the terms of this Contract.

28.

**Statutory Provisions**

- (a) As provided by ORS 279C.505, Contractor shall:
- (1) Make payment promptly, as due, to all persons supplying to Contractor labor or material for the performance of the work provided for in this Contract.
  - (2) Pay all contributions or amounts due the Industrial Accident Fund from the Contractor or subcontractor incurred in the performance of this Contract.
  - (3) 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 material furnished.
  - (4) Pay to the Department of Revenue all sums withheld from employees under ORS 316.167.
  - (5) Demonstrate that an employee drug testing program is in place.
- (b) As provided by ORS 279C.530, Contractor shall promptly, as due, make payment to any person, copartnership, 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 Contractor, of all sums that Contractor agrees to pay for the services and all moneys and sums that Contractor collected or deducted from the wages of employees under any law, contract, or agreement for the purpose of providing or paying for the services. It is a condition of this Contract that all employers working under this Contract are either subject employers that will comply with ORS 656.017 or employers that are exempt under ORS 656.126.
- (c) As provided by ORS 279A.110, Contractor may not discriminate against a subcontractor in the awarding of a subcontract because the subcontractor is a minority, women, or an emerging small business enterprise certified under ORS 200.055 or a business enterprise that is owned or controlled by or that employs a disabled veteran, as defined in ORS 408.225. If Contractor violates this subsection, URA may regard the violation as a breach of contract that permits the URA to: (1) terminate this Contract; or (2) exercise any remedies for breach of contract that are reserved in this Contract.
- (d) As provided by ORS 279C.520:
- i. A person may not be employed for more than ten (10) hours in any one day, or forty (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 contracts for personal services designated under ORS 279C.100, the employee shall be paid at least time and a half pay:
    - (1) For all overtime in excess of eight (8) hours in any one day or forty (40) hours in any one week when the work week is five (5) consecutive days, Monday through Friday; or
    - (2) For all overtime in excess of ten (10) hours in any one day or forty (40) hours in any one week when the work week is four (4) consecutive days, Monday through Friday; and
    - (3) For all work performed on Saturday and on any legal holiday specified in ORS 279C.540.
  - ii. Contractor must give notice in writing to employees who work on this Contract, either at the time of hire or before commencement of work on this Contract, 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.
  - iii. Contractor must comply with ORS 652.220 and shall not unlawfully discriminate against any of Contractor's employees in the payment of wages or other compensation for work of comparable character on the basis of an employee's membership in a protected class. Contractor's compliance with this section constitutes a material element of this Contract and a failure to comply constitutes a breach that entitles URA to terminate this Contract for cause.
  - iv. Contractor may not prohibit any of Contractor's employees from discussing the employee's rate of wage, salary, benefits, or other compensation with another employee or another person. Contractor may not retaliate against an employee who discusses the employee's rate of wage, salary, benefits, or other compensation with another employee or another person.
- (e) Contractor must give notice in writing to employees who work on this Contract, either at the time of hire or before commencement of work on this Contract, 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.
- (f) As provided by ORS 279C.510, if this is:
- (1) A contract for demolition, the Contractor shall salvage or recycle construction and demolition debris, if feasible and cost-effective.
  - (2) A contract for lawn and landscape maintenance, the Contractor shall compost or mulch yard waste material at an approved site, if feasible and cost-effective.
- (g) As provided by ORS 279C.515:
- (1) If the Contractor fails, neglects or refuses to pay promptly a person's claim for labor or services that the person provides to the Contractor or a subcontractor in connection with this Contract as the claim becomes due, the URA may pay the amount of the claim to the person that provides 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.
  - (2) If the Contractor or a first-tier subcontractor fails, neglects or refuses to pay a person that provides labor or materials in connection with this Contract within thirty (30) days after receiving payment from the URA or the Contractor, the Contractor or first-tier subcontractor owes the person the amount due plus interest charges that begin at the end of the ten (10) day period within which payment is due under ORS 279C.580(4) and that end upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest on the amount due is nine percent per annum. The amount of interest may not be waived.
  - (3) If the Contractor or a subcontractor fails, neglects or refuses to pay a person that provides 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.

- (4) Paying a claim in the manner authorized in this section does not relieve the Contractor or the Contractor's surety from obligation with respect to an unpaid claim.
- (h) As provided by ORS 279C.580, Contractor shall include in each subcontract for property or services Contractor enters into with a first-tier subcontractor, including a material supplier, for the purpose of performing a construction contract:
- (1) A payment clause that obligates Contractor to pay the first-tier subcontractor for satisfactory performance under the subcontract within ten (10) days out of amounts the URA pays to Contractor under this contract.
  - (2) A clause that requires Contractor to provide a first-tier subcontractor with a standard form that the first-tier subcontractor may use as an application for payment or as another method by which the subcontractor may claim a payment due from Contractor.
  - (3) A clause that requires Contractor, except as otherwise provided in this paragraph, to use the same form and regular administrative procedures for processing payments during the entire term of the subcontract. Contractor may change the form or the regular administrative procedures Contractor uses for processing payments if Contractor:
    - a. Notifies the subcontractor in writing at least 45 days before the date on which Contractor makes the change; and
    - b. Includes with the written notice a copy of the new or changed form or a description of the new or changed procedure.
  - (4) An interest penalty clause that obligates Contractor, if Contractor does not pay the first-tier subcontractor within thirty (30) days after receiving payment from the URA, to pay the first-tier subcontractor an interest penalty on amounts due in each payment Contractor does not make in accordance with the payment clause included in the subcontract under paragraph (a) of this subsection. Contractor or a first-tier subcontractor is not obligated to pay an interest penalty if the only reason that Contractor or a first-tier subcontractor did not make payment when payment was due is that Contractor or a first-tier subcontractor did not receive payment from the URA or Contractor when payment was due. The interest penalty:
    - a. Applies to the period that begins on the day after the required payment date and that ends on the date on which the amount due is paid; and
    - b. Is computed at the rate specified in ORS 279C.515(2).Additionally, Contractor, in each of Contractor's subcontracts, shall require the first-tier subcontractor to include a payment clause and an interest penalty clause that conforms to the standards set forth above in each of the first-tier subcontractor's subcontracts and shall require each of the first-tier subcontractor's subcontractors to include such clauses in the first-tier subcontractor's subcontracts with each lower-tier subcontractor or supplier.
- (i) Construction Contractors Board (CCB) requirements: Contractor must have a payment bond filed with CCB when required by ORS 279C.380 and 279C.390. Contractor and each subcontractor must have a public works bond filed with CCB before starting work under this Contract, unless exempt under state law.

***[SIGNATURES ON COVER PAGE TO CONTRACT]***

## PERFORMANCE BOND

Bond No. \_\_\_\_\_

Project Name: **Sherwood Festival Plaza**

_____	(Surety #1)	Bond Amount No. 1: \$	_____
_____	(Surety #2)*	Bond Amount No. 2:*	\$ _____
* <i>If using multiple sureties</i>		Total Penal Sum of Bond:	\$ _____

We, \_\_\_\_\_ as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto the City of Sherwood the sum of (Total Penal Sum of Bond)

(Provided, that we the Sureties bind ourselves in such sum “jointly and severally” as well as “severally” only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into a contract with the City of Sherwood, the Plans, Specifications, terms and conditions of which are contained in the above-referenced Solicitation;

WHEREAS, the terms and conditions of the contract, together with applicable Plans, Standard specifications and Standard Drawings, Supplemental Specifications and Special Provisions, Addenda, Bid Schedule, Prevailing Wage Rates are made a part of this Performance Bond by reference, whether or not attached to the contract (all hereafter called “Contract”); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, Plans and Specifications, and all authorized modifications of the Contract which increase the amount of the Work, the amount of the Contract, or constitute an authorized extension of the time for performance, notice of any such modifications hereby being waived by the Surety;

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal herein shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things undertaken by Contractor to be performed under the Contract, upon the terms set forth therein, and within the time prescribed therein, or as extended as provided in the Contract, with or without notice to the Sureties, and shall indemnify and save harmless the City of Sherwood, and the \_\_\_\_\_ (name of institution and any other Owner agency), and members thereof, its officers, employees and agents, against any direct or indirect damages or claim of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Principal or its subcontractors, and shall in all respects perform said contract according to law, then this obligation is to be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond nor shall the City of Sherwood, or the above-referenced agency(ies), be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapter 279C, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

**PRINCIPAL:** \_\_\_\_\_

By \_\_\_\_\_

Signature

\_\_\_\_\_  
Official Capacity

Attest: \_\_\_\_\_

Corporation Secretary

**SURETY:** \_\_\_\_\_

*[Add signatures for each surety if using multiple bonds]*

**BY ATTORNEY-IN-FACT:**

*[Power-of-Attorney must accompany each surety bond]*

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
Phone Fax

### PAYMENT BOND

Bond No. \_\_\_\_\_  
Solicitation \_\_\_\_\_  
Project Name **Sherwood Festival Plaza**

\_\_\_\_\_ (Surety #1)      Bond Amount No. 1: \$ \_\_\_\_\_  
\_\_\_\_\_ (Surety #2)\*      Bond Amount No. 2:\*      \$ \_\_\_\_\_  
\* If using multiple sureties      Total Penal Sum of Bond:\$ \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS: That, WHEREAS, the City of Sherwood, on \_\_\_\_\_, \_\_\_\_\_, has awarded to \_\_\_\_\_, hereinafter designated as "Principal", a Contract for construction of the Langer Drive Grind and Inlay, the terms and provisions of which contract are incorporated herein by reference, and;

WHEREAS, said Principal is required to furnish a bond in connection with this said Contract, providing that if said Principal, or any of his or its subcontractors, shall fail to pay for any materials, provisions, provender or other supplies or teams used in, upon, for, or about the performance of the work contracted to be done, or any other work or labor done thereon of any kind, the Surety of this body will pay the same to extend hereinafter set forth;

NOW, THEREFORE, we the Principal and \_\_\_\_\_, as Surety, are held and firmly bound unto the City of Sherwood, in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), lawful money of the United States, being one hundred percent (100%) of the Contract amount for the payment of which sum well and truly to be made, we bond ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

NOW, THEREFORE, if the above bounden Principal or any of his subcontractor shall promptly make payment to all persons supplying labor and material or amounts due in the prosecution of the work provided for in said Contract, and any and all duly authorized modifications of said Contract that may hereafter be made, then this obligation shall be void; otherwise, this obligation shall remain in full force and virtue; and if the bounden Principal or any of his subcontractors fails to promptly pay any of the persons or amounts due with respect to work or labor performed by any such claimant, the Surety will pay for the same, in an amount not exceeding the sum specified in this bond, and also in case suit brought upon this bond, a reasonable attorney's fee, be fixed by the court; and this bond shall insure to the benefit of any persons so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

The bond shall insure to the benefit of any all persons, companies and corporations entitle to file claims, so as to give a right of action to them or their assigns in any suit brought upon this bond.

And 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 wise affect its obligations 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.



Nonpayment of the bond premium will not invalidate this bond nor shall the City of Sherwood, or the above-referenced agency(ies), be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapter 279C, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES:

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

**PRINCIPAL:** \_\_\_\_\_

By \_\_\_\_\_  
Signature

\_\_\_\_\_  
Official Capacity

Attest: \_\_\_\_\_  
Corporation Secretary

**SURETY:** \_\_\_\_\_  
*[Add signatures for each if using multiple bonds]*

**BY ATTORNEY-IN-FACT:**  
*[Power-of-Attorney must accompany each bond]*

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
Phone Fax



## STATE OF OREGON STATUTORY PUBLIC WORKS BOND

Surety bond #: \_\_\_\_\_ CCB # (if applicable): \_\_\_\_\_

We, \_\_\_\_\_, as principal, and \_\_\_\_\_, a corporation qualified and authorized to do business in the

State of Oregon, as surety, are held and firmly bound unto the State of Oregon for the use and benefit of the Oregon Bureau of Labor and Industries (BOLI) in the sum of thirty thousand dollars (\$30,000) lawful money of the United States of America to be paid as provided in ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, for which payment well and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by this agreement.

WHEREAS, the above-named principal wishes to be eligible to work on public works project(s) subject to the provisions of ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, and is, therefore, required to obtain and file a statutory public works bond in the penal sum of \$30,000 with good and sufficient surety as required pursuant to the provisions of section 2, chapter 360, Oregon Laws 2005, conditioned as herein set forth.

NOW, THEREFORE, the conditions of the foregoing obligations are that if said principal with regard to all work done by the principal as a contractor or subcontractor on public works project(s), shall pay all claims ordered by BOLI against the principal to workers performing labor upon public works projects for unpaid wages determined to be due, in accordance with ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, and OAR Chapter 839, then this obligation shall be void; otherwise to remain in full force and effect.

This bond is for the exclusive purpose of payment of wage claims ordered by BOLI to workers performing labor upon public works projects in accordance with ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360.

This bond shall be one continuing obligation, and the liability of the surety for the aggregate of any and all claims which may arise hereunder shall in no event exceed the amount of the penalty of this bond.

This bond shall become effective on the date it is executed by both the principal and surety and shall continuously remain in effect until depleted by claims paid under ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, unless the surety sooner cancels the bond. This bond may be cancelled by the surety and the surety be relieved of further liability for work performed on contracts entered after cancellation by giving 30 days' written notice to the principal, the Construction Contractors Board, and BOLI. Cancellation shall not limit the responsibility of the surety for the payment of claims ordered by BOLI relating to work performed during the work period of a contract entered into before cancellation of this bond.

IN WITNESS WHEREOF, the principal and surety execute this agreement. The surety fully authorizes its representatives in the State of Oregon to enter into this obligation.

SIGNED, SEALED AND DATED this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

Surety by:

Principal by:

\_\_\_\_\_  
*Company Name* (Seal)

\_\_\_\_\_  
*Name*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Title (e.g. Attorney-in-Fact)*

\_\_\_\_\_  
*Title*

**SEND BOND TO: Construction Contractors Board  
PO Box 14140  
Salem, OR 97309-5052  
Telephone: (503) 378-4621**

\_\_\_\_\_  
*Address*

\_\_\_\_\_  
*City State Zip*



Home of the Tualatin River National Wildlife Refuge

City of Sherwood  
22560 SW Pine St.  
Sherwood, OR 97140  
Tel 503-625-5522  
Fax 503-625-5524  
www.sherwoodoregon.gov

\_\_\_\_\_, 2022

Re: **Notice of Intent to Award**

**Mayor**  
Keith Mays

**Sherwood Festival Plaza**

**Council President**  
Tim Rosener

Dear Proposer:

**Councilors**  
Renee Brouse  
Sean Garland  
Taylor Giles  
Doug Scott  
Kim Young

This is the Notice of Intent to Award required to be posted on the City's website pursuant to OAR 137-049-0395(1).

**City Manager**  
Keith Campbell

The City of Sherwood received \_\_\_\_ bids for work associated with the **Sherwood Festival Plaza**. The bids were opened at the Sherwood City Hall on September 20<sup>th</sup>, 2022 at 2:00 PM. The lowest responsive bidder was **XXXXXX** with a quote of **\$XX.XX**.

City staff will recommend award of the contract for the **Sherwood Festival Plaza** to **XXXXXX**. If you wish to protest the City's Intent to Award, you must do so within seven (7) days after the date of the issuance of this notice. The protest must follow the process set forth in OAR 137-049-450(4). Any protest not so complying, will not be considered by the City. Protests must be directed to:

Kristen Switzer  
Community Services Director  
City of Sherwood  
Public Works Building,  
15527 SW Willamette Street

If you have any questions, please contact Kristen Switzer, Community Services Director at (503) 625-4210, switzerk@sherwoodoregon.gov



Home of the Tualatin River National Wildlife Refuge

City of Sherwood  
22560 SW Pine St.  
Sherwood, OR 97140  
Tel 503-625-5522  
Fax 503-625-5524  
www.sherwoodoregon.gov

\_\_\_\_\_, 2022

XXX  
XXX  
XXX

**Mayor**  
Keith Mays

**Council President**  
Tim Rosener

**Councilors**  
Renee Brouse  
Sean Garland  
Taylor Giles  
Doug Scott  
Kim Young

**City Manager**  
Keith Campbell

## Notice of Award

### Sherwood Festival Plaza

You are notified that your bid dated September 20, 2022 for the above stated project has been considered. You are the apparent low responsive bidder for the project and have been awarded the subject contract.

Attached is one copy of the Contract Agreement. Please sign and resubmit. Also include 1 copy of the Performance Bond, Payment Bond, Proof of Liability Insurance, Oregon Workers Compensation Certificate of Insurance and a copy of your Statutory Public Works Bond sent to the State of Oregon.

Once the Contract Agreement has been signed by the City Manager, one fully executed Contract Agreement will be given to you at the preconstruction meeting set for \_\_\_\_\_, 2022 at City Hall.

We look forward to working with you on this project.

Sincerely,

CITY OF SHERWOOD

By: \_\_\_\_\_  
Kristen Switzer  
Community Services Director



**BUREAU OF LABOR AND INDUSTRIES  
NOTICE OF PUBLIC WORKS**  
(For use by public agencies in complying with ORS 279C.835)

**For Office Use Only:**  
Project DB #: \_\_\_\_\_

**NOTE: ORS 279C.835 requires that public contracting agencies include with this form a copy of the disclosure of first-tier subcontractors submitted pursuant to ORS 279C.370.**

**PUBLIC AGENCY INFORMATION**

Agency Name: \_\_\_\_\_  
Agency Division: \_\_\_\_\_ Agency # (if known): \_\_\_\_\_  
Address: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Agency Representative: \_\_\_\_\_ Phone: \_\_\_\_\_

**SECTION A:** To be completed when a public agency awards a contract to a contractor for a public works project, including CM/GC projects. (See reverse for public works projects in which no public agency awards a contract to a contractor.)

**CONTRACT INFORMATION:**

Project Name: \_\_\_\_\_  
Contract Name (if part of larger project): \_\_\_\_\_  
Project #: \_\_\_\_\_ Contract #: \_\_\_\_\_  
Project Manager Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Project Location (Street(s), City): \_\_\_\_\_ Project County: \_\_\_\_\_  
Date specifications first advertised for bid (if not advertised, date of RFP or first contact with contractor): \_\_\_\_\_  
**OR** If CM/GC contract, date contract became a public works contract (see OAR 839-025-0020(8)): \_\_\_\_\_  
Contract Amount: \$ \_\_\_\_\_  
Is this contract part of a larger project? YES  NO  If yes, total project amount: \$ \_\_\_\_\_  
If yes, **INITIAL** date specifications for project advertised for bid (see OAR 839-025-0020(6)(b)): \_\_\_\_\_  
Will project use federal funds that require compliance with the Davis-Bacon Act? YES  NO   
Date Contract Awarded: \_\_\_\_\_ Date Work Expected to Begin: \_\_\_\_\_ Date Work Expected to be Complete: \_\_\_\_\_

**PRIME CONTRACTOR INFORMATION:**

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City, State Zip: \_\_\_\_\_ Phone: \_\_\_\_\_  
Construction Contractors Board Registration #: \_\_\_\_\_  
Name of Bonding Company for Payment Bond: \_\_\_\_\_  
Address: \_\_\_\_\_  
Agent Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Payment Bond # \_\_\_\_\_  
 Copy of first-tier subcontractors attached (see NOTE above).

Signature of agency representative completing form: \_\_\_\_\_  
Printed Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Date: \_\_\_\_\_  
Email Address: \_\_\_\_\_

**THIS FORM WILL BE RETURNED TO THE PUBLIC AGENCY FOR CORRECTION AND RESUBMITTAL IF INCOMPLETE.**

**Complete this page for public works projects in which NO PUBLIC AGENCY AWARDS A CONTRACT TO A CONTRACTOR. Complete the CONTRACT INFORMATION AND SECTION B, C, D or E, whichever applies to the project.**

**CONTRACT INFORMATION:**

Name of Project Owner: \_\_\_\_\_ Phone: \_\_\_\_\_  
Project Name: \_\_\_\_\_ Project #: \_\_\_\_\_  
Project Location (Street(s), City): \_\_\_\_\_ Project County: \_\_\_\_\_  
Total Project Cost: \$ \_\_\_\_\_ Amount of Public Funds Provided for the Project: \$ \_\_\_\_\_  
Name(s) of Public Agency(ies) Providing Public Funds: \_\_\_\_\_  
Will project use federal funds that require compliance with the Davis-Bacon Act? YES  NO   
Date Work Expected to Begin: \_\_\_\_\_ Date Work Expected to be Complete: \_\_\_\_\_

**SECTION B: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(B)** (a project for the construction, reconstruction, major renovation or painting of a road, highway, building, structure or improvement of any type **that uses \$750,000 or more of funds of a public agency**).

Date the public agency or agencies committed to the provision of funds for the project: \_\_\_\_\_

**SECTION C: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(C)** (a project for the construction of a privately owned road, highway, building, structure or improvement of any type **that uses funds of a private entity and in which 25 percent or more of the square footage of the completed project will be occupied or used by a public agency**).

Total square footage of privately owned road, highway, building, structure or improvement: \_\_\_\_\_  
Percent of total square footage of the completed project that will be occupied or used by a public agency: \_\_\_\_\_  
Date the public agency or agencies entered into an agreement to occupy or use the completed project: \_\_\_\_\_

**SECTION D: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(D)** (a project that includes the construction or installation of a **device, structure or mechanism that uses solar radiation** on public property, regardless of project cost or whether the project uses funds of a public agency).

Date the public agency entered into an agreement for the project: \_\_\_\_\_

**SECTION E: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(E)** (a project for the construction, reconstruction, major renovation or painting of a road, highway, building, structure, or improvement of any type that occurs, with or without using funds of a public agency, **on real property that a public university listed in ORS 352.002 owns**).

Date the public agency entered into an agreement for the project: \_\_\_\_\_

Signature of agency representative completing form: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Date: \_\_\_\_\_

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

**THIS FORM WILL BE RETURNED TO THE PUBLIC AGENCY FOR CORRECTION AND RESUBMITTAL IF INCOMPLETE.**

**RETURN THIS COMPLETED FORM TO:**

Prevailing Wage Rate Unit • Oregon Labor & Industries • 800 NE Oregon Street, #1045 • Portland, OR 97232-3601  
Telephone (971) 673-0852 • FAX (971) 673-0769 • [pwremail@boli.state.or.us](mailto:pwremail@boli.state.or.us)



**Community Development Division  
Engineering Department**  
22560 SW Pine St.  
Sherwood, OR 97140  
503-925-2309

---

**NOTICE TO PROCEED**

**PROJECT NAME:** Sherwood Festival Plaza  
**DATE:** XXX, 2022  
**PROJECT NO.:** 901  
**COUNCIL RESOLUTION:** 2022-XXX  
**C.O.S. PROJECT MANAGER:** Kristen Switzer, Community Services Director

**TO:** XXXXX  
Attn: XXX

**ADDRESS:** XXX  
XXX

**PHONE/EMAIL:** (503) – [email](#) address

**CONTRACT:** City of Sherwood and XXX

**Sherwood Festival Plaza**

You are hereby notified that the Contract for the aforementioned project has been properly executed; performance and payment bonds and proof of insurance have been received.

In accordance with the Contract Agreement, all Contract Work shall be completed by the completion date described in the Bid Booklet on or before June 1, 2023 which is 210 calendar days from the issuance of this Notice to Proceed.

CITY OF SHERWOOD

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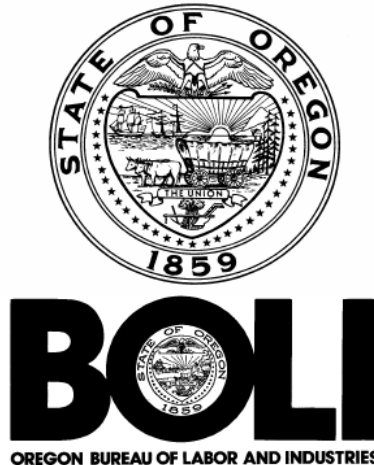
Kristen Switzer  
Community Services Director

# **Division Three**

## **General Requirements**



**PREVAILING WAGE RATES**  
**FOR**  
**PUBLIC WORKS CONTRACTS IN OREGON**



**BOLI PREVAILING WAGE RATES (PWR)**

This Project is subject to Oregon Bureau of Labor and Industry – Prevailing Wage Rates for Public Works Projects in Oregon, effective July 1, 2022, as well as applicable prevailing wage rate amendments effective April 1, 2022.

This publication is available on the web at:  
<https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx>

This is a local project. No Federal Funds are being used on this project. Therefore the project is not subject to the Davis-Bacon Act (40 U.S.C. 3141 et seq.).

## **GENERAL REQUIREMENTS**

### **STANDARD SPECIFICATION**

The Oregon Standard Specifications for Construction 2021 edition, as issued by the Oregon Department of Transportation, as amended herein, these Special Provisions, the Advertisement of Bids, the Accepted Proposal, the Agreement, the Special Specifications, the Plans, the Standard Details appended hereto, and all addenda issued prior to the execution of the agreement and all modifications thereto comprise the Contract documents or the contract.

### **CONSTRUCTION CONTRACTORS BOARD**

The contractor must:

- (a) 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).
- (b) Require, in every subcontract, that the subcontractor 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).

# **Division Four**

## **Special Provisions**

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### SPECIAL PROVISIONS

#### WORK TO BE DONE

This project is called Sherwood Festival Plaza and is located in the City of Sherwood, Washington County, Oregon. The Work to be done under this Contract consists of the following:

#### Project Description

The Work to be done under this Contract consists of the following:

1. Decorative and vehicular concrete paving
2. Brick paving
3. Stone walls
4. Utilities including electrical, stormwater and water
5. Fencing and furnishings.
6. Landscaping and irrigation

7. Other miscellaneous items for completion of work.

### **APPLICABLE SPECIFICATIONS**

The Specification that is applicable to the Work on this Project is the 2021 edition of the "Oregon Standard Specifications for Construction".

All number references in these Special Provisions shall be understood to refer to the Sections and subsections of the Standard Specifications and Supplemental Specifications bearing like numbers and to Sections and subsections contained in these Special Provisions in their entirety.

### **CLASS OF PROJECT**

This is a City of Sherwood Project. The construction of this project is not federally funded.

## **PART 00100 – GENERAL CONDITIONS**

### **SECTION 00110 - ORGANIZATION, CONVENTIONS, ABBREVIATIONS AND DEFINITIONS**

*Comply with Section 00110 of the Standard Specifications modified as follows:*

*Remove the following definitions and replace as noted:*

#### **00110.20 Definitions –**

**Bid Booklet** – The bidding documents bound with the Solicitation Documents that contain the information identified in 00120.10.

**Bid Proposal** – The bidding forms included in Division One - Bidding Requirements of the Solicitation Documents as identified in 00120.10.

**Bid Section** – The portion of the Solicitation Documents labeled, Division One - Bidding Requirements.

### **SECTION 00120 - BIDDING REQUIREMENTS AND PROCEDURES**

*Comply with Section 00120 of the Standard Specifications modified as follows:*

*Remove the text of the following subsection and replace with the following:*

#### **00120.05 Requests for Solicitation Documents –**

Solicitation documents may be obtained as specified in the Invitation To Bid.

*Remove the text of the following subsection and replace with the following:*

#### **00120.10 Bid Booklet –**

The Bidding Documents are bound with the Solicitation Documents, and labeled as Division One – Bidding Requirements. The bidding Documents may include, but are not limited to:

- Invitation to Bid
- Bidder's Checklist
- Bid Statement
- Bid Schedule
- First Tier Subcontractor Disclosure Form
- Bid Bond
- Certificate of Non-Collusion
- Compliance with ORS 279C.840
- Certification of Asbestos Abatement
- Certificate of Non-Discrimination
- Customer Service Acknowledgment
- Prequalification Acknowledgement
- Bidder Responsibility Form

- Addendum Acknowledgment (Example)

*Modify the third paragraph of the following subsection as noted:*

**00120.15 Examination of Work Site and Solicitation Documents; Consideration of Conditions to be Encountered –**

Any clarification of Plans and Specifications needed by the Bidder shall be requested in writing through the Engineer. Requests shall be made ~~in sufficient time~~ at least seven (7) days prior to bid opening for the Agency's reply to reach all Bidders before Bid Closing. Oral explanations or interpretations given before receiving Bids for a Project will not be binding. To be binding, interpretation of the Plans and Specifications by the Agency must be made by written Addendum furnished to all Holders of Bidding Plans according to 00120.30. Notification of erroneous or incomplete Plans or Specifications shall also be submitted to the Engineer. Such notification shall also be made ~~in sufficient time~~ at least seven (7) days prior to bid opening for the Agency to make any necessary modifications and issue Addenda to Bidders prior to Bid Closing.

*Remove the text of the following subsection and replace with the following:*

**00120.30 Changes to Plans, Specifications, or Quantities before Opening of Bids –**

The Agency reserves the right to issue Addenda making changes or corrections to the Plans, Specifications, or quantities. The Agency will provide Addenda only by publishing them on the Agency's web site ([www.sherwoodoregon.gov](http://www.sherwoodoregon.gov)). It is the Bidders responsibility to check the website to receive and review Addenda.

*Remove the text of the following subsection and replace with the following:*

**00120.40 Preparation of Bids**

**(a)(1) Paper Bids**

For Bids submitted by paper, Bidders shall not alter, in any manner, the (paper) documents within the Bid Section. Bidders shall complete the certifications and statements included in the Bid Section of the Bid Booklet according to the instructions. Signature of the Bidder's authorized representative thereon constitutes the Bidder's confirmation of and agreement to all certifications and statements contained in the Bid Booklet. Entries on paper documents in the Bid Section shall be in ink or typed. Signatures and initials shall be in ink. The Bidder shall properly complete and bind all the paper documents in the Bid Section, as specified in 00120.10, together with all other required documents that are part of the Bid Booklet, between the front and back covers of the Bid Booklet.

No changes shall be submitted by facsimile or email.

*Remove the text of the following subsection and replace with the following:*

**00120.40 Preparation of Bids**

**(a)(2) Electronic Bids –**

Electronic Bids will not be accepted for this project.

*Remove the text of the following subsection and replace with the following:*

**00120.40 Preparation of Bids**

**(c)(2) Electronic Bids Schedule Entries –**

Electronic Bids will not be accepted for this project.

*Remove the text of the following subsection and replace with the following:*

**00120.40(d) Bidder's Address and Signature Pages -**

Bidders shall include in the Bid the address to which all communications concerning the Bid and Contract should be sent. The Bid must be signed by a duly authorized representative of the Bidder.

*Remove the text of the following subsection and replace with the following:*

**00120.40 Preparation of Bids**

**(e)(2) Bid Guaranty with Electronic Bids –**

Electronic Bids will not be accepted for this project.

*Remove the text of the following subsection and replace with the following:*

**00120.40 Preparation of Bids**

**(f) Disclosure of First Tier Subcontractors –**

Without regard to the amount of a Bidder's Bid, if the Agency's cost range for a public improvement Project in the "Notice to Contractors", or in other advertisement or Solicitation Documents, exceeds \$100,000, the Bidder shall, within 2 working hours of the time Bids are due to be submitted, submit to the Agency, on a form provided by the Agency, a disclosure identifying any first-tier Subcontractors that will furnish labor or labor and Materials, and whose contract value is equal to or greater than:

- 5% of the total Project Bid, but at least \$15,000; or
- \$350,000, regardless of the percentage of the total Project Bid.

For each Subcontractor listed, Bidders shall state:

- The name of the Subcontractor;
- The dollar amount of the subcontract; and
- The category of Work that the Subcontractor would be performing.

If no subcontracts subject to the above disclosure requirements are anticipated, a Bidder shall so indicate by entering "NONE" or by filling in the appropriate check box. For each Subcontractor listed, Bidders shall provide all requested information. Failure to submit a form or submission of a form that does not include the information required by ORS 279C.370 for each Subcontractor listed, specifically the name of each Subcontractor, the dollar amount of each subcontract and the category of Work that each Subcontractor will perform, will result in the rejection of the Bid. The Agency is not required to determine the



accuracy or the completeness of the Subcontractor disclosure. See ORS 279C.370 and OAR 731-007-0260.

In the event that multiple Subcontractor Disclosure Forms are submitted, the last version received prior to the deadline will be considered to be the intended version.

Bids not in compliance with the requirements of this Subsection will be considered non-responsive.

*Remove the text of the following subsection and replace with the following:*

**00120.45 Submittal of Bids:**

**(b) Electronic Bids -**

No Electronic Bids will be accepted for this project.

*Remove the text of the following subsection and replace with the following:*

**00120.60 Revision or Withdrawal of Bids:**

**(a) Paper Bids -** Information entered into the paper Bid Booklet by the Bidder may be changed after the paper Bid has been delivered to the appropriate location, provided that:

- Changes are prepared according to the instructions identified in the Bid Booklet; and
- Changes are received at the same offices, addresses, and times identified in the paper Bid Booklet for submitting Bids; and
- The changes are submitted in writing and signed by an individual authorized to sign the Bid.

A Bidder may withdraw its paper Bid after it has been delivered to the appropriate location, provided that:

- The written withdrawal request is submitted on the Bidder's letterhead by hand delivery; and
- The request is signed by an individual who is authorized to sign the Bid, and proof of authorization to sign the Bid accompanies the withdrawal request; and
- The request is received at the same offices, addresses, and times identified in the paper Bid Booklet for submitting Bids.
- No Bid may be withdrawn after the deadline for submitting Bids has passed.

*Remove the text of the following subsection and replace with the following:*

**00120.60 Revision or Withdrawal of Bids:**

**(b) Electronic Bids -**

No Electronic Bids will be accepted for this project.

*Remove the text of the following subsection and replace with the following:*

**00120.70 Rejection of Nonresponsive Bids -** A Bid will be considered irregular and will be rejected if the irregularity is deemed by the Agency to render the Bid non-responsive. Examples of irregularities include, without limitation:

- The Bid Section documents provided are not properly used or contain unauthorized alterations.
- The Bid is incomplete or incorrectly completed.
- The Bid contains improper additions, deletions, alternate Bids, or conditions.
- The Bid or Bid modifications are not signed by a person authorized to submit Bids or modify Bids, as required by 00120.01.
- A member of a joint venture and the joint venture submit Bids for the same Project. Both Bids may be rejected.
- The Bid has entries not typed or in ink, or has signatures or initials not in ink.
- Each change or correction is not individually initialed.
- White-out tape or white-out liquid is used to correct item entries.
- The price per unit cannot be determined.
- The Bid guaranty is insufficient or improper. 00120.80 24
- The original Bid Bond form is not used or is altered.
- A disclosure of first-tier Subcontractors, is not received within 2 working hours of the time Bids are due to be submitted, or the disclosure form is not complete.
- The Bidder has not complied with the DBE requirements of the solicitation.
- The Bid does not acknowledge all issued Addenda.
- The Bid contains entries that are not greater than zero.
- The Bid contains entries with more than two decimals to the right of the decimal point.
- The Bid entries are not expressed in U.S. dollars and cents.
- The Bid is submitted on documents not obtained directly from the City of Sherwood or from the City of Sherwood website.
- The agency determines that any Pay Item is significantly unbalanced to the potential detriment of the agency.

The Agency may reject any or all Bids due to irregularities or may waive irregularities not affecting substantial rights in accordance with OAR 137-049-0350 upon a finding of the Agency that it is in the public interest to do so.

*Delete the following subsection in its entirety:*

~~**00120.95 Opportunity for Cooperative Arrangement**~~

**SECTION 00130 - AWARD AND EXECUTION OF CONTRACT**

*Comply with Section 00130 of the Standard Specifications modified as follows:*

*Remove the text of the following subsection and replace with the following:*

**00130.15 Right to Protest Award:**

Adversely affected or aggrieved Bidders, limited to the three apparent lowest Bidder, may submit to the City of Sherwood a written protest of the City's Intent to Award within seven (7) calendar days following the date of the Notice of Intent to Award. The protest shall specify the grounds upon which it is based.

An aggrieved Bidder may protest an award only if the Bidder alleges, in its written protest, that it should have received the award because:

- All lower Bids are non-responsive;
- The Agency failed to conduct the Bid process as described in the Bid document;
- The Agency has abused its discretion in rejecting the protestor's Bid as non-responsive or non-responsible; or
- The Agency's evaluation of Bids or subsequent determination of award is otherwise in violation of ORS Chapter 279C or the Agency's public contracting rules.

The written protest must describe the facts that support the protest. The Agency may not consider late protests or protests that do not describe facts that would support a finding that the Bidder is aggrieved for one of the reasons cited above.

*Remove the text of the following subsection and replace with the following:*

**00130.40 Contract Bonds, Certificates, and Registrations –  
(b) Certificates of Insurance**

For this Contract, the Agency may request at any time a certified copy of any insurance policy that this Contract requires and Contractor will provide same at its sole cost within ten (10) days of Agency's request.

*Add the following Subsection:*

**00130.40 Contract Bonds, Certificates, and Registrations -  
(f) State of Oregon Statutory Public Works Bond**

As particularly described in 00170.20, when awarded the contract, the successful Bidder shall furnish a State of Oregon Statutory Public Works Bond.

**SECTION 00140 - SCOPE OF WORK**

*Comply with Section 00140 of the Standard Specifications supplemented and/or modified as follows:*

*Add the following Subsection:*

**00140.31 As-Built Records** – Contractor shall maintain a current and accurate record of the work completed during the course of this contract. This may be in the form of "as-built" drawings kept by accurately marking a designated set of the contract plans with the specified information as the Work proceeds.

Accurate, complete and current "as-built" drawings are a specified requirement for full payment of the work completed. At project completion and as a condition of final payment, the Contractor shall deliver to the Project Manager a complete and legible set of "as-built" drawings.

The "as-built" drawings must show the information listed below. Where the term "locate" or "location" is used, it shall mean record of position with respect to both the construction vertical datum and either construction horizontal datum or a nearby permanent improvement.

1. Record location of underground services and utilities as installed.
2. Record location of existing underground utilities and services that are to remain and that are encountered during the course of the work.
3. Record changes in dimension, location, grade or detail to that shown on the plans.
4. Record changes made by change order
5. Record details not in the original plans
6. Provide fully completed shop drawings reflecting all revisions

*Add the following text to the following subsection:*

#### **00140.70 Cost Reduction Proposals –**

Proposed changes by the Agency are not eligible for consideration as a cost reduction proposal and will instead be addressed under 00140.30.

*Add the following bulleted item to the following subsection:*

#### **00140.90 Final Trimming and Cleanup**

- Removal and clean-up of erosion and sediment controls facilities, once vegetation is established on disturbed areas of Project Site and the Project Site has been stabilized.

### **SECTION 00150 - CONTROL OF WORK**

*Comply with Section 00150 of the Standard Specifications supplemented and/or modified as follows:*

*Remove the text of the following subsection and replace with the following:*

#### **00150.10 Coordination of Specifications and Plans –**

**(a) Order of Precedence** - The Engineer will resolve any discrepancies between these documents in the following order of precedence:

- Contract Change Orders;
- Permits from governmental agencies;
- Addenda
- Special Provisions;
- Contract Agreement
- Agency-prepared drawings specifically applicable to the Project and bearing the Project title;
- Reviewed and accepted, stamped Working Drawings;
- Standard Drawings;
- Approved Unstamped Working Drawings;
- Supplemental Specifications/Special Provisions;
- Standard Specifications; and
- All other contract documents not listed above.

Engineer provided notes on a drawing shall take precedence over drawing details.

Engineer provided dimensions shown on the drawings, or that can be computed, shall take precedence over scaled dimensions.

*Remove the text of the following subsection and replace with the following:*

**00150.15 Construction Stakes, Lines and Grades**

The Contractor shall establish all field controls for the project and furnish all principal lines, grades, and measurements necessary for the completion of the Work. An electronic copy of the base drawing is will be available for the construction staking of this project. All necessary calculations for staking shall be provided by the Contractor's surveyor. All stakes damaged or removed shall be replaced, as needed, at no cost to the City.

The Contractor shall inform the Engineer of any property corners, monuments and/or survey markers found during construction activities that are not shown on the plans. The Contractor shall not bury or disturb any property corners, monuments and/or survey markers. If disturbance of any property corners, monuments and/or survey markers is necessary, then the Contractor shall contact the City Project Manager prior to any removal of any property corners or monuments.

*Remove the text of the following subsection and replace with the following:*

**00150.30 Delivery of Notices** - Written notices to the Contractor by the Engineer or the Agency will be delivered:

- In person;
- By email.

*Remove the text of the following subsection and replace with the following:*

**00150.40 Cooperation and Superintendence by the Contractor –**

The Contractor is responsible for full management of all aspects of the Work, including superintendence of all Work by Subcontractors, Suppliers, and other providers. The Contractor shall appoint a single Superintendent and may also appoint alternate Superintendents as necessary to control the Work. The form of appointment of the alternate shall state, in writing, the alternate's name, duration of appointment in the absence of the Superintendent, and scope of authority. The Contractor shall:

(a) Provide for the cooperation and superintendence on the Project by:

- (1) Furnishing the Engineer all data necessary to determine the actual cost of all or any part of the Work, added Work, or changed Work.
- (2) Allowing the Engineer reasonable access to the Contractor's books and records at all times. To the extent permitted by public records laws, the Engineer will make reasonable efforts to honor the Contractor's request for protection of confidential information.
- (3) Keeping one complete set of Contract Documents on the Project Site at all times, available for use by all the Contractor's own organization, and by the Engineer if necessary.

- (4) Appoint a single Superintendent and any alternate Superintendent who shall meet the following qualifications:
- a. Appointees shall be competent to manage all aspects of the Work.
  - b. Appointees shall be from the Contractor's own organization.
  - c. Appointees shall have performed similar duties on at least one previous project of the size, scope and complexity as the current Contract.
  - d. Appointees shall be experienced in the types of Work being performed.
  - e. Appointees shall be capable of reading and thoroughly understanding the Plans and Specifications.
  - f. The appointed single Superintendent, or any alternate Superintendent shall:
    1. Be present for all On-Site Work, regardless of the amount to be performed by the Contractor, Subcontractors, Suppliers, or other providers, unless the Engineer provides prior approval of the Superintendent's or alternate Superintendent's absence.
    2. Be equipped with a two way radio or cell phone capable of communicating throughout the project during all the hours of Work on the Project Site and be available for communication with the Engineer.
    3. Have full authority and responsibility to promptly execute orders or directions of the Engineer.
    4. Have full authority and responsibility to promptly supply the Materials, Equipment, labor, and Incidentals required for performance of the Work.
    5. Coordinate and control all Work performed under the Contract, including without limitation the Work performed by Subcontractors, Suppliers, and Owner Operators.
    6. Diligently pursue progress of the Work according to the schedule requirements of Section 00180.
    7. Cooperate in good faith with the Engineer, Inspectors, and other contractors in performance of the Work.
    8. Provide all assistance reasonably required by the Engineer to obtain information regarding the nature, quantity, and quality of any part of the Work.
    9. Provide access, facilities and assistance to the Engineer in establishing such lines, grades and points as the Engineer requires.
    10. Carefully protect and preserve the Engineer's marks and stakes.

Any Superintendent or alternate Superintendent who repeatedly fails to follow the Engineer's written or oral orders, directions, instructions, or determinations, shall be subject to removal from the project.

If the Contractor fails or neglects to provide a Superintendent, or an alternate Superintendent, and no prior approval has been granted, the Engineer has the authority to suspend the Work according to 00180.70. Any continued Work by the Contractor, Subcontractors, Suppliers, or other providers may be subject to rejection and removal. The Contractor's repeated failure or neglect to provide the superintendence required by these provisions constitutes a material breach of the Contract, and the Engineer may impose any remedies available under the Contract, including but not limited to Contract termination.

*Remove the text of the following subsection and replace with the following:*

**00150.50 Cooperation with Utilities:  
(b) Agency Responsibilities –**

The contractor shall coordinate with franchise utility companies for any installation of new franchise utility facilities and any connection to existing franchise utility facilities. The appropriate franchise utility company shall be contacted if any conflicts occur with the franchise utility during construction.

*Add the following text to the following subsection as noted:*

**00150.95 Final Acceptance**

Once the construction work is complete, all systems are operable, and final inspection discloses no deficiencies or inconsistencies with the Work as provided in the Contract Documents, the following documentation shall be delivered to the Engineer prior to issuing of Third Notification:

- Special guarantees and bonds;
- Separate waivers of liens for subcontractor, supplies, and other with lien rights against property of owner;
- Final pay estimate;
- Releases from BOLI;
- Evidence that the Maintenance Bond will remain in effect for two years following the date of Final Acceptance;
- Red-lined as-built drawings showing locations of all improvements constructed as part of this project.

*Add the following text to the following subsection as noted:*

**00150.96 Maintenance Warranties and Guarantees**

The Contractor shall provide a 10% Maintenance Bond for a period of two (2) years from the date of final acceptance by the Agency. A surety licensed to do business as a surety in the state of Oregon shall provide the Maintenance Bond.

The acceptance by the Contractor of final payment shall be and shall operate as a release to the Agency of all claims and all liability to the Contract other than claims in stated amounts as may be specifically excepted by the Contractor in writing prior to the request for final payment for all things done or furnished in connection with this work and for every act and neglect of the Agency and its agents and others relating to or arising out of this work. However, any payment, final or otherwise, or any acceptance, shall not release the Contractor or its sureties from any obligations under the Contract Documents or the Performance and Payment Bonds or diminish the Agency's rights under the guaranty provisions.

In addition to and not in lieu of any other warranties required under the Contract make all necessary repairs and replacements to remedy, in a manner satisfactory to the Engineer and at no cost to the Agency, any and all defects, breaks, or failures of the Work occurring during the specified warranty period due to faulty or inadequate materials or workmanship. Repair damage or disturbance to other improvements under, within, or adjacent to the Work, whether or not caused by settling, washing, or slipping, when such damage or disturbance is caused, in whole or in part, from activities of the Contractor in performing his duties and obligations under this Contract when such defects or damage occur within the warranty period. The required two-year maintenance period shall, with relation to such required repair, be extended one year from the date of completion of such repair when the repair occurs after the first year of the warranty period.

If Contractor, after written notice, fails within ten days to proceed to comply with the terms of this section, Agency may have the defects corrected, and Contractor and Contractor's Surety shall be liable for all expense incurred. In case of an emergency where, in the opinion of the Engineer, delay would cause serious loss or damage, repairs may be made without notice being given to Contractor and Contractor or Surety shall pay the cost of repairs. Failure of the Engineer to act in case of an emergency shall not relieve Contractor or Surety from liability and payment of all such costs.

#### **SECTION 00160 - SOURCE OF MATERIALS**

*Comply with Section 00160 of the Standard Specifications.*

#### **SECTION 00165 - QUALITY OF MATERIALS**

*Comply with Section 00165 of the Standard Specifications.*

#### **SECTION 00170 - LEGAL RELATIONS AND RESPONSIBILITIES**

*Comply with Section 00170 of the Standard Specifications modified as follows:*

*Add the following text to the following subsection as noted:*

##### **00170.70(a) Insurance Coverages –**

The following insurance coverages and dollar amounts are required pursuant to this subsection:



<b>Insurance Coverages</b>	<b>Combined Single Limit per Occurrence</b>	<b>Annual Aggregate Limit</b>
Commercial General Liability	\$2,000,000.00	\$2,000,000.00
Commercial Automobile Liability	\$2,000,000.00	\$2,000,000.00

*Add the following text to the following subsection as noted:*

**00170.70(c) Additional Insured –**

Add the following as Additional Insureds under the Contract:

The City of Sherwood and its officers, agents, and employees.  
Sherwood City Council.

*Add the following text to the following subsection as noted:*

**00170.72 Indemnity/Hold Harmless –**

Extend indemnity and hold harmless to the Agency and the following:

The City of Sherwood and its officers, agents, and employees.  
Sherwood City Council.

**SECTION 00180 - PROSECUTION AND PROGRESS**

*Comply with Section 00180 of the Standard Specifications modified as follows:*

*Delete the following subsection:*

**00180.20(a) – Subcontracting Limitations, General**

*Remove the text of the following subsection and replace with the following:*

**00180.21 Subcontracting:**

(a) **General** – The Contractor shall not subcontract or perform any portion of the Contract by other than the Contractor's own organization without the Agency's prior written consent. A request for consent to subcontract, at any tier, solely for the furnishing of a labor force will not be considered. A written request for consent to subcontract any portion of the Contract at any tier shall be submitted to the Engineer, and when required by the Engineer, shall be accompanied by background information showing that the organization proposed to perform the Work is experienced and equipped for such Work. The Agency will review the Contractor's submission to verify compliance with Contract requirements, confirm the percentage of Work subcontracted, and evaluate the proposed Subcontractor's ability to perform the Work.

If the Engineer revokes consent to subcontract, the Subcontractor shall be immediately removed from the Project Site.

*Add the following bulleted items to the following subsection:*

**00180.40 Limitation of Operations:**

**(a) In General –**

- Limited hours of construction between 8:00 AM until 6:00 PM, Monday through Friday. Except as otherwise noted in the Contract Drawings.
- Construction is prohibited on Saturdays and Sundays without prior written approval from the Engineer.
- Construction activities include all field maintenance of equipment, refueling, and pick-up and delivery of equipment, as well as actual construction activities.
- Construction vehicles shall park on the construction site, at location(s) indicated on the Contract Drawings, or at location(s) approved by the Agency. Contractor parking shall not interfere with the everyday operations of the surrounding area.
- Provide the Agency Project Manager with a 24-hour emergency contact person's name and telephone number.

*Add the following subsection:*

**00180.40(c) Specific Limitations –**

Limitations of operations specified in these Special Provisions include, but are not limited to, the following:

<b>Limitations</b>	<b>Subsection</b>
Cooperation with Utilities.....	00150.50
Cooperation with Other Contractors.....	00150.55
Contract Completion Time.....	00180.50(h)
Right-of-Way and Access Delays.....	00180.65
Traffic Lane Restrictions.....	00220.40(e)

*Add the following text to the following subsection:*

**00180.41 Project Work Schedules:**

The Contractor shall submit a supplemental "look ahead" Project Work schedule each week to the Engineer. The "look ahead" Project Work schedule is supplemental to the Type A, B, or C schedule specified below. The supplemental "look ahead" Project Work schedule shall:

- Identify the sequencing of activities and time required for prosecution of the Work.
- Provide for orderly, timely, and efficient prosecution of the Work.
- Contain sufficient detail to enable both the Contractor and the Engineer to plan, coordinate, analyze, document, and control their respective Contract responsibilities.

The supplemental "look ahead" Project Work schedule shall be written in common terminology and show the planned Work activities broken down into logical, separate activities by area, stage, and size and include the following information:

- The resources the Contractor, subcontractors, or services will use.
- The locations of each activity that will be done including the limits of the work by mile posts, stations, or other indicators.
- The time frames of each activity by Calendar Days, shifts, and hours.
- All anticipated shoulder, lane, and road closures.

At a minimum, the Contractor shall prepare a bar chart that:

- Shows at least three weeks of activity including the week the bar chart is issued.
- Uses a largest time scale unit of one Calendar Day. Smaller time scale units may be used if needed.
- Is appropriate to the activities.
- Identifies each Calendar Day by month and day.

Include the Contract name, Contract number, Contractor's name, and date of issue on each page of the bar chart.

The Contractor shall submit the supplemental "look ahead" Project Work schedule starting at First Notification and continuing each week until Second Notification has been issued and all punch list items and final trimming and clean up has been completed. The Contractor shall meet with the Engineer each week to review the supplemental "look ahead" Project Work schedule. If the Engineer or the Contractor determines that the current supplemental "look ahead" Project Work schedule requires changes or additions, either notations can be made on the current schedule or the Engineer may require the submittal of a revised supplemental "look ahead" Project Work schedule. Review of the current and subsequent supplemental "look ahead" Project Work schedules does not relieve the Contractor of responsibility for timely and efficient execution of the Contract.

A Type "B" schedule as detailed in the Standard Specifications is required on this Contract.

*Add the following text to the following subsection:*

**180.41(b)(2) Detailed Schedule -**

The Contractor shall submit an updated project work schedule with all pay requests unless approved otherwise in writing by the Engineer. Payments to the Contractor may be held or delayed until an updated schedule has been received.

The Project Work schedule shall also address the sequencing of critical activities and shall identify the critical path for the project, critical milestones in accomplishing the work and fixed completion dates for those milestones.

*Add the following subsection:*

**00180.41(b)(4) Weekly Schedule** – Submit a weekly progress schedule to Engineer at each weekly meeting. At a minimum, the schedule shall include the following:

- Actual work completed during the previous week alongside the previously submitted weekly schedule;
- Any lane closures or access restrictions expected within the next two weeks;
- Work to be completed during the current week;
- Tentative work to be completed during the second week;
- Summary of any work elements shown on the schedule which fall behind the current overall project schedule and a summary of corrective actions that the Contractor will utilize to regain the overall project schedule.

*Add the following subsection:*

**00180.41(b)(5) Customer Service Element to Construction Schedule** – Construction will be executed with the highest level of customer service. Critical to that effort is planning of work sequence to minimize disruption and inconvenience to residents and commuter traffic. As a supplement document to the Contractor’s construction schedule, the contractor shall submit, prior to the pre-construction conference, a plan to the Engineer that identifies: construction sequencing and timing, expected disruptions to residents, and a public safety plan that explains procedures on how the Contractor will maintain safe continuous ingress and egress for pedestrians and vehicular traffic including personal use by residents, mail and newspaper delivery, garbage collection and other daily deliveries, as applicable.

*Remove the text of the following subsection and replace with the following:*

**00180.42 Preconstruction Conference:**

Within seven (7) working days of the Notice of Award, the Contractor is required to contact the Agency to schedule the preconstruction conference.

In addition to the Contractor, the intended project superintendents, subcontractor foremen and major suppliers – those who will actually be involved in construction activities – should attend the preconstruction conference. The Contractor must be prepared for a thorough discussion and review, as well as revision, which may be deemed necessary in the opinion of the Engineer, of the following:

(Note: These materials SHALL be brought to the preconstruction conference for discussion followed by Engineer review. Some items may also require submittal in advance of the preconstruction meeting per the specifications.)

- Contractor’s plan of operation and progress schedule (3+ copies)
- List of 24 hour emergency phone numbers for the project manager, site foreman, and traffic control supervisor
- List of subcontractors, names, addresses and phone numbers
- List of quality control subcontractor(s), name(s), address(s) and phone number(s)
- List of materials fabricated or manufactured off the project
- Material sources for the project

- Names of principal suppliers
- Detailed equipment list
- “Project Labor List” for all employee classifications anticipated to be used on project
- Cost percentage breakdown for lump sum bid item(s)
- Shop drawings (bring preliminary list)
- Traffic Control Plans (3+ copies)
- Erosion and Sediment Control Plan (3+ copies)
- Pollution Control Plan (3+ copies)
- Proposed site for waste material disposal and any necessary permits required for placing this material
- Proposed truck haul route

During the preconstruction conference, be prepared to discuss the following items:

- Bonds and Insurance
- Weekly project meetings – schedule and responsibilities
- Provision for inspection for materials from outside sources
- Responsibility for locating utilities
- Responsibility for damage
- Time schedule for relocations, if by other than Contractor (coordinate with utilities)
- Compliance with Contract Documents
- Hours of work
- Acceptance and approval of work
- Labor compliance, payrolls, and certifications
- Safety regulations for Contractor’s and Owner’s employees and representatives
- Suspension of work, time extensions
- Change order procedures
- Progress estimates – procedures for payment
- Special requirements of funding agencies
- Construction engineering, advance notice of special work
- Any interpretation of the Contract Documents requested by the Contractor
- Any conflicts or omissions in the Contract Documents
- Any other problems or questions concerning the work
- Processing and administration of public complaints
- Right-of-way, Easements and Temporary Construction Easements

In addition to the preconstruction conference, the City reserves the right to require the Contractor to attend a construction kick-off public open house/presentation wherein the Contractor shall be prepared to present and discuss all elements of the project’s construction with the general public.

*Add the following Subsection:*

**00180.50(h) Contract Time –**

***All Work under the contract must be completed by June 1, 2023.***

Work on this project may not commence until after the contract is signed by both the contractor and the City. City Council approval and expiration of the 7-day protest period is

required prior to the City Manager signing the contract. City Council approval of the resolution for the City Manager to sign the contract is anticipated to occur at the October 4th, 2023 City Council Meeting. Notice to Proceed is anticipated to be on November 1<sup>st</sup>, 2022.

*Add the following text to the following subsection:*

**00180.85(b) Liquidated Damages –**

The liquidated damages for failure to complete the Work on time required by 00180.50(h) will be \$800 per Calendar Day.

*Delete the following subsection:*

**00180.85(b)(1) Single Contract Time**

*Delete the following subsection:*

**00180.85(b)(2) Multiple Contract Times**

**SECTION 00190 - MEASUREMENT OF PAY QUANTITIES**

*Comply with Section 00190 of the Standard Specifications modified as follows:*

*Remove the text of the following subsection and replace with the following:*

**00190.20(g) Agency-Provided Weigh Technician –**

The Agency will not provide for a weigh technician. The Contractor shall provide, and pay for, a weigh technician for a vehicle weigh scale. The Contractor's weigh technician will:

- Determine tare weights;
- Prepare weigh memos for each load;
- Compile the weigh records; and
- Not participate in the production of Materials or the loading of haul vehicles.

**SECTION 00195 - PAYMENT**

*Comply with Section 00195 of the Standard Specifications modified as follows:*

*Remove the text of the following subsection and replace with the following:*

**00195.12 Steel Materials Price Escalation/De-Escalation Cause** - No Pay Items under this Contract qualify for the steel escalation/de-escalation program for this Project.

*Remove the text of the following subsection and replace with the following:*

**00195.50(c) Forms of Retainage**

- (1) **Cash, Alternate A** - Retainage will be deducted from progress payments and held by the Agency until final payment is made according to 00195.90, unless otherwise specified in the Contract.

The Agency will deposit the cash retainage withheld in an interest-bearing account in a bank, savings bank, trust company, or savings association for the benefit of the Agency, as provided by ORS 279C.560(5). Amounts retained will be included in the final payment made according to 00195.90.

Any retainage withheld on Work performed by a Subcontractor will be released to the Contractor according to 00195.50(d).

*Add the following subsections as follows:*

#### **00195.90 Final Payment**

- (d) The Contractor shall maintain a current and accurate record of the work completed during the course of this contract. These “as-built” drawings shall be kept by accurately marking a designated set of the contract Plans with the specified information as work proceeds. Accurate, complete and current “as-built” drawings are a specified requirement for full or partial payment of the work completed. At project completion and as a condition of final payment, the Contractor shall deliver an acceptably complete and legible full-size set of “as-built” drawings to Agency.

The “as-built” drawings must show the information listed below. Where the term “locate” or “location” is used, it means a record of position with respect to both the construction vertical datum and either horizontal datum or a nearby permanent improvement.

- Record location of underground services and utilities as installed.
  - Record location of existing underground utilities and services that are to remain and that are encountered during the course of the work.
  - Record changes in dimensions, location, grade or detail to that shown on the Plans.
  - Record changes made by change order.
  - Record details not in the original Plans.
  - Provide fully completed shop drawings reflecting all revisions.
- (f) Notwithstanding any contrary language in the Contract Documents, Contractor’s acceptance of the final payment will release Agency and the Engineer from all claims and all liability to the Contractor for all things done or furnished in connection with the Work, and every act of the Agency and others relating to or arising out of the Work. The Contractor’s acceptance of final payment is conclusive proof of Agency’s full performance under the Contract. If Agency requests, Contractor will sign a release stating Contractor has been paid in full prior to the final payment. No payment, final or otherwise, will operate to release the Contractor or the Contractor’s sureties from obligations under the Contract and will not affect the continuing validity and enforceability of the performance, payment and other bonds and warranties provided pursuant to the Contract.

#### **SECTION 00196 - PAYMENT FOR EXTRA WORK**

*Comply with Section 00196 of the Standard Specifications.*

## **SECTION 00197 - PAYMENT FOR FORCE ACCOUNT WORK**

*Comply with Section 00197 of the Standard Specifications.*

## **SECTION 00199 - DISAGREEMENTS, PROTESTS, AND CLAIMS**

*Comply with Section 00199 of the Standard Specifications modified as follows:*

*Add the following text to the following subsection:*

### **00199.20 Protest Procedure –**

- (b) **Written Notice** – The Engineer has no responsibility to evaluate the protest unless the Contractor has timely filed a proper notice submitting all of the above information. Failure to comply with this notice requirement renders the notice improper and shall constitute a waiver of any claim for additional compensation for any part of the protested work.

*Delete the following subsection:*

### **00199.20 Protest Procedure –**

#### **~~(g) Protest Evaluation by Third Party Neutral~~**

*Add the following subsection:*

### **00199.30 Claims Procedure –**

#### **(e) Payment of Costs, Expenses and Attorney’s Fees –**

Each party is responsible for its own costs, expenses and attorney’s fees in the event of litigation.

*Add the following text to the following subsection:*

### **00199.40(b) Step 1: Region Level Review**

For the purposes of this Contract, the “Region-level reviewer” is Agency’s Public Works Director.

*Remove the text of the following subsection and replace with the following:*

### **00199.40(c) Step 2: Agency Level Review**

For the purposes of this Contract, the “Contract Administration Engineer” is the Agency’s City Manager.

If the Contractor does not accept the Step 2 decision, the Contractor may, within 10 Calendar Days of receipt of the written decision, request in writing through the Engineer that the claim be advanced to Step 3.

*Delete the following subsection and replace with the following:*



~~00199.40(d) Step 3: Arbitration; Claims Review Board~~

**00199.40(d) Step 3: Litigation** – This step applies to any claim that is not resolved under Steps 1 or 2.

The Contractor must follow Steps 1 and 2 in order, and exhaust all available administrative remedies, before resorting to litigation. The Contractor must properly file a lawsuit in a court of competent jurisdiction within six months from the date of the final decision that exhausted the Contractor’s administrative remedies under this Contract.

In any litigation, the entire text of any order or permit issued by a governmental or regulatory body, as well as any documents referenced or incorporated by reference therein, will be admissible for the purpose of Contract interpretation.

The Contract or any of its provisions will not be construed against either party regardless of who drafted it. Other than as may be modified by the Contract, the applicable rules of contract construction and evidence will apply. The Contract will be governed by and construed in accordance with Oregon law without regard to conflict of laws principles.

Any dispute between the Agency and the Contractor that arises from or relates to the Contract and that is not resolved under Section 00199 may only be brought and must be conducted solely and exclusively in the Circuit Court for the State of Oregon, Washington County. If a dispute must be brought in a federal forum, then it may only be brought and conducted solely and exclusively in the United States District Court for the State of Oregon. To the maximum extent permitted by law, the dispute will be tried to a court without a jury and will not be subject to mandatory arbitration. In no event will this Subsection be construed as a waiver by the Agency of any form of defense or immunity, whether sovereign immunity, governmental immunity, immunity based on the Eleventh Amendment to the United States Constitution, from any claim or from the jurisdiction of any court. Contractor consents to the personal jurisdiction of the courts referenced herein.

In any dispute between the Agency and the Contractor that arises from or relates to the Contract, each party is solely responsible for its own costs and fees, including attorney fees.

*Delete the following subsection in its entirety.*

~~00199.40(e) Step 4: Litigation~~

*Add the following subsection:*

**00199.55 Expenses, Costs and Attorney Fees** – Notwithstanding any contrary language in the Contract Documents, each party will solely bear its own expenses, costs and fees, including attorney fees, throughout prosecution of the Work and including any disagreements, protests or claims, including all trials and appeals.

**PART 00200 – TEMPORARY FEATURES AND APPURTENANCES**

**SECTION 00210 - MOBILIZATION**

*Comply with Section 00210 of the Standard Specifications modified as follows.*

*Add the following text to the following subsection:*

**00210.90 Payment –**

Payment for Mobilization shall also include all labor, equipment, and material for work listed in the specifications and shown on the Contract Drawings that is not specifically listed with other items of the Bid Schedule.

**SECTION 00220 - ACCOMMODATIONS FOR PUBLIC TRAFFIC**

*Comply with Section 00220 of the Standard Specifications modified as follows:*

*Modify and add the following bulleted items of the following subsection:*

**00220.02 Public Safety and Mobility**

- Do not stop or hold vehicles on ~~a Highway~~ any streets or driveways within the project site for more than ~~20~~ 5 minutes.
- Do not block driveways ~~for more than 2 hours~~ except as noted in the Contract Drawings unless otherwise authorized in writing.
- Contractor shall install barricades with signage for any bike lane or walkway closure and sign for alternate routing of bicycle and pedestrian traffic.
- Notify the City of Sherwood Police Department of all changes to the traffic control prior to implementing the change. Contact Ty Hanlon at [hanlont@sherwoodoregon.gov](mailto:hanlont@sherwoodoregon.gov) (ph.503-925-7109).
- Notify the Tualatin Valley Fire & Rescue Department of all changes to the traffic control prior to implementing the change. Contact Amber Cross at [amber.cross@tvfr.com](mailto:amber.cross@tvfr.com) (Ph. 503-259-1517).
- Notify the Sherwood School District of all changes to the traffic control prior to implementing the change. Contact Sandi Miller at [smiller@sherwood.k12.or.us](mailto:smiller@sherwood.k12.or.us) (Ph. 503-825-5910).
- Notify the United States Post Office of all changes to the traffic control prior to implementing the change.
- Notify Pride Disposal of all changes to the traffic control to occur on Fridays prior to implementing the change. Contact [jaimег@pridedisposal.com](mailto:jaimег@pridedisposal.com) (Ph. 503-625-6177).
- Carbon copy City Project Manager at [christensenc@sherwoodoregon.gov](mailto:christensenc@sherwoodoregon.gov) and City Inspector [strilinga@sherwoodoregon.gov](mailto:strilinga@sherwoodoregon.gov) all traffic control notification emails.

*Add the following bulleted items to the following subsection:*

**00220.40(c) Driveways –**

- Communicate with all affected property owners at least 3 days in advance of any work which will affect access to the property.

*Remove the text of the following subsection and replace with the following:*

**SECTION 00221 – COMMON PROVISIONS FOR WORK ZONE TRAFFIC CONTROL**

*Comply with Section 00221 of the Standard Specifications modified as follows:*

*Add the following subsection:*

**00221.01(d) Field Adjustments to Traffic Control Plan –**

- If at any time during the work the Engineer or Inspector determines the Traffic Control Plan to be inadequate, the Contractor shall provide a revised Traffic Control Plan and install the additional signs and devices at no additional cost to the City.

*Add the following text to the following subsection:*

**00221.98 Payment, Method “B” -**

Method “B” – Lump Sum Basis – shall be the payment method used for this project.

The Contractor shall be responsible for all traffic control costs including all flagging to complete the work and punch-list items.

Payment shall also include payment for the Contractor supplying approved traffic control plans as specified in the Provisions.

Any additional signs and devices deemed necessary by the Engineer or Inspector shall be installed at no additional cost to the City.

*Add the following text to the following subsection:*

**00228.90 Payment –**

“Temporary Sidewalk Bypass, Complete” will be paid for at a Lump Sum amount.

**SECTION 00280 - EROSION AND SEDIMENT CONTROL**

*Comply with Section 00280 of the Standard Specifications modified as follows:*

*Add the following text to the following subsection:*

**00280.04 Erosion and Sediment Control Plan on Agency Controlled Lands**

Do not begin any site activities that have potential to cause erosion or sediment movement

until the erosion control facilities have been installed and approved by the City Inspector.

Update the ESCP and schedule as needed for unexpected storm or other events to ensure that sediment-laden water does not leave the construction site.

*Add the following text to the following subsection as noted:*

**00280.40 Installation -**

Install erosion and sediment control BMP as shown and according to the most current edition of the ODOT Erosion and Sediment Control Manual. Install these BMP before performing clearing, grading, or other land alteration activities. Ensure that no visible and measurable sediment or pollutants leave the Project boundaries, enter drainage systems or waterways, or violate applicable water standards.

For purposes of this requirement, "visible and measurable" is defined as:

- Deposits or tracking of mud, dirt, sediment or similar material exceeding 1/2 cubic foot in volume on any private or public street or adjacent property, or into any storm or surface water drainage system, either by direct deposit, dropping or discharge, or as a result of erosion; or
- Evidence of concentrated flows of water over bare soils; turbid or sediment-laden flows; or evidence of on-site erosion, such as rivulets on bare slopes where the flow of water is not filtered or captured on the site; or
- Earth slides, mudflows, earth sloughing, or other earth movement off the Project site.

**PART 00290 – ENVIRONMENTAL PROTECTION**

*Comply with Section 00290 of the Standard Specifications modified as follows:*

*Add the following text to the following subsection:*

**00290.10 Staging and Disposal Sites –**

Any aggregate/soils contaminated by the contractor within the staging area or on the project site shall be removed and replaced by the contractor at no additional cost.

*Add the following subsection:*

**00290.30(a) Pollution Control Measures**

**(7) Water Quality:**

- Do not discharge contaminated or sediment-laden water, including drilling fluids and waste, or water contained within a work area isolation, directly into any waters of the State or U.S. until it has been satisfactorily treated (for example: bioswale, filter, settlement pond, pumping to vegetated upland location, bio-bags, dirt-bags). Treatment shall meet the turbidity requirements below.

- Do not cause turbidity in waters of the State or U.S. greater than 10% above background reading (up to 100 feet upstream of the Project), as measured 100 feet downstream of the Project.
- During construction, monitor in-stream turbidity and inspect all erosion controls daily during the rainy season and weekly during the dry season, or more often as necessary, to ensure the erosion controls are working adequately meeting treatment requirements.
- If construction discharge water is released using an outfall or diffuser port, do not exceed velocities more than 4 feet per second, and do not exceed an aperture size of 1 inch.
- If monitoring or inspection shows that the erosion and sediment controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.
- Underwater blasting is not allowed.
- Implement containment measures adequate to prevent pollutants or construction and demolition materials, such as waste spoils, fuel or petroleum products, concrete cured less than 24 hours, concrete cure water, silt, welding slag and grindings, concrete saw cutting by-products and sandblasting abrasives, from entering waters of the state or U.S.
- End-dumping of riprap within the waters of the state or U.S. is not allowed. Place riprap from above the bank line.
- Cease project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.
- The Project Manager retains the authority to temporarily halt or modify the Project in case of excessive turbidity or damage to natural resources.

*Delete the text of the following subsection and replace with the following:*

**00290.90 Payment** – There will be no payment for work performed under this Section.

**Division Five  
Specifications**

## SECTION 01 33 00

### SUBMITTALS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Shop Drawings.
- C. Product data.
- D. Samples.
- E. Manufacturer's installation instructions.
- F. Manufacturers' certificates.

##### 1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Contractor's standard transmittal form as approved by Owner's Representative.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite the Project, and deliver to Owner's Representative at business address. Coordinate submission of related items.
- F. For each submittal, allow 15 days for Owner's Representative's review excluding delivery time to and from the Contractor.
- G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.
- H. Provide space for Contractor and Owner's Representative's review stamps.

- I. For submittals required to be revised and resubmitted, identify all changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.
- K. Submittals not requested will not be recognized or processed.

### 1.3 SUBMITTAL SCHEDULE

- A. A list of submittals will be provided by the Owner's Representative prior to the start of work. It is the Contractor's responsibility to submit all materials and documentation noted in the construction documents.

### 1.4 SHOP DRAWINGS

- A. Shop Drawings: Submit digitally for review.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

### 1.5 PRODUCT DATA

- A. Submit digitally for review.
- B. Mark each submittal to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.
- C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. After review, distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700: Contract Closeout.

### 1.6 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, and in custom colors where specified, textures, and patterns for Owner's Representative's selection.
- C. Include identification on each sample, with full project information.
- D. Submit the number of samples specified in individual specification sections; one of which will be retained by Owner's Representative.



- E. Reviewed samples which may be used in the Work are indicated in individual specification sections.

#### 1.7 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Owner's Representative in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

#### 1.8 MANUFACTURER CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer to Owner's Representative, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Owner's Representative.

#### 1.9 OWNER'S REPRESENTATIVE DUTIES

- A. The review will be for conformance of the design concept and compliance with information given in the Contract Documents. The Owner's Representative will make notations directly on the submittals.
- B. The review is intended to foresee unacceptable products and to avoid the possibility of their rejection at the site. The review shall not be construed as:
  - 1. Permitting a departure from the Contract Documents, unless specifically so noted.
  - 2. Relieving the Contractor of the responsibility for errors or omissions.
  - 3. Acceptance of an assemble in which an approved item is a part.
  - 4. Approval of variations from previously approved items.
  - 5. Approval of dimensions.
- C. The Owner's Representative will review all samples. Such review will be for appearance only. Compliance with all other requirements is the responsibility of the Contractor.
- B. Where the Contract Documents require the design of structural, mechanical or electrical systems or components of systems by a supplier, or where a Contractor initiates a

change in the design of a system or component thereof, such systems or components shall be designed by a registered professional engineer and all calculations submitted to the Owner's Representative will not be responsible for the designs of such other professional engineers.

#### 1.10 VARIATIONS FROM CONTRACT DOCUMENTS

- A. If the Owner's Representative determines a variation from the Contract Documents is in the best interest of the Owner, and it does not involve change in the contract price or item, the Owner's Representative, with the Owner's concurrence, may permit such variation.
- B. Unless the Owner's Representative receives immediate written notification, he/she will assume the Contractor approves any variation shown.
- C. If the Contractor fails to mention variations from the Contract Documents, he/she will not be relieved of the responsibility for executing the Work in accordance with the Contract Documents.
- D. When a variation from the Contract Documents is permitted and such variation involves corresponding adjustment in an adjacent or related item, the responsibility for making and paying all costs for such adjustment rests with the Contractor requesting the original variation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SUBSTITUTION REQUEST**

*The Construction Specifications Institute  
Northwest Region*

TO: \_\_\_\_\_

PROJECT: \_\_\_\_\_

SPECIFIED ITEM: \_\_\_\_\_

Section No.	Page	Paragraph	Description
-------------	------	-----------	-------------

**PROPOSED SUBSTITUTION:** \_\_\_\_\_

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of request including identifying applicable portions.

Attached data also includes description of changes to Contract Documents that proposed substitution requires for proper installation.

**Undersigned certifies that the following items, unless modified by attachments, are correct:**

1. Proposed substitution does not affect dimensions shown on Drawings.
2. Undersigned pays for changes to building design, including engineering design, detailing and construction costs caused by proposed substitution.
3. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.
4. Maintenance and service parts are available locally or are readily obtainable for proposed substitution.

**Undersigned further certifies that function, appearance, and quality of proposed substitution are equivalent or superior to specified item.**

**Undersigned agrees that, if this page is reproduced, terms and conditions for substitutions found in Bidding Documents apply to this proposed substitution.**

**Submitted by**

\_\_\_\_\_  
Name (Print)

\_\_\_\_\_  
Signature

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

\_\_\_\_\_  
Noted

\_\_\_\_\_  
Late Address

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Date

\_\_\_\_\_  
Telephone Fax

\_\_\_\_\_  
General Contractor (if after award of Contract)

For use by A/E:	
___ Approved	___ Approved as
___ Not Approved	___ Received Too
_____ By	
_____ Date	
_____ Remarks	

**Attachments**

1999 Edition

## SECTION 03 20 00

### CONCRETE REINFORCING STEEL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Provide all labor, materials, equipment, and services necessary to furnish reinforcing steel, accessories, welding, equipment and services, and place concrete reinforcement.

##### 1.2 REFERENCES

- A. American Society of Testing and Materials (ASTM).
- B. American Welding Society (AWS).
- C. Concrete Reinforcing Steel Institute (CRSI).
- D. American Concrete Institute (ACI).

##### 1.3 RELATED SECTIONS

- A. Section 03100 – Concrete Formwork.
- B. Section 03300 – Cast-in-place Concrete.

##### 1.4 SUBMITTALS

- A. Submit the following in accordance with Section 01334 – Shop Drawings, Product Data and Samples:
  - 1. Placing Drawings and bar lists showing quantities, sizes, dimensions, bends, and applicable details.
  - 2. Steel shall be marked and identified when it arrives at the project. Provide mill certificates for each lot and make available to Owner's Representative upon request.

#### PART 2 – PRODUCTS

##### 2.1 MATERIALS

- A. Unless noted on the Drawings, all reinforcing steel conforming to ASTM A615 Grade 60.
- B. Epoxy coated fabricated reinforcing bars ASTM A934 and ASTM A615 Grade 60.
- C. Cold drawn wire reinforcement conforming to ASTM 82.
- D. Plain smooth dowels and 1/4-inch diameter smooth bars conforming to ASTM A615 Grade 60.
- E. Epoxy-Coated Joint Dowel Bars: ASTM A 775 with ASTM A 615, Grade 60 plain steel bars.
- F. Tie wire shall be 16 gauge or heavier black annealed wire.
- G. Welded wire fabric electrically welded, gauge and mesh size as detailed, conforming to ASTM A185.
- H. Bar supports shall conform to the to the CRSI Manual of Standard Practice, Chapter 3, Bar Supports.

- I. Reinforcing bars to be embedded in concrete shall be free from oil, loose mill scale and rust. Reinforcing bars with rust, mill scale or a combination of both will be acceptable without cleaning or brushing provided that upon wire brushing a sample, the dimensions including height of deformations and weights shall not be less than the applicable ASTM requirements.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Details of concrete reinforcement not covered in the Drawings and these Specifications shall be in accordance with the CRSI Manual of Standard Practice.
- B. Reinforcing bars shall conform accurately to the dimensions detailed and be within the standard fabricating tolerances.
- C. Unless otherwise noted on the Drawings, bend all hooks using the pin diameters and dimensions detailed as ACI Standard Hooks.
- D. Do not bend or straighten reinforcing bars in a manner that will injure the material.
- E. Place bars in conformance with the CRSI Manual of Standard Practice.
- F. Securely tie bars to prevent displacement during the pouring operation. Wire dowels in place before depositing concrete.
- G. Install reinforcing bar splices as detailed on Drawings.
- H. Minimum Clear Thickness of Concrete Over Bars:
  - 1. 3-inches at earth formed or surfaces bearing on earth.
  - 2. 1-1/2-inches at faces of slabs.
  - 3. 2-inches at exterior of walls.
  - 4. 1-1/2-inches at interior face of walls.
- I. Welding of reinforcing bars only as approved by the Owner's Representative and shall be performed in accordance with AWS D1.4, Structural Welding Code – Reinforcing Steel, ASTM A706 Grade 60.

#### 3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections: The Owner will employ the services of an independent testing laboratory to conduct inspection services on all reinforcing steel placement.

END OF SECTION

SECTION 04 43 00

STONE MASONRY

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This section includes fabricating, furnishing, and installing the stonework associated with the stone seat walls.
- B. Related Sections: Concrete

**1.2 SUBMITTALS**

- A. The Contractor shall make all submittals in accordance with Section 013323-Shop drawings, Product Data and Samples. Shop drawings shall be provided for the steel scupper.
- B. Stone Samples
  - 1. Three samples. Samples to show full range of color, finish and pattern.
- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

**1.3 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced installer who has completed granite installation similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of 5 years minimum successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in producing stone installation similar to that indicated for this Project and with a record of 5 years minimum successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.
- C. Source Limitations for stone: Obtain each variety of stone, regardless of finish, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties and to cut and finish material without delaying the Work.
- D. Field-Constructed Mockup: Build mockup of 4 face foot area within basin to comply with the following requirements:
  - 1. Notify Architect 1 week in advance of date and time when mockup will be erected.

2. Demonstrate proposed range of workmanship and visual attributes.
3. Obtain Architect's acceptance of visual attributes.

#### **1.4 ACQUISITION**

- A. Submit documentation to Architect within 10 days after award of contract to show that process of acquiring stone samples for review has been initiated.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to Project site in undamaged condition. Stone that has been broken, chipped, stained or discolored will be rejected.

#### **1.6 PROJECT CONDITIONS**

- A. Weather Limitations for granite installation: Comply with the following requirements:
  1. Cold-Weather Requirements: Protect stone paving against freezing when atmospheric temperature is 40° F and falling. Heat materials to provide mortar and grout temperatures between 40° F and 120° F. Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated: below 40° F, cover with weather-resistant membrane; below 25° F, cover with insulating blankets; below 20° F, provide enclosure and temporary heat to maintain temperature above 32° F.
  2. Hot-Weather Requirements: Protect stone paving when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 10°.F and above.

#### **1.7 MEASUREMENT AND PAYMENT**

- A. Linear foot price includes all Work described in this Section including incidental work necessary to construct stone wall. Price to include concrete stem walls.

### **PART 2 - PRODUCTS**

#### **2.1 STONE**

- A. Manufacturers and Products: Subject to compliance with requirements, provide products by Vancouver Stone LLC (306) 695 – 2988.
  1. Stone: Basalt, Squares & Rectangles, 3"-3.5" thickness. See plans for height and widths.

## **2.2 MORTAR MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or II; natural color, white, or a blend to produce mortar color indicated, low alkali, non-staining cement.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
  - 1. For pigmented mortars, use colored Portland cement-lime mix of formulation required to produce color indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10% of Portland cement by weight for mineral oxides, or 2% for carbon black.
- D. Aggregate: ASTM C 144.
- E. Sealant: Miracle Porous Plus Impregnator as manufactured by Miracle Products 1 800 350-1901 ext. 3010.
- F. Anti-Hydro Mortar Add Mixture as manufactured by Anti-Hydro 800.777.1773

## **2.3 MORTAR AND GROUT MIXES**

- A. General: Do not use admixtures, including coloring pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or calcium chloride, unless indicated otherwise.
- B. Mixing: Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer. Comply with referenced ASTM or ANSI standard, as applicable, for mixing time and water content, unless indicated otherwise. Mortar for stone masonry (setting) shall be composed of one part Portland cement, 3 parts fine aggregate by volume and hydrated lime in an amount not to exceed 10 per cent of the cement by weight.
- C. Setting and Pointing Mortar: ASTM C270, cement-lime mortar, Type N, proportion specification.
- D. Joint Grout: Comply with mixing requirements of ANSI Standards referenced for materials, color and installation methods. Mortar for stone masonry (pointing) shall be composed of one part dark Portland cement and 2 parts fine aggregate to which sufficient hydrated lime may be added to make as stiff a mixture as can be properly worked into the joints.

## **2.4 ANCHORING DEVICES**

- A. All attachments and brackets shall be Type II stainless steel or suitable non-ferrous metal of the types and sizes shown on the Drawings or as required.



## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Examine related work and surfaces with Installer present before starting work in this Section. Note conditions that require correction. Verify that corrections have been made before starting stone work. Do not proceed with work when ambient temperature is below 45° F. Ensure that materials such as curing compounds, which would prevent proper adhesion of the setting bed to the concrete, are removed.
- B. Allow concrete slab or substructure to cure for a minimum of 28 days before beginning work in this Section.

### **3.2 PREPARATION**

- A. Vacuum clean concrete substrates to remove dirt, dust, debris and loose particles.
- B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil and laitance.

### **3.3 INSTALLATION, GENERAL**

- A. Execute stone installation by skilled installers.
- B. Set stone to comply with Contract Drawings and shop drawings.
- C. Installation Tolerances
  - 1. Maximum Joint Width: 3/8-inch. Work stone to achieve to achieve tight fit. Do not exceed maximum joint width.
  - 2. Hand chisel or guillotine snap cut to achieve natural stone look where necessary.

### **3.4 MORTARED APPLICATIONS**

- A. Apply cement-paste slush coat mixed with latex admixture over surface of protection board 15 minutes prior to placing setting bed. Limit area of slush coat to avoid its drying out prior to placing setting bed. Do not exceed 1/16" thickness for cement slush coat.
  - 1. Provide green or wet screed bed throughout.
- B. Apply mortar setting bed over cement-paste slush coat immediately after latter has been applied. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated on Contract Drawings.
- C. Mix and place only that amount of mortar that can be laid with stone prior to initial set. Cut back, bevel edge, remove, and discard mortar material that has reached initial set prior to placing stone.

- D. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation prior to initial set of mortar; do not return to areas already set and disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- E. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining pavers and other surfaces. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free from drying cracks.
- F. Cure grout by maintaining in a damp condition for 7 days except as otherwise recommended by latex additive manufacturer.

### **3.5 REPAIR, POINTING, CLEANING, AND PROTECTION**

- A. Remove and replace stone that is loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with mortar or grout. Point-up joints at sealant joints to provide a neat, uniform appearance, properly prepared for application of sealant.
- C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
  - 1. Remove protective coating as recommended by protective coating manufacturer and acceptable to grout manufacturer and stone fabricator. Trap and remove coating to prevent it from clogging drains.
- D. Provide final protection and maintain conditions in a manner acceptable to University's Representative that ensures that unit paver work is without damage or deterioration at the time of Substantial Completion.

### **3.6 PROTECTION**

- A. Prohibit traffic from installed stone for a minimum of 72 hours.
- B. Protect set, pointed, and grouted stone flooring during construction with non-staining kraft paper. Where adjoining areas require construction work access, cover stone flooring with a minimum of ¾" untreated plywood over draft paper.
- C. Before inspection for Substantial Completion, remove protective covering and clean surfaces using procedures, products, and materials recommended by the stone producer.

### **END OF SECTION**

**DIVISION 26**  
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## SECTION 260010

### SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 26. This Section is also referenced by related Work specified in other Divisions.

##### 1.2 REFERENCES

###### A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. A: Ampere, unit of electrical current.
2. AC or ac: Alternating current.
3. AFCI: Arc-fault circuit interrupter.
4. AIC: Ampere interrupting capacity.
5. AL, Al, or ALUM: Aluminum.
6. AWG: American wire gauge; see ASTM B258.
7. BAS: Building automation system.
8. BIL: Basic impulse insulation level.
9. BIM: Building information modeling.
10. CAD: Computer-aided design or drafting.
11. CATV: Community antenna television.
12. CB: Circuit breaker.
13. cd: Candela, the SI fundamental unit of luminous intensity.
14. CO/ALR: Copper-aluminum, revised.
15. COPS: Critical operations power system.
16. CU or Cu: Copper.
17. CU-AL or AL-CU: Copper-aluminum.
18. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
19. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
20. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
21. dBm: Decibel absolute power with respect to 1 mW.
22. DC or dc: Direct current.

23. DCOA: Designated critical operations area.
24. DDC: Direct digital control (HVAC).
25. EGC: Equipment grounding conductor.
26. ELV: Extra-low voltage.
27. EMF: Electromotive force.
28. EMI: Electromagnetic interference.
29. EPM: Electrical preventive maintenance.
30. EPS: Emergency power supply.
31. EPSS: Emergency power supply system.
32. ESS: Energy storage system.
33. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion  $1 \text{ fc} = 10 \text{ lx}$  in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
34. FLC: Full-load current.
35. ft: Foot.
36. ft-cd: Foot-candle, the antiquated U.S. Standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" after the SI unit candela (cd) replaced the international candle; see "fc,"
37. GEC: Grounding electrode conductor.
38. GFCI: Ground-fault circuit interrupter.
39. GFPE: Ground-fault protection of equipment.
40. GND: Ground.
41. HACR: Heating, air conditioning, and refrigeration.
42. HDPE: High-density polyethylene.
43. HID: High-intensity discharge.
44. HP or hp: Horsepower.
45. HVAC: Heating, ventilating, and air conditioning.
46. Hz: Hertz.
47. IBT: Intersystem bonding termination.
48. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
49. IP: Ingress protection rating (enclosures); Internet protocol (communications).
50. IR: Infrared.
51. IS: Intrinsically safe.
52. IT&R: Inspecting, testing, and repair.
53. ITE: Information technology equipment.
54. kAIC: Kiloampere interrupting capacity.
55. kcmil or MCM: One thousand circular mils.
56. kV: Kilovolt.
57. kVA: Kilovolt-ampere.
58. kVA<sub>r</sub> or kVAR: Kilovolt-ampere reactive.
59. kW: Kilowatt.

60. kWh: Kilowatt-hour.
61. LAN: Local area network.
62. lb: Pound (weight).
63. lbf: Pound (force).
64. LCD: Liquid-crystal display.
65. LCDI: Leakage-current detector-interrupter.
66. LED: Light-emitting diode.
67. Li-ion: Lithium-ion.
68. lm: Lumen, the SI derived unit of luminous flux.
69. LNG: Liquefied natural gas.
70. LP-Gas: Liquefied petroleum gas.
71. LRC: Locked-rotor current.
72. LV: Low voltage.
73. lx: Lux, the SI derived unit of illuminance equal to one lumen per square meter.
74. m: Meter.
75. MCC: Motor-control center.
76. MDC: Modular data center.
77. MG set: Motor-generator set.
78. MIDI: Musical instrument digital interface.
79. MLO: Main lugs only.
80. MV: Medium voltage.
81. MVA: Megavolt-ampere.
82. mW: Milliwatt.
83. MW: Megawatt.
84. MWh: Megawatt-hour.
85. NC: Normally closed.
86. Ni-Cd: Nickel-cadmium.
87. Ni-MH: Nickel-metal hydride.
88. NIU: Network interface unit.
89. NO: Normally open.
90. NPT: National (American) standard pipe taper.
91. OCPD: Overcurrent protective device.
92. ONT: Optical network terminal.
93. PC: Personal computer.
94. PCS: Power conversion system.
95. PCU: Power-conditioning unit.
96. PF or pf: Power factor.
97. PLFA: Power-limited fire alarm.
98. PoE: Power over Ethernet.
99. PV: Photovoltaic.
100. PVC: Polyvinyl chloride.
101. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
102. RMS or rms: Root-mean-square.

103. RPM or rpm: Revolutions per minute.
104. SCADA: Supervisory control and data acquisition.
105. SCR: Silicon-controlled rectifier.
106. SPD: Surge protective device.
107. sq.: Square.
108. SWD: Switching duty.
109. UL: (standards) Underwriters Laboratories, Inc.; (product categories) UL, LLC.
110. UL CCN: UL Category Control Number.
111. USB: Universal serial bus.
112. UV: Ultraviolet.
113. V: Volt, unit of electromotive force.
114. V(ac): Volt, alternating current.
115. V(dc): Volt, direct current.
116. VA: Volt-ampere, unit of complex electrical power.
117. VAR: Volt-ampere reactive, unit of reactive electrical power.
118. VFC: Variable-frequency controller.
119. VOM: Volt-ohm-multimeter.
120. VPN: Virtual private network.
121. W: Watt, unit of real electrical power.
122. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit (thin wall).
7. EPEC-A: Type A electrical HDPE underground conduit.
8. EPEC-B: Type B electrical HDPE underground conduit.
9. ERMC: Electrical rigid metal conduit.
10. ERMC-A: Aluminum electrical rigid metal conduit.
11. ERMC-S: Steel electrical rigid metal conduit.
12. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
13. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
14. ERMC-SS: Stainless steel electrical rigid metal conduit.
15. FMC: Flexible metal conduit.
16. FMC-A: Aluminum flexible metal conduit.
17. FMC-S: Steel flexible metal conduit.
18. FMT: Steel flexible metallic tubing.
19. FNMC: Flexible nonmetallic conduit. See "LFNC."
20. HDPE: HDPE underground conduit (thick wall).
21. HDPE-40: Schedule 40 HDPE underground conduit.
22. HDPE-80: Schedule 80 HDPE underground conduit.

23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERM-C-S-G.
38. RMC: See ERM-C.
39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.
15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.



17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.
19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.
38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.
46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: (high heat) Thermoset rubber, heat-resistant cable.
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.

59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.
65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
66. THHW: Thermoplastic, heat- and moisture-resistant cable.
67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
68. TW: Thermoplastic, moisture-resistant cable.
69. UF: Underground feeder and branch-circuit cable.
70. USE: Underground service-entrance cable.
71. XHH: Cross-linked polyethylene, heat-resistant cable.
72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Definitions:

1. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
2. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
3. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
4. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
5. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
6. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:
  - a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.

- b. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
- c. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
- d. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
- e. Device Box: A box with provisions for mounting a wiring device directly to the box.
- f. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
- g. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
- h. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
- i. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
- j. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
- k. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
- l. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
- m. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
- n. Raised-Floor Box: A floor box intended for use in raised floors.
- o. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
- p. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.

- q. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
  - r. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
  - s. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.
7. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.
- a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical
8. Jacket: A continuous nonmetallic outer covering for conductors or cables.
9. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
10. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
11. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
12. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
13. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
14. Sheath: A continuous metallic covering for conductors or cables.
15. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.

16. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:
  - a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
  - b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
  - c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
  - d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.
17. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

### 1.3 COORDINATION

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:
  1. Notify Architect Construction Manager Owner no fewer than seven days in advance of proposed interruption of electrical service.
  2. Do not proceed with interruption of electrical service without Owner's written permission.
- B. Arrange to provide temporary electrical service or power in accordance with requirements specified in Division 01.

### 1.4 PREINSTALLATION MEETINGS

- A. Electrical Preconstruction Conference: Schedule conference with Architect and Owner, not later than 10 days after notice to proceed. Agenda topics include, but are not limited to, the following:
  1. Electrical installation schedule.
  2. Status of power system studies.

3. Value analysis proposals and requests for substitution of electrical equipment.
4. Utility work coordination and class of service requests.
5. Commissioning activities.
6. Sustainability activities, including Measurement and Verification Plan.

#### 1.5 SEQUENCING

- A. Conduct and submit results of power system studies before submitting Product Data and Shop Drawings for electrical equipment.

#### 1.6 ACTION SUBMITTALS

- A. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.
- B. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Size and location of access panels on ceilings.
3. Elevation, size, and route of 2 inch or larger conduit.
4. Elevation and size of wall-mounted and ceiling-mounted equipment.
5. Luminaires.
6. Indicate clear dimensions for maintenance access in front of equipment.
7. Indicate dimensions of fully open access doors.

- C. Coordination Drawings for Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of specified coordination drawings.
2. Submission of action submittals specified in Division 26.
3. Orders placed for major electrical equipment.

4. Arrival of major electrical equipment on-site.
  5. Preinstallation meetings specified in Division 26.
  6. Utility service outages.
  7. Closing of walls and ceilings containing electrical Work.
  8. System startup, testing, and commissioning activities for major electrical equipment.
  9. System startup, testing, and commissioning activities for emergency lighting.
  10. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
  11. Requests for special inspections.
  12. Requests for inspections by authorities having jurisdiction.
- B. Delegated Design Drawings for Structural Masonry Wall Penetrations: Where indicated on Drawings, provide reflected ceiling plan(s), supplemented by elevations, sections, and other details, drawn to scale, signed, and sealed by a qualified structural professional engineer, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Location and dimensions of structural members supporting wall.
  2. Location and dimensions of columns near penetrations.
  3. Location and dimension of headers and lintels.
  4. Doors and windows near penetrations.
  5. Location and dimensions of penetrating cuts.
  6. Sprinkler piping and sleeves.
  7. Plumbing piping and sleeves.
  8. Ductwork and sleeves.
  9. Cable tray and sleeves.
  10. Conduit and sleeves.
  11. Firestopping assemblies for rated penetrations.
  12. Structural supports for piping, ductwork, and conduit on both sides of wall.
- C. Seismic-Load Performance Certificates: Provide special certification for designated seismic systems as indicated in Paragraph 13.2.2 "Special Certification Requirements for Designated Seismic Systems" of ASCE/SEI 7-05 ASCE/SEI 7-10 ASCE/SEI 7-16 for all designated seismic-load systems identified on Drawings or in the Specifications.
1. Include the following information:
    - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
    - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- d. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
  - e. Provide equipment manufacturer's written certification for each designated active electrical seismic device and system, stating that it will remain operable following the design earthquake. Certification must be based on requirements of ASCE/SEI 7, including shake table testing per ICC-ES AC156 or a similar nationally recognized testing standard procedure acceptable to authorities having jurisdiction, or experience data as permitted by ASCE/SEI 7-05 ASCE/SEI 7-10 ASCE/SEI 7-16.
  - f. Provide equipment manufacturer's written certification that components with hazardous contents maintain containment following the design earthquake by methods required in ASCE/SEI 7-05 ASCE/SEI 7-10 ASCE/SEI 7-16.
  - g. Submit evidence demonstrating compliance with these requirements for approval to authorities having jurisdiction after review and acceptance by qualified structural professional engineer.
2. The following systems and components are Designated Seismic Systems and require written special certification of seismic qualification by manufacturer:
    - a. Hangers and supports specified in Section 260529 "Hangers and Supports for Electrical Systems."
    - b. Luminaires, accessories, and components specified in Section 265119 "LED Interior Lighting."

## 1.8 CLOSEOUT SUBMITTALS

### A. Operation and Maintenance Data:

1. Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device listed below:
2. Include the following information:
  - a. Manufacturer's operating specifications.
  - b. User's guides for software and hardware.
  - c. Schedule of maintenance material items recommended to be stored at Project site.
  - d. Detailed instructions covering operation under both normal and abnormal conditions.
  - e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
  - f. List of load-current and overload-relay heaters with related motor nameplate data.
  - g. List of lamp types and photoelectric relays used on Project, with ANSI and manufacturers' codes.
  - h. Manufacturer's instructions for setting field-adjustable components.



## 1.9 QUALIFICATIONS

- A. Qualified Regional Manufacturer: Manufacturer, that maintains a service center capable of providing training, parts, and emergency on-site repairs to Project site with response time less than eight hours.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTION LIMITATIONS FOR ELECTRICAL EQUIPMENT

- A. Substitution requests for electrical equipment will be entertained under the following conditions:
  - 1. Substitution requests may be submitted for consideration prior to the Electrical Preconstruction Conference if accompanied by value analysis data indicating that substitution will comply with Project performance requirements while significantly increasing value for Owner throughout life of facility.
  - 2. Substitution requests may be submitted for consideration concurrently with submission of power system study reports when those reports indicate that substitution is necessary for safety of maintenance personnel and facility occupants.
  - 3. Contractor is responsible for sequencing and scheduling power system studies and electrical equipment procurement. After the Electrical Preconstruction Conference, insufficient lead time for electrical equipment delivery will not be considered a valid reason for substitution.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF ELECTRICAL WORK

- A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Architect for resolution of conflicting requirements.

### 3.2 FIELD QUALITY CONTROL

- A. Administrant for Low-Voltage Electrical Tests and Inspections:
  - 1. Owner will engage qualified low-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
  - 2. Engage qualified low-voltage electrical testing and inspecting agency to administer and perform tests and inspections.

3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections with assistance of factory-authorized service representative.

B. Administrant for Power-Limited Electrical Tests and Inspections:

1. Owner will engage qualified power-limited electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified power-limited electrical testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections with assistance of factory-authorized service representative.

C. Administrant for Field Tests and Inspections of Lighting Installations:

1. Owner will engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections with assistance of factory-authorized service representative.

3.3 CLEANING

A. Waste Management:

1. Refer to design drawings.

3.4 CLOSEOUT ACTIVITIES

A. Demonstration: With assistance from factory-authorized service representatives, demonstrate to Owner's maintenance and clerical personnel how to operate the following systems and equipment:

1. Lighting control devices specified in Section 260923 "Lighting Control Devices."

B. Training: With assistance from factory-authorized service representatives, train Owner's maintenance personnel on the following topics:

1. How to implement Facility EPM Program.
2. How to adjust, operate, and maintain devices specified in Section 260923 "Lighting Control Devices."

**END OF SECTION 260010**

## **SECTION 26 0519**

### **LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Section Includes:

1. Copper building wire.
2. Connectors and splices.

B. Related Requirements:

1. Section 26 00 10 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

##### **1.2 ACTION SUBMITTALS**

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

##### **1.3 INFORMATIONAL SUBMITTALS**

A. Field quality-control reports.

#### **PART 2 - PRODUCTS**

##### **2.1 COPPER BUILDING WIRE**

A. Description: Flexible, insulated, and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Carol, General Cable, Okonite, Rome, Southwire, or approved.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Conductor Insulation:
  1. Type NM: Comply with UL 83 and UL 719.
  2. Type RHH and Type RHW-2: Comply with UL 44.
  3. Type USE-2 and Type SE: Comply with UL 854.
  4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
  5. Type THHN and Type THWN-2: Comply with UL 83.
  6. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
  7. Type UF: Comply with UL 83 and UL 493.
  8. Type XHHW-2: Comply with UL 44.

## 2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers:
  1. Connectors: Anderson, Burndy, IlSCO, Thomas & Belts, or approved.
  2. Splices: Branch circuit splices: Ideal, Scotch-Lock, 3M or approved. Feeder splices: Scotch 23 or layers of Scotch 33+ as vapor barrier.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc diecast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  1. Material: Copper.
  2. Type: Two hole with standard barrels.
  3. Termination: Compression.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders:
  1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

2. Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits:
1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
  2. Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- C. ASD Output Circuits Cable: Extra-flexible stranded for all sizes.
- D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.
- 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS
- A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application. Retain one shield option with Type TC-ER cable in "ASD Output Circuits" Paragraph below.
- 3.3 INSTALLATION, GENERAL
- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inch of slack.
- E. Comply with requirements in Section 28 46 21.11 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

### 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

### 3.6 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
  - 2. After installing conductors and cables and before electrical circuitry has been energized, test conductors feeding the following critical equipment and services for compliance with requirements:
  - 3. Perform each of the following visual and electrical tests:
    - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    - b. Test bolted connections for high resistance using one of the following:
      - 1) A low-resistance ohmmeter.
      - 2) Calibrated torque wrench.
      - 3) Thermographic survey.

- c. Inspect compression-applied connectors for correct cable match and indentation.
    - d. Inspect for correct identification.
    - e. Inspect cable jacket and condition.
    - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
    - g. Continuity test on each conductor and cable.
    - h. Uniform resistance of parallel conductors.
  4. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
  5. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:
1. Procedures used.
  2. Results that comply with requirements.
  3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

**END OF SECTION 260519**



## SECTION 26 05 26

### GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
  - 1. Underground distribution grounding.
  - 2. Ground bonding common with lightning protection system.
  - 3. Foundation steel electrodes.
- C. Related Requirements:
  - 1. Section 26 00 10 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

##### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
  - 1. Grounding arrangements and connections for separately derived systems.
- B. Field quality-control reports.

##### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 26 00 10 "Supplemental Requirements for Electrical," include the following:

- a. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
  - 1) Grounding arrangements and connections for separately derived systems.
- b. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NFPA 70B
  - 1) Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
  - 2) Include recommended testing intervals.

## **PART 2 - PRODUCTS**

### 2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### 2.2 MANUFACTURERS

- A. Grounding Electrode Conductors: Bare copper stranded conductors.

### 2.3 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  1. Solid Conductors: ASTM B3.
  2. Stranded Conductors: ASTM B8.
  3. Tinned Conductors: ASTM B33.
  4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
  7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.

## 2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Mechanical-Type Bus-Bar Connectors: Cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- D. Compression-Type Bus-Bar Connectors: Copper or copper alloy, with two wire terminals.
- E. Cable-to-Cable Connectors: Compression type, copper, or copper alloy.
- F. Conduit Hubs: Mechanical type, terminal with threaded hub.
- G. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- H. Water Pipe Clamps:
  - 1. Mechanical type, two pieces with stainless steel bolts.
    - a. Material: Tin-plated aluminum.
  - 2. U-bolt type with malleable-iron clamp and copper ground connector.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 30-inch below grade.
  - 2. Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.
- C. Grounding Conductors: Green-colored insulation with continuous yellow stripe.

- D. Isolated Grounding Conductors: Green-colored insulation with more than one continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- E. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode must be connected to the equipment grounding conductor and to the frame of the generator.

### 3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Armored and metal-clad cable runs.
  - 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

- D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

### 3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 ft. apart.
- G. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
  2. Make connections with clean, bare metal at points of contact.
  3. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
  4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
  5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

### 3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.
  - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

- b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
  - C. Prepare test and inspection reports.
  - D. Report measured ground resistances that exceed the following values:
    1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
    2. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
  - E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

**END OF SECTION - 260526**

## SECTION 260529

### HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Support, anchorage, and attachment components.
2. Fabricated metal equipment support assemblies.

###### B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

##### 1.2 ACTION SUBMITTALS

###### A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
  - a. Slotted support systems, hardware, and accessories.
  - b. Clamps.
  - c. Hangers.
  - d. Sockets.
  - e. Eye nuts.
  - f. Fasteners.
  - g. Anchors.
  - h. Saddles.
  - i. Brackets.
2. Include rated capacities and furnished specialties and accessories.

###### B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.



4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated Design Submittals: For hangers and supports for electrical systems.
1. Include design calculations and details of hangers.
  2. Include design calculations for seismic restraints.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified structural professional engineer to design hanger and support system.

### **2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS**

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch diameter holes at a maximum of 8 inch on center in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide one of the following:
    - a. CADDY; brand of nVent Electrical plc.
    - b. Cooper B-line; brand of Eaton, Electrical Sector.
    - c. Unistrut; Atkore International.
  2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Material for Channel, Fittings, and Accessories: Galvanized steel.
  4. Channel Width: Selected for applicable load criteria.
  5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Unistrut; Atkore International.
  2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Channel Material: 6063-T5 aluminum alloy.
  4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
  5. Channel Width: Selected for applicable load criteria.
  6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center, in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; Atkore International.
    - b. Champion Fiberglass, Inc.
    - c. Cooper B-line; brand of Eaton, Electrical Sector.
  2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Channel Width: Selected for applicable load criteria.
  4. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
  5. Fitting and Accessory Materials: Same as those for channels and angles, except metal items may be stainless steel.
  6. Rated Strength: Selected to suit applicable load criteria.
  7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti, Inc.
      - 2) MKT Fastening, LLC.
  2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti, Inc.
      - 2) MKT Fastening, LLC.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
  5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
  6. Toggle Bolts: All steel springhead type.
  7. Hanger Rods: Threaded steel.

### **PART 3 - EXECUTION**

#### **3.1 SELECTION**

- A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:
1. NECA NEIS 101
  2. NECA NEIS 102.
  3. NECA NEIS 105.
  4. NECA NEIS 111.
- B. Firestopping to be provided to restore fire rating of penetrations of fire rated walls.

- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

### 3.2 INSTALLATION OF SUPPORTS

- A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT IMC and ERMC may be supported by openings through structure members, in accordance with NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
  - 3. To Light Steel: Sheet metal screws.
  - 4. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

3.4 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

**END OF SECTION - 260529**

## **SECTION 260533**

### **RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

###### **A. Section Includes:**

1. Type EMT-A and Type EMT-SS raceways and elbows.
2. Type EMT-S raceways and elbows.
3. Type ENT raceways and fittings.
4. Type EPEC raceways and fittings.
5. Type ERMC-A and Type ERMC-SS raceways, elbows, couplings, and nipples.
6. Type ERMC-S raceways, elbows, couplings, and nipples.
7. Type FMC-S and Type FMC-A raceways.
8. Type FMT raceways.
9. Type IMC raceways.
10. Type LFMC raceways.
11. Type LFNC raceways.
12. Type PVC raceways and fittings.
13. Fittings for conduit, tubing, and cable.
14. Threaded metal joint compound.
15. Solvent cements.
16. Surface metal raceways and fittings.
17. Surface nonmetallic raceways.
18. Strut-type channel raceways and fittings.
19. Wireways and auxiliary gutters.
20. Metallic outlet boxes, device boxes, rings, and covers.
21. Nonmetallic outlet boxes, device boxes, rings, and covers.
22. Termination boxes.
23. Cabinets, cutout boxes, junction boxes, pull boxes, and miscellaneous enclosures.
24. Cover plates for device boxes.
25. Hoods for outlet boxes.

##### **1.2 ACTION SUBMITTALS**

###### **A. Product Data: For the following:**

1. Wireways and auxiliary gutters.
2. Surface metal raceways.
3. Surface nonmetallic raceways.
4. Floor boxes.

5. Cabinets, cutout boxes, and miscellaneous enclosures.

- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details. Show that floor boxes are located to avoid interferences and are structurally allowable. Indicate floor thickness where boxes are embedded in concrete floors and underfloor clearances where boxes are installed in raised floors.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturers' Instructions:
1. For Type ERMC-S-PVC.

## **PART 2 - PRODUCTS**

### 2.1 TYPE EMT-A AND TYPE EMT-SS RACEWAYS AND ELBOWS

- A. Performance Criteria:
1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
  2. General Characteristics: UL 797A and UL Category Control Number FJMX.
- B. Aluminum Electrical Metal Tubing (EMT-A) and Elbows:
1. Material: Aluminum.
  2. Options:
    - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
    - b. Colors: As indicated on Drawings.
- C. Stainless Steel Electrical Metal Tubing (EMT-SS) and Elbows:
1. Material: Stainless steel.
  2. Options:
    - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
    - b. Colors: As indicated on Drawings.

### 2.2 TYPE EMT-S RACEWAYS AND ELBOWS

- A. Performance Criteria:
1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
  2. General Characteristics: UL 797 and UL Category Control Number FJMX.
- B. Steel Electrical Metal Tubing (EMT-S) and Elbows:

1. Material: Steel.
2. Options:
  - a. Exterior Coating: Zinc.
  - b. Interior Coating: Zinc.
  - c. Minimum Trade Size: Metric designator 21 (trade size 3/4).

## 2.3 TYPE ENT RACEWAYS AND FITTINGS

### A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1653 and UL Category Control Number FKHU.

### B. Electrical Nonmetallic Tubing (ENT) and Fittings:

1. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Fittings:
    - 1) Mechanically Attached Fittings: UL 1653.
    - 2) Solvent-Attached Fittings: UL 651.

## 2.4 TYPE EPEC RACEWAYS AND FITTINGS

### A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651A and UL Category Control Number EAZX.

### B. Schedule 40 Electrical HDPE Underground Conduit (EPEC-40):

1. Dimensional Specifications: Schedule 40.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

### C. Schedule 80 Electrical HDPE Underground Conduit (EPEC-80):

1. Dimensional Specifications: Schedule 80.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

### D. Type A Electrical HDPE Underground Conduit (EPEC-A):

1. Dimensional Specifications: Type A.



2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
- E. Type B Electrical HDPE Underground Conduit (EPEC-B):
  1. Dimensional Specifications: Type B.
  2. Options:
    - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
- 2.5 TYPE ERMCA AND TYPE ERMCSS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES
  - A. Performance Criteria:
    1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    2. General Characteristics: UL 6A and UL Category Control Number DYWV.
  - B. Aluminum Electrical Rigid Metal Conduit (ERMC-A), Elbows, Couplings, and Nipples:
    1. Material: Aluminum.
    2. Options:
      - a. Protective Coating: Provide protective coating for use in concrete.
      - b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
      - c. Colors: As indicated on Drawings.
  - C. Stainless Steel Electrical Rigid Metal Conduit (ERMC-SS), Elbows, Couplings, and Nipples:
    1. Material: Stainless steel.
    2. Options:
      - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
      - b. Colors: As indicated on Drawings.
- 2.6 TYPE ERMCS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES
  - A. Performance Criteria:
    1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    2. General Characteristics: UL 6 and UL Category Control Number DYIX.
  - B. Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:
    1. Exterior Coating: Zinc.
    2. Options:

- a. Interior Coating: Zinc.
  - b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - c. Colors: As indicated on Drawings.
- C. PVC-Coated-Steel Electrical Rigid Metal Conduit (ERMC-S-PVC), Elbows, Couplings, and Nipples:
1. Additional Characteristics:
    - a. Fittings for PVC-Coated Conduit:
      - 1) Minimum coating thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
      - 2) Conduit bodies must be Form 8 with an effective seal and a positive placement feature to ease and assure proper installation. Certified results confirming seal performance at 15 psig (positive) and 25 in. of mercury (vacuum) for 72 hours must be available. Conduit bodies must be supplied with plastic-encapsulated stainless steel cover screws.
      - 3) Form 2 inch long or one pipe diameter long, whichever is less, PVC sleeve at openings of female fittings, except unions. Inside sleeve diameter must be matched to outside diameter of metal conduit.
      - 4) PVC coating on the outside of conduit couplings must be protected from tool damage during installation.
      - 5) Female threads on fittings and couplings must be protected by urethane coating.
      - 6) Fittings must be from same manufacturer as conduit.
      - 7) Beam clamps and U bolts must be formed and sized to fit outside diameter of coated conduit. Plastic-encapsulated nuts must cover the exposed portions of threads.
    2. Options:
      - a. Exterior Coating: PVC complying with NEMA RN 1.
      - b. Interior Coating: Zinc.
      - c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
      - d. Colors: As indicated on Drawings.
      - e. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
      - f. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
- 2.7 TYPE FMC-S AND TYPE FMC-A RACEWAYS
- A. Performance Criteria:
1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics: UL 1 and UL Category Control Number DXUZ.

B. Steel Flexible Metal Conduit (FMC-S):

1. Material: Steel.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

C. Aluminum Flexible Metal Conduit (FMC-A):

1. Material: Aluminum.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Colors: As indicated on Drawings.

2.8 TYPE FMT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1652 and UL Category Control Number ILJW.

B. Steel Flexible Metallic Tubing (FMT):

1. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

2.9 TYPE IMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1242 and UL Category Control Number DYBY.

B. Steel Electrical Intermediate Metal Conduit (IMC):

1. Options:
  - a. Exterior Coating: Zinc.
  - b. Interior Coating: Zinc.
  - c. Minimum Trade Size: Metric designator 21 (trade size 3/4).

2.10 TYPE LFMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 360 and UL Category Control Number DXHR.

B. Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Material: Steel.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

C. Stainless Steel Liquidtight Flexible Metal Conduit (LFMC-SS):

1. Material: Stainless steel.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Colors: As indicated on Drawings.

2.11 TYPE LFNC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1660 and UL Category Control Number DXOQ.

B. Layered (Type A) Liquidtight Flexible Nonmetallic Conduit (LFNC-A):

1. Additional Criteria: Type A conduit with smooth seamless inner core and cover bonded together with one or more reinforcement layers between core and cover.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Markings: Sunlight resistant.

C. Integral (Type B) Liquidtight Flexible Nonmetallic Conduit (LFNC-B):

1. Additional Criteria: Type B conduit with smooth inner surface with integral reinforcement within conduit wall.
2. Options:

- a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
- b. Markings: Sunlight resistant.

D. Corrugated (Type C) Liquidtight Flexible Nonmetallic Conduit (LFNC-C):

1. Additional Criteria: Type C conduit with corrugated internal and external surfaces without integral reinforcement within conduit wall.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Markings: Sunlight resistant.

2.12 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651 and UL Category Control Number DZYR.

B. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:

1. Dimensional Specifications: Schedule 40.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Markings: For use with maximum 90 deg C wire.

C. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:

1. Dimensional Specifications: Schedule 80.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Markings: For use with maximum 90 deg C wire.

D. Type A Rigid PVC Concrete-Encased Conduit (PVC-A) and Fittings:

1. Dimensional Specifications: Type A.
2. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

2.13 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

- B. Fittings for Type ERM, Type IMC, Type PVC, Type EPEC, and Type RTRC Raceways:
    - 1. General Characteristics: UL 514B and UL Category Control Number DWTT.
    - 2. Options:
      - a. Material: Steel.
      - b. Coupling Method: Compression coupling.
      - c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
      - d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
  - C. Fittings for Type EMT Raceways:
    - 1. General Characteristics: UL 514B and UL Category Control Number FKAV.
    - 2. Options:
      - a. Material: Steel.
      - b. Coupling Method: Compression coupling.
      - c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
      - d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
  - D. Fittings for Type FMC Raceways:
    - 1. General Characteristics: UL 514B and UL Category Control Number ILNR.
  - E. Fittings for Type LFMC and Type LFNC Raceways:
    - 1. General Characteristics: UL 514B and UL Category Control Number DXAS.
- 2.14 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT
- A. Performance Criteria:
    - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    - 2. General Characteristics: UL 2419 and UL Category Control Number FOIZ.
- 2.15 SOLVENT CEMENTS
- A. Performance Criteria:
    - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    - 2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL Category Control Number DWTT.
    - 3. Sustainability Characteristics:

## 2.16 WIREWAYS AND AUXILIARY GUTTERS

### A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 870 and UL Category Control Number ZOYX.

### B. Metal Wireways and Auxiliary Gutters:

1. Additional Characteristics:
  - a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
  - b. Finish: Manufacturer's standard enamel finish.
2. Options:
  - a. Degree of Protection: Type 1 unless otherwise indicated.
  - b. Wireway Covers: Screw-cover type unless otherwise indicated.

### C. Nonmetallic Wireways and Auxiliary Gutters:

1. Additional Characteristics:
  - a. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings must match and mate with wireways as required for complete system.
  - b. PVC Solvents and Adhesives: As recommended by wireway manufacturer.
2. Options:
  - a. Material:
    - 1) PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

## 2.17 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

### A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 514A and UL Category Control Number QCIT.

### B. Metallic Outlet Boxes:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
  2. Options:
    - a. Material: Sheet steel.
    - b. Sheet Metal Depth: Minimum 2 inch.
    - c. Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.
- C. Metallic Conduit Bodies:
1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
- D. Metallic Device Boxes:
1. Description: Box with provisions for mounting wiring device directly to box.
  2. Options:
    - a. Material: Sheet steel.
    - b. Sheet Metal Depth: minimum 2 inch.
- E. Metallic Extension Rings:
1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.
- F. Metallic Floor Boxes and Floor Box Covers:
1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.
- G. Metallic Raised-Floor Boxes and Floor Box Covers:
1. Description: Box mounted in raised floor with floor box cover and other components to complete floor box enclosure.
- H. Metallic Recessed Access-Floor Boxes and Recessed Floor Box Covers:
1. Description: Floor box with provisions for mounting wiring devices below floor surface and floor box cover with provisions for passage of cords to recessed wiring devices mounted within floor box.
- I. Metallic Concrete Boxes and Covers:



1. Description: Box intended for use in poured concrete.

## 2.18 NONMETALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

### A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 514C and UL Category Control Number QCMZ.

### B. Nonmetallic Outlet Boxes:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.

### C. Nonmetallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.

### D. Nonmetallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

### E. Nonmetallic Floor Boxes and Floor Box Covers:

1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.

### F. Nonmetallic Raised-Floor Boxes and Floor Box Covers:

1. Description: Box mounted in raised floor with floor box cover and other components to complete floor box enclosure.

### G. Nonmetallic Recessed Access-Floor Boxes and Recessed Floor Box Covers:

1. Description: Floor box with provisions for mounting wiring devices below floor surface and floor box cover with provisions for passage of cords to recessed wiring devices mounted within floor box.

### H. Nonmetallic Floor Nozzles:

1. Description: Enclosure intended primarily as housing for receptacle, provided with means, such as collar, for surface-mounting on floor, which may or may not include stem to support it above floor level, and is sealed against the entrance of scrub water at floor level.

I. Nonmetallic Concrete Boxes and Covers:

1. Description: Box intended for use in poured concrete.

2.19 TERMINATION BOXES

- A. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.

B. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1773 and UL Category Control Number XCKT.

- C. Termination Boxes and Termination Bases for Installation on Load Side of Service Equipment:

1. Additional Characteristics: Listed and labeled for installation on load side of service equipment.

2.20 CABINETS, CUTOUT BOXES, JUNCTION BOXES, PULL BOXES, AND MISCELLANEOUS ENCLOSURES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:
  - a. Non-Environmental Characteristics: UL 50.
  - b. Environmental Characteristics: UL 50E.

B. Indoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Additional Characteristics: UL Category Control Number CYIV.
3. Options:
  - a. Degree of Protection: Type 1.

C. Indoor Sheet Metal Cutout Boxes:

1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
2. Additional Characteristics: UL Category Control Number CYIV.

3. Options:
  - a. Degree of Protection: Type 1.
- D. Indoor Sheet Metal Junction and Pull Boxes:
  1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  2. Additional Characteristics: UL Category Control Number BGUZ.
  3. Options:
    - a. Degree of Protection: Type 1.
- E. Indoor Cast-Metal Junction and Pull Boxes:
  1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  2. Additional Characteristics: UL Category Control Number BGUZ.
  3. Options:
    - a. Degree of Protection: Type 1.
- F. Indoor Polymeric Junction and Pull Boxes:
  1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  2. Additional Characteristics: UL Category Control Number BGUZ.
  3. Options:
    - a. Degree of Protection: Type 1.
- G. Indoor Sheet Metal Miscellaneous Enclosures:
  1. Additional Characteristics: UL 1773 and UL Category Control Number XCKT.
  2. Options:
    - a. Degree of Protection: Type 1.
- H. Outdoor Sheet Metal Cabinets:
  1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
  2. Additional Characteristics: UL Category Control Number CYIV.
  3. Options:
    - a. Degree of Protection: Type 3R.
- I. Outdoor Sheet Metal Cutout Boxes:
  1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.

2. Additional Characteristics: UL Category Control Number CYIV.
  3. Options:
    - a. Degree of Protection: Type 3R.
- J. Outdoor Sheet Metal Junction and Pull Boxes:
1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  2. Additional Characteristics: UL Category Control Number BGUI.
  3. Options:
    - a. Degree of Protection: Type 3R.
- K. Outdoor Cast-Metal Junction and Pull Boxes:
1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  2. Additional Characteristics: UL Category Control Number BGUI.
  3. Options:
    - a. Degree of Protection: Type 3R.
- L. Outdoor Polymeric Junction and Pull Boxes:
1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  2. Additional Characteristics: UL Category Control Number BGUI.
  3. Options:
    - a. Degree of Protection: Type 3R.
- M. Outdoor Sheet Metal Miscellaneous Enclosures:
1. Additional Characteristics: UL 1773 and UL Category Control Number XCKT.
  2. Options:
    - a. Degree of Protection: Type 3R.
- 2.21 COVER PLATES FOR DEVICES BOXES
- A. Performance Criteria:
1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
  2. General Characteristics:

- a. Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
  - b. Wallplate-Securing Screws: Metal with head color to match wallplate finish.
- B. Metallic Cover Plates for Device Boxes:
- 1. Options:
    - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
    - b. Wallplate Material: As indicated on architectural Drawings.
- C. Nonmetallic Cover Plates for Device Boxes:
- 1. Options:
    - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
    - b. Wallplate Material: As indicated on architectural Drawings.
    - c. Color: As indicated on architectural Drawings.
- D. Illuminating Cover Plates for Device Boxes:
- 1. Options:
    - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
    - b. Wallplate Material: As indicated on architectural Drawings.
    - c. Color: As indicated on architectural Drawings.
- 2.22 HOODS FOR OUTLET BOXES
- A. Performance Criteria:
- 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
  - 2. General Characteristics:
    - a. Reference Standards:
      - 1) UL 514D and UL Category Control Numbers QCIT and QCMZ.
      - 2) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.
    - b. Mounts to box using fasteners different from wiring device.
- B. Retractable or Reattachable Hoods for Outlet Boxes:

1. Options:
  - a. Provides gray, weatherproof, "while-in-use" cover.
- C. Extra-Duty, While-in-Use Hoods for Outlet Boxes:
  1. Additional Characteristics: Marked "Extra-Duty" in accordance with UL 514D.
  2. Options:
    - a. Provides gray, weatherproof, "while-in-use" cover.
    - b. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

### **PART 3 - EXECUTION**

#### **3.1 SELECTION OF RACEWAYS**

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.
- B. Outdoors:
  1. Exposed and Subject to Severe Physical Damage: ERMC.
  2. Exposed and Subject to Physical Damage: ERMC.
    - a. Locations less than 2.5 m (8 ft) above finished floor.
  3. Exposed and Not Subject to Physical Damage: ERMC Corrosion-resistant EMT.
  4. Concealed Aboveground: EMT.
  5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
- C. Indoors:
  1. Exposed and Subject to Severe Physical Damage: ERMC. Subject to severe physical damage includes the following locations:
    - a. Loading docks.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
    - d. Gymnasiums.
  2. Exposed and Subject to Physical Damage: ERMC. Subject to physical damage includes the following locations:
    - a. Locations less than 2.5 m (8 ft) above finished floor.
    - b. Stub-ups to above suspended ceilings.
  3. Exposed and Not Subject to Physical Damage: EMT.

4. Concealed in Ceilings and Interior Walls and Partitions: ERM C EMT.
5. Damp or Wet Locations: ERM C Corrosion-resistant EMT.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC FMC.

D. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERM C and IMC: Provide threaded type fittings unless otherwise indicated.

### 3.2 SELECTION OF BOXES AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

- a. Type 3R unless otherwise indicated.
- b. Locations Exposed to Hosedown: Type 4.
- c. Locations Subject to Potential Flooding: Type 6P.
- d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
- e. Locations in-Ground or Exposed to Corrosive Agents: Type 4X.
- f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

- a. Type 1 unless otherwise indicated.
- b. Damp or Dusty Locations: Type 12.

C. Exposed Boxes Installed Less Than 2.5 m (8 ft) Above Floor:

1. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

### 3.3 INSTALLATION OF RACEWAYS

A. Installation Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

3. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
  4. Comply with NECA NEIS 101 for installation of steel raceways.
  5. Comply with NECA NEIS 102 for installation of aluminum raceways.
  6. Comply with NECA NEIS 111 for installation of nonmetallic raceways.
  7. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
  8. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts.
  9. Raceway Terminations at Locations Subject to Moisture or Vibration:
    - a. Provide insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- B. General Requirements for Installation of Raceways:
1. Complete raceway installation before starting conductor installation.
  2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
  3. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
  4. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
  5. Support conduit within 12-inch of enclosures to which attached.
  6. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
  7. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:



- a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - b. Where an underground service raceway enters a building or structure.
  - c. Conduit extending from interior to exterior of building.
  - d. Conduit extending into pressurized duct and equipment.
  - e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
  - f. Where otherwise required by NFPA 70.
8. Keep raceways at least 6-inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
  9. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
  10. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12-inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- C. Requirements for Installation of Specific Raceway Types:
1. Types EMT-A, ERMC-A, and FMC-A:
    - a. Do not install aluminum raceways or fittings in contact with concrete or earth.
  2. Types ERMC and IMC:
    - a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
  3. Types FMC, LFMC, and LFNC:
    - a. Comply with NEMA RV 3. Provide a maximum of 36 inch of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  4. Types PVC and EPEC:
    - a. Do not install Type PVC or Type EPEC conduit where ambient temperature exceeds 122 deg F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.
    - b. Comply with manufacturer's written instructions for solvent welding and fittings.
- D. Stub-ups to Above Recessed Ceilings:

1. Provide EMT, IMC, or ERM C for raceways.
2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

E. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

1. ERM C-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
2. EMT: Provide compression, fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

F. Expansion-Joint Fittings:

1. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERM C and EMT conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.
2. Install type and quantity of fittings that accommodate temperature change listed for the following locations:
  - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at locations where conduits cross building or structure expansion joints.
5. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

G. Raceways Penetrating Rooms or Walls with Acoustical Requirements:

1. Seal raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.

3.4 INSTALLATION OF BOXES AND ENCLOSURES

- A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
- B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- C. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
- D. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- E. Locate boxes so that cover or plate will not span different building finishes.
- F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
- G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
- H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
- I. Set metal floor boxes level and flush with finished floor surface.
- J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
- M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:
  - 1. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
  - 2. Provide gaskets for wallplates and covers.

### 3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies to restore original fire rating.

### 3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

### 3.7 CLEANING

- A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

**END OF SECTION - 260533**

## **SECTION 260553**

### **IDENTIFICATION FOR ELECTRICAL SYSTEMS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

###### **A. Section Includes:**

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

###### **B. Related Requirements:**

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

##### **1.2 ACTION SUBMITTALS**

###### **A. Product Data:**

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

###### **B. Samples:** For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

###### **C. Identification Schedule:** For each piece of electrical equipment and electrical system components to be index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with ASME A13.1.
- B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:
  - 1. Fire-protection and fire-alarm equipment must be finished, painted, or suitably marked safety red.
  - 2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.
- C. Signs, labels, and tags required for personnel safety must comply with the following standards:
  - 1. Safety Colors: NEMA Z535.1.
  - 2. Facility Safety Signs: NEMA Z535.2.
  - 3. Safety Symbols: NEMA Z535.3.
  - 4. Product Safety Signs and Labels: NEMA Z535.4.
  - 5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.
- D. Comply with NFPA 70E requirements for arc-flash warning labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

### **2.2 COLOR AND LEGEND REQUIREMENTS**

- A. Raceways and Cables Carrying Circuits at 1000 V or Less:
  - 1. Black letters on orange field.
  - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
  - 1. Color must be factory applied or field applied for sizes larger than 8 AWG if authorities having jurisdiction permit.
  - 2. Colors for 208Y/120 V Circuits:

- a. Phase A: Black.
  - b. Phase B: Red.
  - c. Phase C: Blue.
3. Colors for 240 V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
  4. Colors for 480Y/277 V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
  5. Color for Neutral: White or gray.
  6. Color for Equipment Grounds: Green.
  7. Colors for Isolated Grounds: Green with two or more yellow stripes.
- C. Warning Label Colors:
1. Identify system voltage with black letters on orange background.
- D. Warning labels and signs must include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."
- E. Equipment Identification Labels:
1. Black letters on white field.
- 2.3 LABELS
- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.

- B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.
- C. Self-Adhesive Wraparound Labels: Preprinted, 3 mil thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.
  2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over legend. Labels sized such that clear shield overlaps entire printed legend.
  3. Marker for Labels:
    - a. Permanent, waterproof, black ink marker recommended by tag manufacturer.
    - b. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3 mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.
  2. Minimum Nominal Size:
    - a. 1-1/2 by 6 inch for raceway and conductors.
    - b. 3-1/2 by 5 inch for equipment.
    - c. As required by authorities having jurisdiction.



## 2.4 BANDS AND TUBES

- A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch long, with diameters sized to suit diameters and that stay in place by gripping action.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at maximum of 200 deg F. Comply with UL 224.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.

## 2.5 TAGS

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Brady Corporation.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Panduit Corp.

## 2.6 CABLE TIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ideal Industries, Inc.

2. Panduit Corp.

- B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black, except where used for color-coding.
- C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black.
- D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F.
  - 5. Color: Black.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless-steel machine screws with nuts and flat and lock washers.

**PART 3 - EXECUTION**

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings,

Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.
- J. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
  - 1. "EMERGENCY POWER."
  - 2. "POWER."
  - 3. "UPS."
- K. Vinyl Wraparound Labels:
  - 1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
  - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.
- L. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.
- M. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

- N. Self-Adhesive Labels:
  - 1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inch high.
- O. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.
- P. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.
- Q. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.
- R. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.
  - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- S. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- T. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.
- U. Metal Tags:
  - 1. Place in location with high visibility and accessibility.
  - 2. Secure using general-purpose cable ties.
- V. Nonmetallic Preprinted Tags:
  - 1. Place in location with high visibility and accessibility.
  - 2. Secure using general-purpose cable ties.
- W. Baked-Enamel Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
  - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on minimum 1-1/2 inch high sign; where two lines of text are required, use signs minimum 2 inch high.

- X. Metal-Backed Butyrate Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
  - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.
  
- Y. Laminated Acrylic or Melamine Plastic Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
  - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.
  
- Z. Cable Ties: General purpose, for attaching tags, except as listed below:
  - 1. Outdoors: UV-stabilized nylon.
  - 2. In Spaces Handling Environmental Air: Plenum rated.

### 3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
  
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
  
- C. Concealed Raceways, Duct Banks, More Than 1000 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3 inch high, black letters on 20 inch centers.
  - 1. Locate identification at changes in direction, at penetrations of walls and floors, and at 10 ft maximum intervals.
  
- D. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
  - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

- E. Accessible Fittings for Raceways and Cables within Buildings: Identify cover of junction and pull box of the following systems with self-adhesive labels containing wiring system legend and system voltage. System legends must be as follows:
  - 1. "EMERGENCY POWER."
  - 2. "POWER."
  - 3. "UPS."
  
- F. Power-Circuit Conductor Identification, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify phase.
  - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
  
- G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.
  
- H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with conductor designation.
  
- I. Conductors to Be Extended in Future: Attach marker tape to conductors and list source.
  
- J. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  
- K. Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.
  
- L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
  - 1. Apply to exterior of door, cover, or other access.
  - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
    - a. Power-transfer switches.
    - b. Controls with external control power connections.
  
- M. Operating Instruction Signs: Self-adhesive labels.

- N. Emergency Operating Instruction Signs: Self-adhesive labels with white legend on red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for load shedding.
  
- O. Equipment Identification Labels:
  - 1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
  - 2. Equipment to Be Labeled:
    - a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of engraved, laminated acrylic or melamine label.
    - b. Access doors and panels for concealed electrical items.
    - c. Emergency system boxes and enclosures.
    - d. Enclosed switches.
    - e. Enclosed circuit breakers.
    - f. Push-button stations.
    - g. Contactors.
    - h. Remote-controlled switches, dimmer modules, and control devices.
    - i. Monitoring and control equipment.
    - j. UPS equipment.

**END OF SECTION 260553**

## SECTION 260923

### LIGHTING CONTROL DEVICES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

A. Section Includes:

1. Conductors and cables.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

##### 1.2 ACTION SUBMITTALS

A. Product Data:

1. Conductors and cables.

B. Shop Drawings:

1. Show installation details for the following:
  - a. Occupancy sensors.
  - b. Low Voltage Cabling.
2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

C. Field quality-control reports.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's warranties.

##### 1.4 WARRANTY

- A. Special Extended Warranty: Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within extended warranty period.



1. Failures include, but are not limited to, the following:
  - a. Faulty operation of lighting control software.
  - b. Faulty operation of lighting control devices.
2. Extended Warranty Period: Two year(s) from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 ELECTRONIC TIME SWITCHES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Eaton.
  2. Intermatic, Inc.
  3. Leviton Manufacturing Co., Inc.
  4. Schneider Electric USA, Inc.

### **2.2 INDOOR OCCUPANCY AND VACANCY SENSORS**

- A. General Requirements for Sensors:
  1. Hardwired connection to switch.
  2. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

### **2.3 CONDUCTORS AND CABLES**

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION OF WIRING**

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.
- C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

#### **3.3 IDENTIFICATION**

- A. Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
  - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

#### **3.4 FIELD QUALITY CONTROL**

- A. Field tests must be witnessed by authorities having jurisdiction.
- B. Tests and Inspections:
  - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.6 MAINTENANCE

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement include software support for two years.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.
  - a. Upgrade Notice: No fewer than 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.
3. Upgrade Reports: Prepare written report after each update, documenting upgrades installed.

**END OF SECTION 260923**

## **SECTION 262726**

### **WIRING DEVICES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

###### **A. Section Includes:**

1. General-use switches, dimmer switches, and fan-speed controller switches.
2. General-grade single straight-blade receptacles.
3. General-grade duplex straight-blade receptacles.
4. Locking receptacles.
5. Special-purpose power outlet assemblies.
6. Connectors, cords, and plugs.

###### **B. Related Requirements:**

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260923 "Lighting Control Devices" for occupancy sensors, timers, control-voltage switches, and control-voltage dimmers.

##### **1.2 DEFINITIONS**

- A. Commercial/Industrial-Use Cord Reel: A cord reel subject to severe use in factories, commercial garages, construction sites, and similar locations requiring a harder service-type cord.
- B. UL 1472 Type I Dimmer: Dimmer in which air-gap switch is used to energize preset lighting levels.

##### **1.3 ACTION SUBMITTALS**

###### **A. Product Data:**

1. Single straight-blade receptacles
2. Duplex straight-blade receptacles.
3. Duplex straight-blade receptacles with integral switching means.
4. Receptacles with GFCI device.

###### **B. Shop Drawings:**

1. Wiring diagrams for duplex straight-blade receptacles with integral switching means.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturers' Instructions: Record copy of official installation instructions issued to Installer by manufacturer for the following:

1. Single straight-blade receptacles.
2. Duplex straight-blade receptacles.
3. Duplex straight-blade receptacles with integral switching means.
4. Receptacles with GFCI device.

B. Sample warranties.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Items: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. SPD Receptacles: Equal to 10 percent of quantity installed for each kind specified, but no fewer than one unit.

1.6 WARRANTY FOR DEVICES

A. Special Manufacturer Extended Warranty: Manufacturer warrants that devices perform in accordance with specified requirements and agrees to provide repair or replacement of devices that fail to perform as specified within extended warranty period.

1. Extended Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

**PART 2 - PRODUCTS**

2.1 GENERAL-GRADE SINGLE STRAIGHT-BLADE RECEPTACLES

A. Single Straight-Blade Receptacle:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.

- b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour; Legrand North America, LLC.
2. Regulatory Requirements:
- a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
3. General Characteristics:
- a. Reference Standards: UL CCN RTRT and UL 498.
4. Options:
- a. Device Color: As indicated on architectural Drawings.
  - b. Configuration:
    - 1) General-duty, NEMA 5-20R.
    - 2) Heavy-duty, NEMA 14-30R (Dryer).
5. Accessories:
- a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
  - b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

## 2.2 GENERAL-GRADE DUPLEX STRAIGHT-BLADE RECEPTACLES

### A. Duplex Straight-Blade Receptacle:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
  - b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour; Legrand North America, LLC.
- 2. Regulatory Requirements:

- a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
  3. General Characteristics:
    - a. Reference Standards: UL CCN RTRT and UL 498.
  4. Options:
    - a. Device Color: As indicated on architectural Drawings.
    - b. Configuration:
      - 1) General-duty, NEMA 5-20R.
  5. Accessories:
    - a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    - b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.
- B. Wired Full-Controlled Duplex Straight-Blade Receptacle:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Hubbell Lighting; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    - b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    - c. Pass & Seymour; Legrand North America, LLC.
  2. Regulatory Requirements:
    - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
  3. General Characteristics:
    - a. Reference Standards: UL CCN RTX1 and UL Subject 498B.
  4. Options:
    - a. Device Color: As indicated on architectural Drawings.
    - b. Configuration: NEMA 5-20R.

5. Accessories:
  - a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
  - b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

##### **A. Receptacles:**

1. Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

#### **3.2 INSTALLATION OF STRAIGHT-BLADE RECEPTACLES**

##### **A. Comply with manufacturer's instructions.**

##### **B. Reference Standards:**

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Architect for resolution of conflicting requirements.

##### **C. Identification:**

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

#### **3.3 FIELD QUALITY CONTROL OF STRAIGHT-BLADE RECEPTACLES**

##### **A. Tests and Inspections:**

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.
4. Measure percent voltage drop.
5. Measure grounding circuit continuity: impedance must be not greater than 2 ohms.



- B. Nonconforming Work:
  - 1. Device will be considered defective if it does not pass tests and inspections.
  - 2. Remove and replace defective units and retest.
- C. Assemble and submit test and inspection reports.

### 3.4 PROTECTION

- A. Devices:
  - 1. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.
  - 2. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

**END OF SECTION 262726**

## **SECTION 265619**

### **LED EXTERIOR LIGHTING**

#### **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. Luminaire-mounted photoelectric relays.
- 2. Luminaire types.
- 3. Materials.
- 4. Finishes.
- 5. Luminaire support components.

- B. Related Requirements:

- 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

##### **1.3 DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

##### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
5. Wiring diagrams for power, control, and signal wiring.
6. Photoelectric relays.
7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  1. Luminaires.
  2. Structural members to which equipment and luminaires will be attached.
  3. Underground utilities and structures.
  4. Existing underground utilities and structures.
  5. Above-grade utilities and structures.
  6. Existing above-grade utilities and structures.
  7. Vertical and horizontal information.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
  1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of the following:
  1. Luminaire.
  2. Photoelectric relay.
- E. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.
- F. Source quality-control reports.

- G. Sample warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
  - 2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

#### 1.7 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. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
  - 2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
  - 3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

#### 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications:
  - 1. Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
  - 2. Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including luminaire support components.
    - b. Faulty operation of luminaires and accessories.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: 5 year(s) from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance:
  - 1. Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 2. Luminaires and lamps shall be labeled vibration and shock resistant.
  - 3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. CRI of minimum 80 and CCT of 3000K.
- F. L70 lamp life of 50,000 hours.
- G. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- H. Internal driver.
- I. Nominal Operating Voltage: 120 V ac.
- J. In-line Fusing: Separate in-line fuse for each luminaire.
- K. Source Limitations:
  - 1. Obtain luminaires from single source from a single manufacturer.
  - 2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

### 2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. Intermatic, Inc.
  - 3. Lithonia Lighting; Acuity Brands Lighting, Inc.
- B. Comply with UL 773 or UL 773A.
- C. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay.
  - 1. Relay with locking-type receptacle shall comply with ANSI C136.10.
  - 2. Adjustable window slide for adjusting on-off set points.

### 2.4 LUMINAIRE TYPES

- A. Bollard:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Cooper Lighting Solutions; Signify North America Corp.
  - b. Kim Lighting; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - c. Lithonia Lighting; Acuity Brands Lighting, Inc.

## 2.5 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Stainless steel. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
  1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  2. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  1. White Surfaces: 85 percent.
  2. Specular Surfaces: 83 percent.
  3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
  1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
  2. Provide filter/breather for enclosed luminaires.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:
  - a. "USE ONLY" and include specific lamp type.
  - b. Lamp diameter, shape, size, wattage, and coating.
  - c. CCT and CRI for all luminaires.

## 2.6 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
  3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
- D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
  2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.



## 2.7 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Support luminaires without causing deflection of finished surface.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

3.4 GROUND-MOUNTED LUMINAIRES

- A. Aim as indicated on Drawings.

3.5 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.7 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Verify operation of photoelectric controls.
- C. Illumination Tests:
  - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
    - a. IES LM-5.
    - b. IES LM-50.
    - c. IES LM-52.
    - d. IES LM-64.
    - e. IES LM-72.
  - 2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.

- E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

### 3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

### 3.9 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 3. Adjust the aim of luminaires in the presence of the Architect.

**END OF SECTION 265619**

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SECTION 27 0528      PATHWAYS FOR COMMUNICATIONS SYSTEMS

## SECTION 270528

### PATHWAYS FOR COMMUNICATIONS SYSTEMS

#### **PART 1 - GENERAL**

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Metal conduits and fittings.
  - 2. Boxes, enclosures, and cabinets.

##### 1.3 DEFINITIONS

- A. GRC: Galvanized rigid conduit.
- B. IMC: Intermediate metal conduit.

##### 1.4 ACTION SUBMITTALS

- A. Product data for the following:
  - 1. Wireways and fittings.
  - 2. Boxes, enclosures, and cabinets.

##### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. Underground ducts, piping, and structures in location of underground enclosures and handholes.
- B. Seismic Qualification Data: Provide seismic bracing for all pathway racks, enclosures, cabinets, equipment racks, and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
  4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.
- C. Source quality-control reports.

## **PART 2 - PRODUCTS**

### **2.1 METAL CONDUITS AND FITTINGS**

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. General Requirements for Metal Conduits and Fittings:
1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
  2. Comply with TIA-569-D.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Fittings for EMT:
    - a. Material: Steel or die cast.
    - b. Type: Set screw or compression.
  2. Expansion Fittings: Match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
- G. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

### **2.2 BOXES, ENCLOSURES, AND CABINETS**

- A. Description: Enclosures for communications.

- B. General Requirements for Boxes, Enclosures, and Cabinets:
  - 1. Comply with TIA-569-D.
  - 2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.
  - 3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
  - 4. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
  - 5. Gangable boxes are allowed.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Metal Floor Boxes:
  - 1. Material: Cast metal or sheet metal.
  - 2. Type: Fully adjustable.
  - 3. Shape: Rectangular.
  - 4. Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- I. Cabinets:
  - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.
  - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### **PART 3 - EXECUTION**

#### **3.1 PATHWAY APPLICATION**

- A. Indoors: Apply pathway products as specified below unless otherwise indicated:
  - 1. Exposed, Not Subject to Physical Damage: EMT.
  - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
  - 3. Exposed and Subject to Severe Physical Damage: GRC.
  - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 5. Damp or Wet Locations: GRC.
- B. Minimum Pathway Size: 3/4-inch trade size for copper and aluminum cables, and 1 inch for optical-fiber cables.
- C. Pathway Fittings: Compatible with pathways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. EMT: Use, fittings. Comply with NEMA FB 2.10.
- D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

#### **3.2 INSTALLATION**

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
  - 1. NECA 1.
  - 2. NECA/BICSI 568.
  - 3. TIA-569-D.
  - 4. NECA 101
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Complete pathway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.
- F. Support conduit within 12 inches of enclosures to which attached.
  - 1. Use EMT, IMC, or RMC for pathways.



2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
  - G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
  - H. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.
  - I. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
  - J. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
  - K. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.
  - L. Expansion-Joint Fittings:
    1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed 100 deg F, and that has straight-run length that exceeds 100 feet.
    2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
    3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
  - M. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
  - N. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
  - O. Set metal floor boxes level and flush with finished floor surface.
- 3.3 PROTECTION
- A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

**END OF SECTION 270528**

## SECTION 31 10 00

### SITE CLEARING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section applies to work on private property only. Work in the public right of way shall be constructed in accordance with applicable sections of the City of Sherwood Standard Construction Specifications, current edition.
- B. Section Includes:
  - 1. Removing existing vegetation.
  - 2. Clearing and grubbing.
  - 3. Removing above- and below-grade site improvements.
  - 4. Disconnecting, capping or sealing site utilities.
  - 5. Temporary erosion- and sedimentation-control measures.

##### 1.2 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other 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.

##### 1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

- D. 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.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "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. 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. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "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, in a manner approved by Architect.

### 3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
  - 1. Arrange with utility companies to shut off indicated utilities.
- B. 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.
- C. Removal of underground utilities is included in Division 33 Sections.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
  - 2. Use only hand methods for grubbing within protection zones.
- 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 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.7 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. 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 31 10 00

## SECTION 31 20 00

### EARTH MOVING

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

##### 1.2 SUMMARY

###### A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, grasses and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Base course for concrete walks and pavements.
5. Base course for asphalt paving.
6. Excavating and backfilling for utility trenches.
7. Backfill at retaining structures.

##### 1.3 DEFINITIONS

###### A. Backfill: Soil 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: Course placed between the subbase course and hot-mix asphalt paving.

###### C. Bedding Course: Course 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. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

###### F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

- G. Fill: Soil materials used to raise existing grades.
- H. Structural Fill: Fill material used beneath foundations, slabs, pavements, and other areas intended to support structures, or within the influence zones of structures.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.4 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Geotextiles.
  - 2. Controlled low-strength material, including design mixture.
  - 3. Detectable warning tapes.
- B. Remaining paragraphs are defined in Division 01 Section "Submittal Procedures" as "Informational Submittals."
- C. Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.
- D. Qualification Data: For qualified testing agency.
- E. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Laboratory compaction curve according to ASTM D 1557.

### 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: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- 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 2 percent of optimum moisture content at time of compaction.
- D. Pavement Base Course: Base rock for pavements shall consist of  $\frac{3}{4}$ - or 1  $\frac{1}{2}$ -inch-minus material meeting the requirements of WSDOT SS 00641, with the exception that the aggregate shall have less than 5 percent by weight passing the U.S. Standard No. 200 Sieve, and have at least two mechanically fractured faces.
- E. Structural Fill: All material used as structural fill shall be free from organic matter or other unsuitable materials. The material shall meet the specifications of WSDOT SS 00330. All structural fill shall have a maximum particle size of 4-inches and contain no frozen, organic or other deleterious material. More specific subclassifications follow:
  - 1. Native Soil: The native silts and silty soils are suitable for use as structural fill, provided they meet the requirements in ODOT SS 00330.12.
  - 2. Imported Granular Material: Imported granular material used for structural fill shall be pit or quarry run rock, crushed rock, or crushed gravel and sand and shall meet the requirements set forth in ODOT SS 00330.14 and 00330.15. Imported granular material shall be fairly well graded between coarse and fine material, and have less than 5 percent by weight passing the U.S. Standard No. 200 Sieve, and have at least two mechanically fractured faces.
- F. Pipe Bedding and Pipe Zone Courses: Crushed, well-graded, granular material with a maximum particle size of 1-inch and less than 5 percent by weight passing the U.S. Standard No. 200 Sieve and shall meet ODOT SS 00405.14. The material shall be free from roots, organic matter, and other unsuitable material.
- G. Pipe Trench Backfill: Material within building, pavement, and other structural areas shall consist of Pipe Bedding and Pipe Zone Course. Other areas, trench backfill may consist of properly moisture conditioned Native Soil or other Satisfactory Soils.
- H. Drainage Course: Shall consist of angular, granular material with a maximum particle size of 2-inches and shall meet ODOT SS 00430.11. The material shall be free of roots, organic matter, and other unsuitable materials. The material shall have less than 2 percent by weight passing the U.S. Standard No. 200 Sieve (washed analysis) and have at least two mechanically fractured faces.
- I. Stabilization Material: Shall consist of pit or quarry run rock, crushed rock, or crushed gravel and sand and shall meet the requirements of ODOT SS 00330.14 and 00330.15. Material size shall consist of 4- to 6-inch minus material, and have less than 5 percent passing the

U.S. Standard No. 4 sieve. The material shall be free of organic matter and other deleterious material.

- J. Floor Slab Base Rock: Imported granular material placed beneath building floor slabs consisting of clean, crushed rock or crushed gravel and sand that is fairly well graded between coarse and fine. Material shall have maximum particle size of 1 1/2 –inches and less than 5 percent by weight passing the U.S. Standard No. 200 Sieve with at least two mechanically fractured faced. Material shall meet ODOT SS 00641.
- K. Recycled On-Site Material: On-site asphalt pavement, conventional concrete, and oversized rock may be used as fill if they are processed to meet the requirements for their intended use.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.

## 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 earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.

### 3.2 EXCAVATION

- 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.

### 3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. 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.

### 3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- 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 higher than top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: 12 inches 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. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

### 3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with fully loaded dump truck or similar heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

### 3.8 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.

### 3.9 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 trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."
- D. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of base coarse material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

### 3.10 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.

### 3.11 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.

### 3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than:
  - 1. On-site backfill or fill soil material: 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
  - 2. Pavement Base Course: 12 inches in loose depth.
  - 3. Imported Granular Material: 12 inches in loose depth.
- 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 1557:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of:
    - a. On-site backfill or fill soil material at 92 percent.
    - b. Imported Granular material: at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches:
    - a. Under building, pavement, and other structural areas, backfill shall be compacted to 92 percent at depths greater than 2 feet below the finished grade, and 95 percent within 2 feet of finished grade.
    - b. Other areas, backfill shall be compacted to 92 percent.
  - 5. Stabilization material: Compact to firm condition.
  - 6. Floor slab base rock: Compact in one lift to 95 percent.
- D. Backfill at retaining structures: Fill located within 3 horizontal feet from the retaining wall shall be compacted to 90 percent of ASTM D 1557. Compact in 6-inch thick loose lifts with hand-operated tamping equipment (such as jumping jack or vibratory plate compactor). If flat work (slabs, sidewalk, or pavement) is located adjacent to the wall, compact the upper 2 feet of fill to 95 percent of ASTM D 1557.

### 3.13 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.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch.
  - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.14 BASE COURSES

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:
  - 1. Shape base course to required crown elevations and cross-slope grades.
  - 2. Place in 12 inch maximum uncompacted thicknesses.
  - 3. Compact 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 1557.

### 3.15 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  - 1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

### 3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.
- 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 to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- 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.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION



## SECTION 32 13 13

### CONCRETE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 WHERE THESE SPECIFICATIONS APPLY

- A. Section 32 13 13 specifications are applicable to the Sherwood Festival Plaza on-site facilities.
  - 1. Public frontages to be constructed as part of this project are to be constructed in accordance with City of Sherwood City Public Works Standards.

##### 1.3 SUMMARY

- A. Section Includes:
  - 1. Vehicular Paving
  - 2. Concrete Footings
  - 3. Brick Subslab
  - 4. Concrete Curbs
  - 5. Stone Seat Wall Stem Walls
  - 6. Decorative Screen Wall

##### 1.4 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

##### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittals:
  - 1. 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. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Bonding agent or epoxy adhesive.

B. Material Test Reports: For each of the following:

1. Aggregates

#### 1.7 QUALITY ASSURANCE

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

#### 1.8 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

#### 1.9 MOCK UPS:

A. Prior to installing concrete paving, construct representative mockups for each form and pattern required to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of work, including same base construction, special features for expansion joints, and contiguous work as indicated.

1. Notify Designer of Record one week in advance of the dates and times when mockups will be constructed.
2. Provide separate mockups for concrete paving type and pattern specified and as shown on the Drawings. Each mockup shall be 4-foot by 8-foot minimum. Accepted mockups may become part of the completed Work.
3. Obtain Designer of Record's acceptance of mockups before start of final unit of work.
4. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - a. When directed, demolish and remove mockups from project site.
  - b. Accepted mockups for brick paving in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

## 1.10 MEASUREMENT AND PAYMENT

- A. Square foot price includes all Work described in this Section including incidental work necessary to construct concrete surfaces.
- B. Linear foot price includes all Work described in this Section including incidental work and appurtenances necessary to construct concrete curbs.
- C. Note that concrete footings, stem walls for stone walls, and wall for decorative screen to be included in pricing of

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Specialty concrete paving:
  - 1. Vehicular Concrete Paving in Right-of-Way: Standard concrete paving with joints and finish to match existing concrete sidewalks.
  - 2. Vehicular Concrete Paving in Festival Plaza: Integrally colored concrete paving with Davis Color Pewter 860 color admixture, see 2.5.G.2. Finish: Light broom.
  - 3. Exposed Aggregate Paving: integrally colored concrete paving with pebble pressed into surface, see 2.4.D. Color to match existing streetscape.
  - 4. Concrete Paving for areas where no type is indicated: standard concrete paving as specified herein and as shown on the Drawings, with light broom finish.

### 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 or less.
- B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affected concrete surfaces and will not impair subsequent treatments of concrete surfaces.

### 2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

- C. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.
- D. 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.
- E. Joint Dowel Bars: Plain steel bars, ASTM A615, Grade 60. Cut bars true to length with ends square and free of burrs.
- F. Epoxy-Coated Joint Dowel Bars: ASTM A 775 with ASTM A 615, Grade 60 plain steel bars.
- G. Hook Bolts: ASTM A 307, grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150, gray portland cement .
- B. Normal-Weight Aggregates: ASTM C 33 uniformly graded.
  - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Aggregate Paving: Aggregate paving to match existing streetscape aggregate paving. Aggregate is to be 1"-2" Mexican Beach Pebbles as provided by Oregon Decorative Rock, 503-646-9232, (or approved equal) pressed into concrete.

## 2.5 ADMIXTURES

- A. Provide concrete admixtures that contain no more than 0.1 percent chloride ions.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

- C. Water-Reducing Admixture: ASTM C 494 Type A.
- D. High-Range Water-Reducing Admixture: ASTM C 494 Type F or Type G.
- E. Water-Reducing and accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and retarding Admixture: ASTM C 494 Type D.
- G. Integral color admixtures:
  - 1. Type: Concentrated pigments specially processed for mixing into concrete and complying with ASTM C979.
  - 2. Vehicular Concrete Paving with project limits: Davis Color Pewter 860, available from Davis Colors 800-356-4848.
  - 3. Color Additive Delivery:
    - a. Automated Dispensing: Meter and dispense colors using computer-controlled automated color weighing and dispensing system. Use Davis Colors Chameleon liquid metering system and Hydrotint liquid color additives.
    - b. Manual Dispensing: Use Davis Colors Mix-Ready powdered color additives in pre-measured disintegrating bags.

## 2.6 CURING MATERIALS

- A. Curing materials for integrally colored concrete shall comply with complying with ASTM C309 and designed for use on integrally colored concrete.
  - 1. Davis Colors W 1000 Clear Cure & Seal, available from Davis Colors 800-356-4848 or approved equal.
- B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard., complying with AASHTO M 182, Class 2.
- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
  - 1. Waterproof paper.
  - 2. Polyethylene film.
  - 3. White burlap-polyethylene sheet.
- D. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, class A or B, wax free.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I Class B.
  - 1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.
- F. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

## 2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, 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 meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 4000 psi.
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.44
  - 3. Slump Limit: 4 inches, plus or minus 1 inch.

## 2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. 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

- 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.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

### 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.
- 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. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
  - a. Tolerance: Ensure that sawed joints are within [3 inches] either way from centers of dowels.
- D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

### 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 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 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.
- 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 bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.



- J. Curbs or 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.
- L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F 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.
- M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.7 CONCRETE 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. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

### 3.8 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/2 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a testing agency to perform tests and inspections.

### 3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by 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 32 13 13

## SECTION 32 13 73

### JOINT SEALANTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Work included in this Section: Furnish labor, material and equipment required to install concrete paving joint sealants as shown on the Drawings and as specified herein.
- B. Related Sections:
  - 1. Section 02780 – Brick Paving.
  - 2. Section 02781 – Granite Pavers.
  - 3. Section 03300 – Cast-in-place Concrete.
  - 4. Section 04400 – Stonework.

##### 1.2 SUBMITTALS

- A. Submit product data in accordance with Section 01300 – Submittal Procedures with materials list and color cards, before ordering materials.
- B. Submit sample of sealant color for use for all paving types.

##### 1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver sealant to job in manufacturer's original, unopened dated containers.

##### 1.4 PROJECT CONDITIONS

- A. The installer must examine the joint surfaces, backing, and the conditions under which the sealant work is to be performed, and notify the Contractor of conditions detrimental to the proper and timely completion of the work and performance of the sealants.
- B. Do not proceed with the sealant work until unsatisfactory conditions have been corrected.
- C. Weather Conditions:
  - 1. Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
  - 2. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.
  - 3. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Colors: For exposed materials, provide color as indicated or if not indicated, as selected by Architect from manufacturer's standard colors.
  - 1. Joint Sealants for brick paving areas: match grout colors as specified in Section 02780 – Brick Paving.
  - 2. Joint Sealants for granite paving areas: match grout colors as specified in Section 02781 – Granite Pavers.
  - 3. Joint Sealants for stonework: match grout colors as specified in Section 04400 – Stonework.
- B. Hardness: As recommended by manufacturer for application shown, unless otherwise indicated.
- C. Modulus of Elasticity: Provide the lowest available modulus of elasticity which is consistent with exposure to weathering, indentation, vandalism, abrasion, support of loading, and other requirements.
- D. Compatibility: Before purchase of each required material, confirm its compatibility with each other material it will be exposed to in the joint system.
- E. Size and Shape: As shown or, if not shown, as recommended by the manufacturer for the type and condition of joint, and for the indicated joint performance of movement.
- F. Grade of Sealant: For each application, provide the grade of sealant (non-sag, self-leveling, no-track, knife-grade, preformed, etc.) as recommended by the manufacturer for the particular condition of the installation (locations, joint shape, ambient temperature, and similar conditions), to achieve the best possible overall performance. Grades specified herein are for normal conditions for installation.

### 2.2 PAVEMENT JOINTS

- A. Provide traffic-bearing surface joints at all locations.
- B. Provide polyurethane-based, 2-part elastomeric sealant, complying with FS TT-S-00227E, Class A, Type 1 (self-leveling) unless Type 2 (non-sag) is recommended by the manufacturer for applications shown.
- C. Acceptable Product and Manufacturer: Subject to compliance with the requirements, provide one of the following products, or approved equal.
  - 1. Sonolastic SL-2, as manufactured by Sonneborn.
  - 2. Dynatred, as manufactured by Pecora Corporation.

### 2.3 JOINTS IN STONE MASONRY

- A. Expansion and Control Joint Sealant for joints in Stonework to be a one component, neutral cure, exterior grade silicone sealant and meet the following requirements:
  - 1. Tensile Strength (ASTM C794): 280 psi

2. Hardness (ASTM D751; Shore A): 25 (colored sealant) / 15 (clear sealant)
3. Weather Resistance (QUV Weather-ometer): 10000 hours (no change)

#### 2.4 MISCELLANEOUS MATERIALS

- A. Joint Cleaner: Provide the type of joint cleaning compound as recommended by the sealant manufacturer for the joint surfaces to be cleaned.
- B. Joint Primer/Sealer: Provide the type of joint primer/sealer recommended by the sealant manufacturer, for the joint surfaces to be primed or sealed.
- C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer, to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever applicable.
- D. Joint Backer-Rod: Provide closed-cell, polyethylene foam joint filler as recommended by the sealant manufacturer for the joint applications shown.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Clean joint surfaces as recommended by sealant manufacturer. Provide bond breaker between sealant and joint filler, wherever recommended by manufacturer and wherever sealant is not compatible with joint filler.
- B. Prime or seal the joint surfaces wherever shown or recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

#### 3.2 INSTALLATION

- A. Specify embedded items and anchorage devices for other work attached to or supported by cast-in-place concrete. Add specific requirements for installing embedded items, if any, that are part of the Work.
- B. Do not use sealants after compounds have "set" or when discharge is not continuous.
- C. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces.
- D. Install sealants to depths shown, or if not shown, as recommended by the sealant manufacturer.
- E. Remove excess and spillage of compounds promptly as work progresses. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- F. Repair or replace sealants which fail to perform as air-tight and water-tight joints; or fail in joint adhesion, cohesion or abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to

deteriorate in another manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated.

END OF SECTION

## SECTION 32 14 19

### BRICK PAVERS

#### PART 1 - GENERAL

##### 1.1 SECTION INCLUDES

- A. Brick pavers set in mortar setting bed for all brick paving.

##### 1.2 RELATED SECTIONS

- A. Section 32 13 73 – Joint Sealants.
- B. Section 32 13 13 – Concrete.
- C. Section 04 43 00 – Stone Masonry.

##### 1.3 REFERENCES

- A. ASTM C 67-93a: Test Methods of Sampling and Testing Brick and Structural Clay Tile.
- B. ASTM C 216-92: Facing Brick.
- C. ASTM C 902-93: Specification for Pedestrian and Light Traffic Paving Brick.
- D. ANSI A 118.4: Specifications for Latex-Portland Cement Mortar.
- E. ANSI A 118.6: Specifications for Ceramic Tile Grouts.

##### 1.4 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data for the Following:
  - 1. Brick pavers, including results of all tests specified.
  - 2. Verification of quantity and quality of granite pavers as specified herein and shown on the Drawings.
  - 3. Mortar and grout materials, including results of tests specified, and sources of aggregates.
  - 4. Expansion joint material, 12-inch length.
- C. Samples:
  - 1. Brick Samples: For verification in full-size units of each type of unit paver indicated; in sets of three for each color, texture, pattern, and surface finish specified and indicated in Drawings, showing the full range of variations expected in these characteristics.
  - 2. Grout Samples: Include similar samples of grout material in manufacturer's standard range of colors.
  - 3. Provide 12-inch length of expansion joint material.
- D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with

project names and addresses, names and addresses of Engineers and Owners, references from Owners, and other information specified.

- E. Compatibility and adhesion test reports from latex additive manufacturer indicating that mortar and grout containing latex additives have been tested with pavers for compatibility and adhesion. Include latex additive manufacturer's interpretation of test results relative to mortar and grout performance and recommendations for installation practices needed to obtain adhesion.
- F. Test reports for tests required under Field Quality Control, below.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
  - 1. Installer shall have a minimum 10 years of experience installing brick paving on concrete subslabs.
  - 2. Certified ICPI (Interlocking Concrete Pavement Institute) Installer.
  - 3. Three projects over the last five years containing a minimum of 10,000 square feet of mortar-set brick paving.
- B. Single-Source Responsibility: Obtain each color, type, and variety of brick pavers, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.
- C. Preconstruction Compatibility and Adhesion Testing: Submit samples of paving materials contacting or affecting mortar and grout that contain latex additives to latex additive manufacturer for compatibility and adhesion testing as indicated below.
  - 1. Use test methods standard with manufacturer to determine if mortar and grout materials will obtain optimum adhesion with, and will be non-staining to, installed pavers and other materials constituting the paver installation.
  - 2. Submit sufficient number of pavers and other materials involved in installation to allow comprehensive testing.
  - 3. Schedule sufficient time for testing and analysis of results to prevent delaying the Work.
  - 4. Investigate materials failing compatibility or adhesion tests and obtain mortar and grout manufacturer's written recommendations for the use of materials to obtain optimum bond and prevent staining.
  - 5. Failure of testing described above will require re-testing and re-submittal of alternative material. The cost of testing is the responsibility of the Contractor.
- D. Mockup: Prior to installing unit pavers, construct mockups for each form and pattern of unit pavers required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of work, including same base construction, special features for expansion joints,



and contiguous work as indicated.

1. Notify Designer of Record one week in advance of the dates and times when mockups will be constructed.
2. Demonstrate the proposed range of aesthetic effects and workmanship.
3. Obtain Designer of Record's acceptance of mockups before start of final unit of work.
4. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - a. When directed, demolish and remove mockups from project site.
  - b. Accepted mockups for brick paving in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect unit pavers and aggregate during the storage and construction against soilage or contamination from earth and other materials.
  1. Wrap pavers in plastic or use other packaging materials that will prevent rust marks from steel strapping.
  2. Store pavers on non-staining wood skids or pallets at least four inches above grade.
- B. Protect grout and mortar materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed. Protect liquid components from freezing.

#### 1.7 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace brick paver work damaged by frost or freezing.
- B. Weather Limitations for Mortar and Grout: Comply with the following requirements:
  1. Cold-Weather Requirements: Protect brick paver work against freezing when atmospheric temperature is 40 degrees F and falling. Heat materials to provide mortar and grout temperatures between 40 degrees F and 120 degrees F. Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated: below 40 degrees F, cover with weather-resistant membrane; below 24 degrees F, cover with insulating blankets; below 20 degrees F, provide enclosure and temporary heat to maintain temperature above 32 degrees F.
  2. Hot-Weather Requirements: Protect brick paver work when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 degree F and above.

## 1.8 SEQUENCING AND SCHEDULING

- A. Coordinate with installation of buried utilities and poured-in-place concrete and other structural components as they are constructed.
- B. Coordinate installation of brick paver work with installation of stonework, granite paving and other components.
- C. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the Work.
- D. Coordinate paver installation with other underground and overhead utilities and services. Comply with requirements of authorities having jurisdiction, franchised service companies, and controlling agencies.

## 1.9 WARRANTY AND CORRECTION OF WORK

- A. Warrant performance of paved surface as required by the General Provisions. Repair elevation irregularities greater than 1/8-inch in 10-feet immediately upon notification.

## 1.10 MEASUREMENT AND PAYMENT

- A. Square Foot price includes all work described in this Section including incidental work necessary to install brick paving, including concrete base.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers and Products: Subject to compliance with the requirements, provide products by the following manufacturers:
  - 1. Brick Pavers, manufactured by Endicott and supplied by Mutual Materials (503) 624-8860, as specified below or approved equal:
    - a. Brick: 3-5/8-inch x 7-5/8-inch x 2-1/4-inch thick (Endicott - 50% MED 77 and 50% MED 46)
  - 5. Latex-Portland Cement Mortar and Grout:
    - a. Laticrete 4237 Latex Thin Set Mortar Additive and Laticrete 3701 Grout and Mortar Admix, as manufactured by Laticrete International (800) 243-4788, or approved equal.

### 2.2 COLORS AND TEXTURES

- A. Provide materials and products that result in colors, textures and physical requirements of exposed unit paver surfaces and joints matching approved submittal samples.
- B. Where pavers are set on edge or have more than one surface exposed, provide kiln-process finish on exposed surfaces to match finish surface of flat-laid pavers. Match approved submittal samples for each type of exposed surface condition for each specified color type. Refer to Drawings for layout of brick pavers.

### 2.3 BRICK PAVERS

- A. Brick Pavers: Light-traffic paving brick; solid (uncored), unfroged brick of sizes

indicated, complying with ASTM C 902 and the following:

1. Weather Class: SX.
  2. Traffic Type: I.
  3. Application: PX.
- B. Additional Requirements:
1. Provide extruded side cut solid (uncored) brick with wire cut faces; when installed “flatwise”, expose end “grain” (vertical fiber) as extruded. Expose face with maximum abrasion resistance.
  2. Compressive Strength, Minimum: 15,000 psi for average of 5 brick, 13,000 psi for individual brick.
  3. Water absorption by 5-hour boiling test maximum; 7.0 percent for average of 5 brick; 8.0 percent for individual brick, 4.0 percent minimum.
  4. Saturation Coefficient Requirement: Not waived.
  5. Freeze/Thaw Test: Not waived.
  6. Modulus of Rupture (Flexure Test): ASTM C 67; 2,000 psi minimum for average of 5 brick; 1,600 psi minimum for individual brick.
  7. Abrasion Resistance: ASTM C 418; not over 0.040 abrasion coefficient loss for average of 5 brick, 0.060 maximum abrasion coefficient loss for individual brick.
  8. Frictional Properties: Test in accordance with ASTM C 1028, using both wet and dry surfaces and neolite rubber. The coefficient of friction shall be 0.40 minimum.
- C. Blend brick range at manufacturing plant for uniform color range and consistent percentage of color on each pallet of brick.

#### 2.4 PORTLAND CEMENT MORTAR SETTING-BED MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II.
- B. Aggregate: ASTM C 144 with a fineness module of 2.25, plus or minus 0.10.
- C. Latex additive (water emulsion), serving as replacement for gaging water, of type specifically recommended by latex additive manufacturer for use with job-mixed Portland cement and aggregate and not containing a retarder.
- D. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
- E. Water: None permitted; use only latex additive.

#### 2.5 GROUT MATERIALS

- A. Latex-Portland Cement Grout: ANSI A118.6, composition as follows:
  1. Latex additive (water emulsion), serving as replacement for gaging water, combined at Project site with dry grout mixture, with latex and dry grout mixture, as follows.

- a. Dry Grout Mixture: Factory-mixed, sanded grout complying with ANSI A118.6 and recommended by latex manufacturer, in natural color. Use latex additive without retarder with dry-set grout.
- B. Water: None permitted; use only latex additive.

## 2.6 MORTAR AND GROUT MIXES

- A. General: Comply with referenced standards and with manufacturers' instructions relative to mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout when they have reached their initial set.
- B. Cement-Paste Slush Coat: Mix slush coat to a consistency similar to that of thick cream and consisting of either neat cement and water or cement, sand, and water.
  - 1. For latex-modified Portland cement setting-bed mortar, substitute latex admixture for water per directions of latex additive manufacturer.
- C. Latex-Modified Portland Cement Setting-Bed Mortar: Proportion and mix Portland cement, aggregate, and latex additive for setting bed to comply with directions of latex additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.
  - 1. Compressive Strength, ANSI A118.4: Thick Bed Mortar – 3,000 psi minimum.
  - 2. Paver Bond Strength (Shear and Tensile), ANSI A118.4: 500 psi minimum.
  - 3. Water Absorption, ANSI A118.4: 4.0 percent maximum.
- D. Latex-Modified Portland Cement Grout: Add latex additive to dry grout mix in proportion and concentration recommended by latex additive manufacturer.

## 2.7 EXPANSION JOINT MATERIAL

- A. Non-asphaltic impregnated fiberboard.
- B. Joint sealants: see Section 02760 – Joint Sealants.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Examine surfaces indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit pavers. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 1. Where pavers are to be installed over waterproofing, examine waterproofing installation, with waterproofing installer present, for protection from paving operations. Examine areas where waterproofing system is turned up or flashed against vertical surfaces as well as horizontal waterproofing. Do not proceed with installation until protection is in place.
- B. Concrete subslab to be installed per the requirements of Section 03300 – Cast-in-Place Concrete.

- C. Aggregate Base to be installed per the requirements of Section 02235 – Aggregate Base.

### 3.2 PREPARATION

- A. Vacuum clean concrete substrates to remove dirt, dust, debris, and loose particles.
- B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

### 3.3 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubs as they are placed to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Joint Pattern: As indicated on Drawings. Completed work shall match field-constructed mockups.
- E. Pavers over Non-Cementitious Substrates: Exercise care in placing pavers and setting materials over other materials so protective materials are not displaced and substrate is not damaged. Carefully replace protective materials that become displaced and arrange for repair of damaged substrates before covering with paving.
- F. Tolerances:
  - 1. Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8-inch in 24 inches and 1/8-inch in 10 feet from level, or indicated slope, for finished surface of paving (see “Warranty and Correction of Work” above).
  - 2. Provide surfaces free of standing water (no “bird baths”).
- G. Expansion and Control Joints: Provide for sealant-filled joints at locations and of widths indicated. Provide non-asphalt impregnated joint filler as backing for sealant-filled joints where indicated. Install joint filler before setting pavers. Sealant materials and installation are specified in Section 02760 – Joint Sealants.

### 3.4 MORTARED APPLICATIONS

- A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply cement-paste slush coat mixed with latex admixture over surface of concrete subbase about 15 minutes prior to placing setting bed. Limit area of slush coat to avoid its drying out prior to placing setting bed. Do not exceed 1/16-inch thickness for cement slush coat.
  - 1. Provide green or wet screed bed throughout.
- C. Apply mortar setting bed over cement-paste slush coat immediately after latter has been applied. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

- D. Mix and place only that amount of mortar setting bed that can be covered with pavers prior to initial set. Cut back, bevel edge, remove, and discard setting-bed material that has reached initial set prior to placing pavers.
  - 1. Place reinforcing wire fabric with joints lapped at least one full mesh and supported so that the mesh becomes embedded in the middle of the setting bed. Do not butt edges against vertical surfaces.
- E. Wet brick pavers prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb the water so that they are damp but not wet at the time of laying.
- F. Place pavers before initial set of cement occurs. Immediately prior to placing pavers on green or wet setting bed, apply uniform 1/16" inch thick slurry bond coat to back of each paver with a flat trowel.
  - 1. Provide "fresh-set" system throughout (do not lay brick on hardened mortar).
  - 2. Do not add water to mortar or grout that has become too stiff to place easily. Discard stiffened mortar and grout.
- G. Tamp and beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within the indicated tolerances. Set each paver in a single operation prior to initial set of mortar; do not return to areas already set and disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- H. Spaced Joint Widths: Provide nominal joint width indicated with variations not exceeding plus or minus 1/8-inch.
- I. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining pavers and other surfaces. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free from drying cracks.
- J. Cure grout by maintaining in a damp condition for 7 days except as otherwise recommended by latex additive manufacturer.

### 3.5 FIELD QUALITY CONTROL

- A. Provide two sets of 3 test specimens (12-inch x 12-inch) of brick pavers mortared to a 4-inch concrete base slab for testing shear and tensile strength.
- B. Provide two sets of 3 test specimen cubes of mortar for compressive and/or other tests that may be considered necessary by the City.
- C. Costs of testing shall be the responsibility of the Contractor.

### 3.6 REPAIR, POINTING, CLEANING AND PROTECTION

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with mortar or grout. Point-up joints at sealant joints to provide a neat, uniform appearance, properly prepared for application of sealant.

- C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
  - 1. Remove protective coating as recommended by protective coating manufacturer and acceptable to brick and grout manufacturer and stone fabricator. Trap and remove coating to prevent it from clogging drains.
- D. Provide final protection and maintain conditions in a manner acceptable to Installer that ensures that unit paver work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 32 17 23  
PAVEMENT MARKINGS

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 painted markings applied to concrete pavement.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include technical data and tested physical and performance properties.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

1.5 MEASUREMENT AND PAYMENT

- A. Lump Sum price includes all Work described in this Section including incidental work necessary to install pavement markings.

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Columbia 17-223 Instant Dry Acrylic Latex Paint
  - 1. Color: White
  - 2. Equal as may be found acceptable to the Architect.



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

### 3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of **30** days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated (if no dimensions are indicated on the plans parking stall paint delineations shall be 4 inches wide), with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of [15 mils]
  - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

### 3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

## SECTION 32 84 00

### IRRIGATION

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. The Contractor shall furnish all labor, supervision, and materials to install a complete irrigation system as described by and implied in the Contract Documents.
  - 2. The Contractor shall repair any settling of backfilled trenches that may occur during the guarantee period, and completely restore and repair all plantings, lawn, paving, and other site improvements disturbed by this construction.
- B. Coordinate work with installation of other site work.

##### 1.2 SUBMITTALS

- A. The Contractor shall make all submittals in accordance with Section 01330 – Submittal Procedures.
- B. Product Submittals:
  - 1. Products used shall not deviate from those indicated on Contract Drawings, specified herein or approved through the substitution request process. Product submittals are required for all irrigation items.
- C. Quality Assurance Submittals:
  - 1. Submit copies of manufacturer's installation instructions for irrigation equipment.
  - 2. Submit documentation that the installer is a licensed and bonded landscape or irrigation contracting firm that specializes in and has experience in the successful installation of similar systems that include installation of centralized irrigation systems.
- D. Contract Closeout Submittals:
  - 1. The Contractor shall submit PDF format Record Drawings and shall include all approved variations or changes, indicating all sleeve, main line, lateral line, valve, wire runs, irrigation head, and other irrigation component locations to be located by field dimensions to the nearest permanent landmark, as approved by the Owner's Representative.
  - 2. The Contractor shall submit a letter of certification from the controller system manufacturer's representative stating that the controller system has been installed correctly.

##### 1.3 SITE CONDITIONS

- A. Weather Requirements:

1. Do not solvent weld polyvinyl chloride pipe (PVC) when ambient temperature is below 40° F and falling.
  2. Do not solvent weld polyvinyl chloride pipe in wet conditions, without adequate cover.
- B. Schedule for Installing Pipe Sleeves, Conduits and Sprinkler Heads:
1. Coordinate with other trades as required to schedule installation of pipe sleeves and conduits below paving and walks prior to installation of paving and walks.
  2. Schedule installation of sprinkler heads after final grading.

#### 1.4 DAMAGES

- A. Any structures or facilities damaged by work on this project shall be restored to equal or better than original condition at the Contractor's expense and to the satisfaction of the Owner's Representative.
- B. The Contractor shall be responsible for all damage caused by leaks or breaks in the equipment and materials furnished or installed in this contract for 1 year after the date of final acceptance.

#### 1.5 EXISTING UTILITIES

- A. The Contractor shall verify, locate, and identify, with visible marking, all existing underground utilities in the areas of work and maintain such markings until all work in those areas is complete. If utilities are to remain in place, the Contractor shall provide adequate means of protection during excavation operations.
- B. Should uncharted piping or other utilities be encountered during the execution of the work, the Contractor shall notify the Owner's Representative immediately and consult with the utility owner for instructions before proceeding with the work.
- C. The Contractor shall cooperate with the Owner and public or private utility companies in keeping their respective services and facilities in operation. If it becomes necessary to temporarily interrupt existing services or facilities, the Contractor must provide temporary utility services to the satisfaction of the Owner's Representative.

#### 1.6 PERMITS AND REGULATIONS

- A. The Contractor shall obtain all necessary permits and inspections as applicable and required for the project. All work detailed and specified herein shall be accomplished in strict accordance with the applicable local, state, and federal codes and regulations.

#### 1.7 RECORD DRAWINGS

- A. The Contractor shall maintain a current record of all pipe, wire, and equipment placement, and shall record all variations or changes approved by the Owner's Representative. Changes in layout of proposed work shall be recorded on the Record Drawing Set in blue pencil or ink. Additions to the proposed scope of work shall be recorded on the Record Drawing Set in green pencil or ink. Deletions either in the proposed scope of work or by a change in layout shall be recorded on the Record Drawing Set in red pencil or ink.

- B. Record Drawings must be submitted to the Owner's Representative for review and approval on a weekly basis.

## 1.8 SUBSTITUTIONS

- A. Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements".
- B. If materials other than those specified in the Contract Documents are proposed, the Owner's Representative shall determine whether such materials or methods are a suitable or equal substitute. The irrigation system described in the Contract Documents is based on specific GPM output, static and operating pressures. Approved substitutions may require partial or complete redesign of the system at the Contractor's expense. The Owner's Representative's decision will be final.

## 1.9 WARRANTIES

- A. Manufacturer's Warranty: Provide equipment manufacturer's standard warranty for control valves, and heads.
- B. Installer's Guarantee:
  - 1. Provide installer's 1-year guarantee for entire system to the Owner's Representative at the time of final acceptance, showing the date of completion, which shall be the beginning of the guarantee period.
  - 2. Guarantee shall include repair of trench backfill that settles more than ½" or of plantings, paving, and walk materials damaged by settlement of trench backfill soils during the guarantee period.

## 1.10 MEASUREMENT AND PAYMENT

- A. Lump Sum price includes all Work described in this Section including incidental work necessary to install irrigation systems.

## PART 2 PRODUCTS

### 2.1 PIPE

- A. All main line PVC (Polyvinyl Chloride Plastic) pipe shall be PVC 1220, Type 1, normal impact, I.P.S., N.S.F. approved and shall conform to ASTM D1784-69, ASTM D1785, and PS22-70. All main line pipe size 3" and smaller shall be Schedule 40 PVC. All main line pipe size 4" and larger shall be Class 315 PVC.
- B. All PVC lateral line pipe shall be Schedule 40 PVC pipe and shall conform to ASTM D1784-69, ASTM D1785, and PS22-70. All PVC pipe shall be new, defect free, and continuously and permanently marked with the manufacturer's name or trademark, size, schedule and type of pipe. Minimum pipe size shall be 3/4-inch.

### 2.2 PIPE FITTINGS and unions

- A. All PVC fittings shall be PVC 1220, Schedule 40, type 1, normal impact, I.P.S., N.S.F. approved and meeting the requirements of ASTM D-2466.

- B. All PVC nipples shall be standard weight Schedule 80, with molded threads.
- C. All PVC fittings for electrical conduits shall be sweep fittings.
- E. Unions shall be Spears 897 series grey Schedule 80 PVC, line size.

### 2.3 PVC CLEANER AND PRIMER

- A. "Weld-On P-75". All equals for "Weld-On P-75" shall meet the requirements of ASTM F-656.

### 2.4 PVC SOLVENT CEMENT

- A. In all circumstances use "Weld-On 725". All equals for "Weld-On 725" shall meet N.S.F. approval for Type I and II PVC through 3" and meeting requirements of ASTM D-2564.

### 2.5 PVC SLEEVES AND CONDUITS

- A. All sleeves for irrigation main and lateral lines shall be Schedule 40 PVC and shall be sized as detailed.
- B. All electrical conduit for control wires shall be Schedule 40 PVC, gray in color.

### 2.6 BACKFLOW DEVICE

- A. See Civil Drawings.

### 2.7 IRRIGATION HEADS

- A. As shown on Drawings.

### 2.8 DRIP LINE SYSTEMN AND ACCESSORIES

- A. Drip Line: Hunter HDL-06-18-PC, for subsurface installation.
  - 1. Row Spacing: 18-inches on center or equally spaced between 14 and 18-inches on center. Drip lines and headers shall be installed 4-inches from edge of planting beds or planter walls.
- B. Drip Line Fittings: Hunter PLD-LOC fittings, adapters for PVC piping for manufacturer's recommendations.
- C. Drip Control Zone Kits: Drip Control Zone Kits: Hunter ICZ 1LF, sized as shown on the Drawings.
- D. Flush Valve: Spears 2622, line size.
- E. Tie Down Stakes: Rain Bird TSD-050

### 2.9 MANUAL VALVES

- A. Quick-Coupling Valves: Hunter HQ-44-LRC quick-coupling valves with locking cover. Provide 2 keys and swivels.
- B. Isolation Valves: Nibco T-113 Bronze Gate Valves, line size.
- C. Gate Valves: OS&Y, Rising Stem, Resilient-Seated Gate Valves:

1. Standard: AWWA c515, pressure rating 250 psig min. Body material – ductile iron w/ bronze trim. End connections – flanged.

#### 2.10 VALVE BOXES AND VALVE BOX COVERS

- A. Valve Boxes Control Valves: Highline 12-inch standard, Model 071497, with 6-inch extensions as needed to facilitate required installation.
- B. Valve Boxes for Quick Coupling and Isolation Valves: Highline 10" diameter, with 6-inch extensions as needed to facilitate required installation.

#### 2.11 VAULT FOR BACKFLOW PREVENTION DEVICE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. Oldcastle Infrastructure Vaults:
    - a. Up to 56 inches interior length: 25-TA communications vault.
    - b. Up to 66 inches interior length: 55-LA or 644-LA electrical vaults

#### 2.12 SWING JOINT ASSEMBLIES

- A. Polyethylene Pipe Swing Joint Assemblies: Where "poly-pipe" swing joint assemblies are detailed on plans and in details the "poly-pipe" shall be flexible black tubing constructed of virgin linear low density polyethylene material. The tubing shall have a wall thickness of 0.090-inch (+/- 0.010-inch). It shall have an inside diameter of 0.490-inch (+/- 0.010-inch) for use with 'spiral barb' fittings without the necessity of glue or clamps. The model number and logo of the manufacturer shall be printed at no less than 12-inch intervals along the length of the pipe. Each section of pipe used shall be capable of pressure testing at the rate of 100 lbs./sq.in. to a minimum burst pressure of 475 lbs./sq.in.. All pipe must have an operating pressure rating of 80 lbs./sq.in. at 110 degrees F.
- B. Spiral Barb Fittings for Polyethylene Swing Joint Assemblies: All fittings shall be constructed specifically for use in constructing "poly-pipe" swing assemblies. The fittings shall have a maximum operating water pressure of 80 lbs./sq.in.. All fittings shall be constructed of UV resistant, thermoplastic material and be so designed to permit twist-in insertion eliminating the need for glue or clamps.
- C. Triple swing joints:
  1. For quick coupling valves, all threaded nipples to be Sch. 80 PVC and all threaded fittings shall be 40 PVC.

#### 2.13 CONTROLLER AND CONTROLLER ACCESSORIES

- A. Controller: Calsence CS3-8-S/CS3EN/FM 1U outdoor controller with standalone locking metal pedestal to be provided by irrigation installer, see irrigation drawings. Provide additional compatible station zone expansion modules as required to run the complete irrigation system as well as 4 additional zones for future expansion.
- B. Flow Sensor: Flomec 1"
- C. Master Valve: Superior, normally closed

## 2.14 WIRE, CABLE AND ELECTRICAL CONNECTORS

- A. Control Valve and Tracer Wires: 14 gauge copper wire designed for 24 volts or greater, Type UF, Underwriter's Lab (UL) approved for direct burial in NEC Class II circuits.
  - 1. Remote control valve pilot wires shall be red in color.
  - 2. Remote control ground wires shall be white in color.
  - 3. Extra remote control valve wires shall be blue in color.
  - 4. Tracer wires shall be yellow in color.
- B. Electrical Connectors for all irrigation wires: 3-M DBY/DBR, Rain Bird Snap-Tite or Pen-Tite PVC Socket and Sealing Plus.

## 2.15 OTHER MATERIALS

- A. Pipe Joint Tape: Pipe joint tape shall be a minimum of ½-inch wide Teflon tape intended for use in wrapping threaded PVC pipe fittings and joints, as required.
- B. Drain Rock: ¾-inch to ¼-inch washed round rock, with no fines.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Do not allow any work to be covered or enclosed until it has been inspected, pressure tested, and approved by the Owner's Representative.
- B. Installation of all materials and equipment shall be in strict accordance with the manufacturer's written specifications and recommendations and with local and state codes, whether detailed or not. The Contractor is responsible for calling to the immediate attention of the Owner's Representative any conflicts between the manufacturer's written specifications and recommendations, local and state, and the Contract Documents. The Owner's Representative may require the Contractor to correct to the Owner's Representative's satisfaction any work installed that results from such conflicts at no additional cost to the Owner.
- C. The location of pipe, sprinkler heads, valves, and other equipment shall be as detailed and shall be the size and type indicated. No changes shall be made without prior approval by the Owner's Representative. Minor changes necessary to conform to ground conditions may be made by the Contractor without the Owner's Representative's prior consent in order to ensure the smooth progress of the work. However, all such changes are subject to approval by the Owner's Representative and must be recorded on the Record Drawings.
- D. Permission to shut off any water lines must be obtained in writing from the Owner's Representative prior to the beginning of any work. Disruptions in service shall be kept to a minimum.
- E. The Contractor shall be responsible for maintaining the system and protecting it from all damage, including damage caused by vandalism or adverse weather conditions, until date of final acceptance. The Contractor shall be responsible for repairing such damage at no additional cost to the Owner.
- F. The Contractor shall maintain at the site a clean copy of the drawings for recording changes to the project. All changes shall be recorded within 24 hours of occurrence.

### 3.2 TRENCHING

- A. A minimum depth of cover to the top of irrigation piping shall be as follows:
  - 1. All lateral lines shall have 18-inches minimum and maximum 18-inches depth of cover.
  - 2. Where multiple pipes are laid in common trench, the Contractor must maintain a minimum separation of 2-inches in any direction between all pipe.
  - 3. All sleeves and conduits shall have 24-inches minimum and 30-inches maximum depth of cover.
- B. Remove all lumber, rubbish, and rocks from irrigation trenches. Irrigation lines shall have a firm, uniform bearing surface for the entire length of each line. Wedging or blocking of pipe is not permitted.
- C. Before back-filling trenches, all pipe shall be flushed clear and clean of all dirt and foreign material.
- D. Backfill trenches in layers of not more than 6-inches in depth and compact each layer. Fill trenches to finish grade with native or imported topsoil keeping the top 12-inches free of rock. Restore surface to original or better than original condition.
- E. Any materials or equipment damaged or destroyed while back filling shall be repaired or replaced by the Contractor at no additional cost to the Owner.
- F. Backfilling under all paved areas shall conform to minimum density and compaction requirements as described in applicable specification sections.

### 3.3 PIPE

- A. Exercise care in handling and storing all pipe and fittings. Store materials under cover before using. Transport materials in a vehicle of adequate size and capacity to prevent bending or the concentration of an external load at any point on the materials. Any materials or portions of materials that show such damage shall be discarded and replaced.
- B. Remove all foreign matter and dirt from inside pipe or fittings before lowering into the trench.
- C. Install all pipe and fittings per the manufacturer's specifications. Use the specified primer and cement on all glue joints. Use Teflon tape on all threaded joints.
- D. Snake pipe in trenches to allow for expansion and contraction as recommended by the manufacturer.
- E. At all installed joints cut pipe ends square and remove all burrs.
- H. Where Pipe is installed under pedestal paving system, route strategically to minimize conflicts. In order to prevent movement, mainlines shall be securely fastened to pedestal system with cable ties at 4' maximum spacing. Where pipe is in direct contact with pedestals or any other elements that may abrade the pipe, the pipe shall first be wrapped with specified PVC pipe foam tape.

### 3.4 VALVES

- A. Install within shrub planting areas whenever possible. Install as detailed and as recommended by the manufacturer, complete with valve box and extension(s) and as detailed. All valve boxes shall be installed so that the top of the box is flush with



adjacent finish lawn grade or 1-inch above planting area grade, after settling. Valves shall not be manifolded and shall be located no closer than 3' on center apart. Owner's Representative shall approve final valve locations prior to commencement of trenching operations.

- B. See Plumbing drawings for installation of all valves located inside the building.

### 3.5 CONTROLLER, CONTROLLER ACCESSORIES AND RAIN GAUGE

- A. Install as shown on the drawings and as recommended by the manufacturers.
- B. Coordinate with other trades as necessary to facilitate complete installation.
- C. Contractor shall meet on-site with the controller manufacturer's representative, prior to commencement of installation of controller.

### 3.6 IRRIGATION SLEEVES

- A. Install sleeves for irrigation lines and/or control wire under pavement prior to placing pavement materials. Extend sleeves beyond pavement edge a minimum of 12-inches. All sleeves shall be installed with a minimum depth of cover to the top of the pipe of 24-inches. If length of required sleeve is greater than the length of the unit of pipe, solvent weld all joints required. Otherwise all sleeves shall be of one continuous length of pipe.
- B. Tape ends of sleeve closed to keep soil out of the sleeve until irrigation lines and/or control wire are installed.
- C. Stake both ends of sleeves with a readily visible stake extending 12-inches above grade and below grade to the bottom of the sleeve. Mark the above grade portion of the stake with the words "Irrig. Sleeve". Remove stakes after sleeves are recorded on the Record Drawings and after irrigation lines and/or control wires are installed and inspected.
- D. In areas of new paving, place a minimum of 4-inches of sand backfill over the top of all sleeves before back-filling with soil or other subgrade materials.
- E. Where sleeves pass under concrete paving or curbs, concrete shall be marked with a marking tack as described in the concrete section.

### 3.7 IRRIGATION WIRING AND CABLES

- A. Tape control wires and cables in trench under main line or lateral lines whenever they occur in the same trench. Place control wires in electrical conduits or sleeves under all paving and when not in common trench with main line or lateral lines.
- B. Make all wire and splices moisture proof using specified electrical connectors. Splices shall be made in valve boxes only. All splices shall be noted on Record Drawings. Provide a minimum of 1-foot of coiled slack between all wire splices.
- C. Control wires shall be bundled together and wrapped with electrical tape at intervals of no more than 10-feet. Wires shall be placed below mainline or laterals when in same trench.
- D. Sharp bends or kinks in wires and cables shall not be permitted. Wires shall be unreeled in place alongside of or in the trench and shall be carefully placed along the bottom of the trench. Wire shall not be unreeled and pulled into trench from one end.

- E. Install tracer wires with all lateral line pipes and sleeves, taped to top of pipe or sleeve at 10-foot intervals with electrical tape. Where pipes tee off, make wire connections with specified waterproof connectors.
- F. For control wires, cables and tracer wires, provide 18-inches loop of extra wire in all valve boxes.
- G. Contractor shall install all remote control valve wires and cables from valves to controller shown at the approximate location on the Drawings. Contractor shall coordinate with other trades as necessary to facilitate this installation.
- H. Label all installed wires on each end with waterproof tags for all wires including those for future use.

### 3.8 IRRIGATION CONTROLLER

- A. The Contractor is responsible for providing a power source and making connections to the specified controller locations in accordance with the manufacturer's standard specifications and all applicable local and state codes.
- B. The Contractor shall install controllers as detailed and as recommended by the manufacturers.
- C. The Contractor shall determine the sizes and quantities of all conduits coming into the controller that will be required for all specified wiring. The use of smaller gauge wiring than specified in order to route through undersized conduits shall not be allowed.
- D. All wiring within the building shall be installed with securely mounted conduits.

### 3.9 FLUSHING AND TESTING

- A. Thoroughly flush all piping before testing and installation of irrigation heads and before back-filling any trenches.
- B. The Contractor shall not allow or cause any work to be covered before it has been inspected and approved. Work covered before approval shall be uncovered at the Contractor's expense.
- C. Soil may be placed in trenches between fittings to insure the stability of the line under pressure. In all cases, fittings and couplings must be open for visual inspection for full period of test. No testing shall be done until the last solvent welded joint has had a minimum of 24-hours to set and cure.
- D. Before testing, fill pipe with water and expel all air from pipes. Thrust blocks and all valves shall be in place prior to filling the main line with water for testing.
- E. Minimum pressure test on mainline, valves, joints and fittings, shall be 100-lbs./sq.in. without losing more than 1-pound per square inch during a period of 1-hour. Lateral lines shall be visually inspected by the Owner's Representative at line pressure with swing joints installed and capped. The Contractor shall first perform the tests for himself and repair any leaks or defects. The Contractor shall then notify the Owner's Representative at least 24-hours in advance and complete another test in the presence of the Owner's Representative for approval. All testing shall be done with a certified pressure gauge supplied by the Contractor.
- F. The Contractor shall adjust and balance the irrigation system to provide uniform coverage prior to commencement of planting operations. The Contractor shall change or adjust heads and/or nozzles as required to provide uniform coverage and match final grades. Upon completion of all systems and coverage tests performed by and for the

Contractor, the Contractor shall notify the Owner's Representative at least 24 hours in advance, and perform another coverage test in the presence of the Owner's Representative for approval.

- G. Where inspected work does not comply with specified requirements or if pressure tests fail, replace the rejected work until re-inspected by the Owner's Representative and found to be acceptable. The Contractor shall credit the Owner, against the contract amount, at the rate of \$75.00/hr. for re-inspection of failed tests.

### 3.10 CLEAN-UP

- A. Upon completion of the work, clean up all boxes, wrappings, excess materials, and other rubbish resulting for this work and leave the site in original or better condition.

### 3.11 FINAL SUBMITTAL

- A. Submit Record Drawings and project manuals. Provide owner with laminated 11x17 zone chart with each zone numbered and color coded to identify zone and area of coverage. Record Drawing Document to be provided in PDF format to Owner as well.
- B. Provide training to Owner as described in Paragraph 1.2 D.

END OF SECTION

SECTION 32 91 19

SOIL PREPARATION

PART 1 GENERAL

1.1 SUMMARY

- A. This section covers all Work necessary to furnish and place imported topsoil and general preparation of planting areas as denoted on plan.
- B. Related Sections:
  - 1. Section 31 20 00 – EARTHWORK
  - 2. Section 32 84 00 – IRRIGATION
  - 3. Section 32 93 00 – TREES SHRUBS AND GROUNDCOVER

1.2 PROTECTION

- A. Protect existing trees to be preserved as denoted on plan, and other features such as fences, roads, sidewalks, paving, and curbs as final work.

1.3 DEFINITIONS

- A. Imported Topsoil: Natural or cultivated surface-soil layer containing organic matter, sand, silt, and clay particles: fertile, friable, pervious natural fine sandy loam, or silt loam, a darker shade of brown or gray than underlying subsoil, with a pH range of 5.5 to 7, 4 percent organic material minimum, free of subsoil, stones or hard earth 1-inch or larger, free of noxious weeds (including quack grass and horsetail), roots, stones, sticks or other extraneous material.

1.4 SUBMITTALS

- A. The Contractor shall make all submittals in accordance with Section 01 30 00-ADMINISTRATIVE REQUIREMENTS.
- B. Submit manufacturer's or vendor's certified analysis for soil amendments, fertilizer and other materials. Submit other data substantiating that materials comply with specified requirements. Such certificates may be tags, labels, and manufacturer's literature, and all submittals shall be reviewed for approval by Architect prior to installation.
- C. Submit 10-inch by 10-inch ziplock bag sample for each type of aggregate specified.
- D. Product data and proof of purchase for all fertilizers and soil amendments, as well as other specified amendments.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver packaged materials in manufacturer's unopened containers fully identified by name, brand, type, weight and analysis.
- B. Store and handle packaged materials to prevent damage and intrusion of foreign matter.
  - 1. Maintain stockpiled topsoil in designated areas. Provide erosion control measures for stockpiled topsoil on site to prevent contamination of the soil.
- C. Submit receipts of all fertilizers and compost to Owner's Representative.

## 1.6 SITE CONDITIONS

- A. Topsoil placement and soil preparation shall not take place during periods where saturated soil or surface water is present in work areas.
- B. Work shall not take place when temperature is less than 32° F. or soil is frozen.
- C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before placing topsoil.
- D. Utilities: Determine location of above grade and underground utilities and perform work in a manner that will avoid damage. Hand excavate as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

## 1.7 PROTECTION

- A. Provide adequate measures to protect workers and passersby at the site. Execute all works in an orderly and careful manner with due consideration for any and all surrounding areas, plantings, or structures which are to remain. Protect all adjacent property and improvements from work damage, and replace any portions damaged through this operation.

## PART 2 PRODUCTS

### 2.1 IMPORTED TOPSOIL

- A. Landscape Blend #2 from ProGrow (503) 628-3500 or approved equal. Soil to be ASTM D 5268. pH range of 5.5-7, 4 percent organic material minimum, free of stones and gravel and other extraneous material that will interfere with planting and are harmful to plant growth.
- B. Free of noxious weeds as designated in this Section and as listed by State of Oregon Dept. of Agriculture.
- C. Obtain from a well-drained site.

## PART 3 EXECUTION

### 3.1 EQUIPMENT

- A. Contractor shall furnish and maintain earth-moving and compaction equipment in satisfactory condition and shall operate such equipment as necessary to control uniform density, and smoothness.

### 3.2 INSPECTION

- A. Verify site conditions and note irregularities affecting work in this Section.
- B. Beginning work of this section means acceptance of existing conditions.

### 3.3 EXCAVATION HANDLING

- A. Remove all foreign matter obtained from site soil cleaning, screening and/or picking process from the site and legally dispose of as required by the appropriate jurisdiction. Dispose of all waste off-site.

### 3.4 SHRUB AND GROUNDCOVER PLANTING AREAS

- A. This section pertains to those areas on-site where ground covers and shrubs are scheduled to be planted.
- B. Excavate and remove existing topsoil to a 18-inch depth and stockpile on site.
- C. Grade subgrade as necessary to achieve finish elevation prior to adding topsoil. Thoroughly rototill subgrade to a minimum 6-inches depth for approval.
- D. Place topsoil backfill a 6-inch liftS, watering lightly to allow topsoil to settle between lifts. Add additional topsoil to bring soil level to grades shown on Drawings.
- E. See Section 32 93 00 – Trees, Shrubs and Groundcover for mulch placement in beds.

### 3.7 SOIL PREPARATION FOR PLANTING PITS OF TREES AND SHRUBS

- A. Thoroughly mix 3 parts approved topsoil with 1 part yard debris compost and 2 lbs. of Woodburn fertilizer "Pro Ornamental" per cubic yard 14/18/12 slow release. Place in planting pits as specified in Section 32 93 00-TREES, SHRUBS AND GROUNDCOVER.
- B. Grade smooth to elevations shown on Contract Documents.

### 3.8 FINAL FINISH GRADING

- A. All Topsoil and Conditioner placement shall not be performed when satisfactory results cannot be obtained due to rain freezing weather, or other unsatisfactory conditions.

- B. Rocks, stones, sticks, brush, roots, and other objectionable materials shall be removed and disposed of off-site.
- C. All areas to be planted shall be graded and floated to eliminate water holding depressions and pockets.
- D. Undulations and unsightly variations in grade that will not permit the use of normal mowing equipment without scalping or missing shall be re-graded and floated to smooth surfaces.
- E. Grading tolerance shall be within  $\pm 1$ -inch from finish grades. All areas shall be graded to provide positive drainage. Owner's Representative shall review grades prior to Contractor proceeding with further construction, irrigation or planting.
- F. All planted areas shall be machine or hand worked to eliminate objectionable lumps and soil clods, as deemed necessary by the Owner's Representative. Tillage shall include the removal of all equipment ruts and tracks, areas of compaction or erosion, and any other undesirable soil conditions which would prevent the proper formation of a finely pulverized seedbed, as directed by Owner's Representative.
- G. Finish grade after full settlement, not including mulch, shall be 1-inch below tops of curbs, walks, or existing grades in shrub, groundcover and ornamental grass areas, and  $\frac{1}{2}$ -inch lower in seeded grass areas.

### 3.10 UTILITY PROTECTION

- A. Contractor shall be responsible for protecting all existing and proposed water lines, underground utilities, and any other subsurface features while excavating and working on the project site

END OF SECTION

## SECTION 32 93 00

### TREES, SHRUBS, AND GROUNDCOVER

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. The work included in this section, whether mentioned or not, shall consist of all labor, tools, materials, tests, permits, and other related items necessary for the installation of all plant materials as shown on the drawings and/or as specified in the Specifications.
- B. The work in this section includes:
  - 1. Trees, plants, and groundcover.
  - 2. Staking.
  - 3. Mulching.
  - 4. Fertilizer.
  - 5. Pruning.
  - 6. Weed Control.
  - 7. Maintenance.

##### 1.2 RELATED WORK

- A. Topsoil placed and graded to a grade tolerance of +/-0.1-foot prior to start of the landscape work.
- B. Grass and weed removal for planting areas shall be performed per these specifications.

##### 1.3 REFERENCES

- A. American National Standards Institute:
  - 1. ANSI A300 - Tree Care Operations - Tree, Shrubs, and Other Woody Plant Maintenance - Standard Practices.
  - 2. ANSI Z60.1 - Nursery Stock.

##### 1.4 SUBMITTALS

- A. Certified Confirmed Orders: Certify in writing to the Owner's Representative within 30 days of the award of the contract, confirmed orders for plants and provide the quantity, location, phone number, and address of the grower who has agreed to provide any plant material. Should the Contractor neglect to provide this documentation within the allocated time, Contractor may forfeit any substitution benefits. Landscape architect will visit nursery to inspect and tag trees secured by Contractor.
- B. Certificates: Certificates required by law shall accompany shipments. Upon completion of the installation, submit certificates to the Owner's Representative.



- C. Quantity Certification: Provide certification of quantities of mulch, fertilizer, herbicide, and planting accessories delivered to the site.
- D. Maintenance Log: Provide calendar dates/sequencing of all maintenance activities to be performed after Final Acceptance.

#### 1.5 QUALITY ASSURANCE

- A. Tree Pruning: ANSI A300 Pruning Standards for Woody Plants.
- B. Field Superintendent – Provide one person who shall:
  - 1. Be present at all times during execution of work in this section;
  - 2. Be familiar with the materials and best methods for installation;
  - 3. Direct work performed under this section.
  - 4. Be a Certified Landscape Technician, certified by the Oregon Landscape Contractors' Association.
- C. Government Inspection: All plants and planting material shall meet or exceed the specifications of federal, state, and county laws requiring inspection for plant disease and control.
- D. Industry Standards: Quality definitions, size tolerances and caliper-to-height ratios shall be no less than minimums specified in American Standards for Nursery Stock, published by American Association of Nurserymen, Inc., ANSI Z60.1-1990.
- E. Provide documentation that all plant material has been sourced and procured from nurseries that do not use neonicotinoids.
- F. Owner reserves the right to reject any or all plant material at any time until final review and acceptance. Remove rejected plants immediately from site.
- G. Produce upon request, sales receipts for all nursery stock and certificates of inspection from federal, state, and other authorities.

#### 1.6 CHANGE ORDERS AND SUBSTITUTIONS

- A. The Contractor shall provide all plants of the size, species, variety, and quality noted and specified. If unavailable, the Contractor shall notify the Owner's Representative in writing immediately and provide the names and telephone numbers of five nursery suppliers that he has contacted. If substitution should be permitted, it can be made only with the prior written approval of the Owner. The nearest variety, size, and grade as approved by the Owner's Representative shall then be furnished.

#### 1.7 QUALIFICATIONS

- A. Installer: The Contractor installing work covered by this specification section must be a state licensed and bonded Landscape Contractor. Contractor must be 2-5 year experienced in landscape work of best-accepted trade practices and have equipment

and personnel adequate to perform the work specified. Contractor must be familiar and comply with American Standard for Nursery Stock published by the American Association of Nurserymen.

#### 1.8 PRE-INSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing work of this section.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Notify Owner's Representative of delivery schedule so plant materials may be inspected upon job site delivery. Remove unacceptable products immediately from job site.
- B. Storage and Handling: Protect products against damage or dehydration. Cover plant roots and root balls with soil or other accepted material upon job site delivery if not to be planted within four hours. Store plant material in light shade and protect against harmful weather until planted. Maintain plant materials not to be planted within four hours.
- C. Plant material damaged as a result of delivery, storage or handling will be rejected.
- D. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

#### 1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install plant life when ambient temperatures may drop below 35°F or rise above 90 °F.
- B. Do not install plant life when wind velocity exceeds 30 mph.

#### 1.11 COORDINATION

- A. Install plants after finish grading and coordinate with installation of underground irrigation system piping and sprinkler heads, and installation of root barriers.
- B. Coordinate the removal of grass and weeds for planting areas prior to work in this section.

#### 1.12 PROTECTION

- A. Protect Existing Site Improvements: Verify location of underground facilities prior to doing work. Protect active service lines whether indicated or not. Repair and make good any damage to service lines or improvements caused by planting operations.
- B. Barricade or Cover Excavations: Barricade or cover as necessary all excavations to protect pedestrians & workers.

- C. Contractor is responsible for protecting plant material through final acceptance.

#### 1.13 WARRANTY

- A. Warranty begins at date of substantial completion.
- B. Plant materials must be in healthy condition at end of a one-year warranty period, or for one full growing season from substantial completion, whichever is longer.
- C. Contractor is responsible to assume liability for all plant material and to warranty plants against disease, insect infestation, desiccation, sun scald, freeze damage, or any other condition that would cause plants to be unhealthy or to die through substantial completion.
- D. Replace all trees, shrubs, and groundcovers when plants are no longer in a satisfactory growing condition as determined by the Owner for the duration of the Warranty period. Make replacements within seven days of notification from the Owner. Remove dead plants within two days of notification and mark the planting plan showing the exact location of replaced plants.
- E. Contractor is not responsible for damage to plants due to vandalism, theft, or accidental damage from pedestrians during the warranty period.

#### 1.14 MAINTENANCE

- A. Begin maintenance immediately after planting.
- B. Maintain trees, shrubs and other plants until Final Acceptance. After Final Acceptance and all punch list items have been addressed, begin the Maintenance Period. The Maintenance Period shall last 90 days from the date of Final Acceptance.
- C. During the maintenance period maintain trees, shrubs and other plants by watering, pruning, cultivating, weeding and replenishing mulch as required and needed for healthy growth. Restore planting basins. Adjust and repair stake supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required and approved by City to keep trees, shrubs, and other plantings free of insects and disease. Rake and remove leaves and debris from deciduous plant foliage.
  - 1. Contractor shall provide resources for bed weeding every two weeks through the duration of the maintenance period. Contractor to provide a monthly report stating hours spent maintaining the landscape and activities. For every month that maintenance activities do not occur per these specifications, the maintenance period shall be extended one month.

#### 1.15 PERMITS, CODES, AND REGULATIONS

- A. The Contractor shall obtain and pay for all necessary permits and fees as required by local authority and prevailing ordinances and/or codes.

- B. The Contractor shall keep fully informed and shall comply with all existing laws, codes, ordinances, and regulations which in any way affect the conduct of the work.

## PART 2 PRODUCTS

### 2.1 TREES, PLANTS, AND GROUNDCOVER

- A. All plants shall be nursery grown, or normal habit of growth, healthy, vigorous and free of disease, insect eggs and larvae. Plants shall not be pruned prior to delivery. Plants shall have all leaders and buds intact. Grading of plant material and root ball / container sizes shall be in accordance with the code of standards of the American Association of Nurserymen.
- B. Provide the number of plants shown graphically on the Landscape Drawing or listed on the Plant Materials List, whichever is greater, or to cover at specified spacings.
- C. Tree with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leader, bark abrasions, sunscald, disfiguring knots, insect damage, or cuts of limbs over ¾-inch in diameter that are not completely closed will be rejected.
- D. Plants are required to be from stock acclimated to 'Project Site' environmental conditions, having been consistently cultivated and grown under these conditions.
- E. Root Protection: Large plants Balled and Burlapped (B&B) with natural ball of size to ensure healthy growth. Small plants container-grown furnished in removable containers or integral peat pots well rooted to ensure healthy growth. Grow container plants in containers from six months to two years prior to delivery with roots filling container but not root bound.
- F. Plant Names: Plants shall be true to name and one of each bundle or lot shall be tagged with the common and botanical name and size of the plants in accordance with the standards of practice of the American Association of Nurserymen and shall conform to Standardized Plant Names, 1942 Edition, published by J. Horace McFarland Company. In all cases, botanical names shall take precedence over common names.

### 2.2 FERTILIZER

- A. Fertilizer: Agriform planting tablets, 10 and 21 gram, or approved equal.

### 2.3 PRE-EMERGENT HERBICIDE

- A. Ronstar G, granular or approved equal.

### 2.4 MULCH MATERIALS

- A. Bark Mulch: Commercial product, medium ground hemlock bark mulch. Bark shall be medium ground, dark hemlock bark of uniform color, free from weeds, seed, sawdust,

and splinters and shall not contain resin, tannin, wood fiber or other compounds detrimental to plant life. Source shall be from freshwater mill.

## 2.5 ACCESSORIES

- A. Tree Wrap: Corrugated or crepe paper, designed specifically to resist insect infestation and sun scald.
- B. Stakes: 2-inch x 2-inch x 8 feet rough, Douglas fir stakes, standard and better grade, free of large knots, pre-stained with one coat oil base wood stain, Olympic Redwood Natural Tone #717 or approved equal.
- C. Cable, Wire and Accessories: 3/32-inch minimum 5 strand galvanized steel wire rope. Install 12- inch length of ¾-inch PVC pipe flag on evergreen guys. 5/16-inch galvanized turnbuckles and eye hooks.
- D. Tree Ties: Broad belt-type strapping or plastic chain (min. ½-inch width). Submit sample for approval.
- E. Tree Staples: 2 per tree in tree grates. Manufactured by Tree Staple, info@treestaple.com, 908-626-9300, or approved equal.

## 2.6 WATER

- A. Contractor shall make, at Contractor expense, whatever arrangements are necessary to ensure an adequate water delivery system to meet the needs of this Contract. The Owner will make water available to the Contractor from the existing domestic water meter on site.
- B. Water for plant irrigation must be clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of plants.

## 2.7 ANTI-DESICCANT

- A. Anti-desiccant shall be 'Wilt-Pruf', or approved equal, delivered in manufacturer's containers and used in accordance with manufacturer's recommendations.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify prepared subsoil and planting beds are ready to receive the Work of this section, including the removal of grass and weeds per these specifications and as shown on the drawings.

### 3.2 SOIL PREPARATION

- A. Prepare planting bed soils per specification Section 32 91 19, LANDSCAPE GRADING, TOPSOIL, AND SOIL PREPARATION.

### 3.3 EXCAVATION

- A. Excavate planting pits or beds for trees, shrubs, and groundcover consistent with good horticultural practices. The inside surfaces of all planting holes are to be rough, not smooth. If the Contractor encounters any unusual condition which, in his opinion, is detrimental to the new planting, he shall notify Owner's Representative immediately.

### 3.4 PLANTING

- A. Contractor shall field stake tree locations for approval. Make required field adjustments as directed without additional cost to the Owner. The right to make minor adjustments in layout is reserved by the Owner.
- B. Place all plants as shown on drawings. Plant upright and orient to give best appearance or relationship to adjacent plants and structures. Place all shrubs 5 feet from trails, all trees 10 feet from trails. Notify Owner's Representative for review and approval of final orientation.
- C. Tree Base: Place a 2-inch lightly compacted layer of prepared planting soil under root system.
- D. Set plants in prepared pits or beds. Loosen and remove twine binding and burlap from top one-half of root balls. Weeds in the top of root balls must be removed prior to planting.
- E. Place bare root plant materials so roots lay in natural position.
- F. Cut off cleanly all broken or frayed roots.
- G. Backfill planting hole with prepared planting mix material comprised of a mixture of native topsoil and compost. When planting hole is one-half backfilled, fill with water and let stand until water is absorbed into soil. Continue topsoil fill and when planting hole is three-fourths filled, place planting tablets evenly spaced around each plant or tree. Provide the following quantities per plant or tree:
  - 1. 4-inch potted plant: one 10 gram tablet.
  - 2. Gallon container shrubs up to 12-inch spread: two 10 gram tablets.
  - 3. Shrubs 15-inch to 36-inch spread: four 10 gram tablets.
  - 4. Shrubs 36-inch and larger spread: three 21 gram tablets.
  - 5. Evergreen trees: four 21 gram tablets.
  - 6. Deciduous trees up to 1½-inch caliper: three 21 gram tablets.
  - 7. Deciduous trees 1½-inch caliper: four 21 gram tablets.
  - 8. Deciduous trees 2- inch and larger: five 21 gram tablets.

- H. Place and compact topsoil backfill to finish grade and provide 2-inch depressed water basin at each shrub and tree.
- I. Water each plant thoroughly upon completion of planting. Initial water-in of trees and shrubs by underground sprinkler system is not permitted.
- J. Remove non-biodegradable root containers and all plant pots from site.

### 3.5 WEED CONTROL

- A. Apply pre-emergent herbicide according to the manufacturer's directions on the planting beds that will not be seeded, after planting and before mulching. No herbicide shall be applied to areas of annual flower plantings, as shown on plans. Herbicide must be applied by a licensed chemical applicator. **WARNING:** Pre-emergent herbicide will prevent germination of lawn grass seed. The Contractor shall use his best judgment during application procedures to avoid lateral movement of chemical into lawn areas. The Contractor may elect to skip certain portions of planting beds if lateral movement of chemical cannot be avoided. Notify Owner's Representative of areas that did not receive herbicide. Contractor is still responsible for weed control until final acceptance.

### 3.6 INSTALLATION OF ACCESSORIES

- A. Stake all deciduous trees. Refer to planting details.
- B. Brace plants vertically with plant support(s) specified and per planting details.
- C. Contractor shall make all possible efforts to provide favorable conditions for healthy plant growth, and should notify the Owner's Representative immediately upon concerns and/or conflicts with design drawings.

### 3.7 FIELD PRUNING

- A. Prune trees and shrubs to remove damaged branches.
- B. Paint all cuts more than ½-inch in diameter with tree paint approved by American Association of Nurserymen.

### 3.8 MULCH

- A. Apply a 2½-inch layer of specified mulch over all planting areas after planting and rake to a smooth finish grade.
- B. Provide mulch layer around newly planted trees as detailed.
- C. At existing trees, provide a 5-foot diameter mulch ring at base of tree, 2-inches thick, but keep mulch from touching actual base of tree trunk.

### 3.9 ADJUSTMENT AND CLEANING

- A. Remove and replace plants or materials not meeting specified standards.
- B. Areas are to be kept clean during progress of work until completion.
- C. Pressure Washing of Concrete, Masonry, and Asphaltic Paving: Any paved area or surfaces stained or soiled from landscaping materials having been hauled, carried or spilled over or around it shall be cleaned with a power sweeper using water under pressure. Building surfaces shall be washed with proper equipment and materials as approved by the Owner's Representative.

### 3.10 MAINTENANCE

- A. Maintain plant life immediately after placement. Continue maintenance through substantial completion.
- B. Protect and maintain work in this specification section against all defects of materials and workmanship. Maintenance of all the planted areas shall include, but not be limited to, watering, mowing, weeding, herbicide and insecticide applications, cultivation of beds, mulch replacement, guys, turnbuckles, and stakes, and pruning as well as replacement of any plants that appear to be in distress.
- C. Irrigate when necessary to avoid drying out of plant materials, and to promote healthy growth.
- D. It is understood that following the 90 day maintenance period, the Owner will be responsible during the Warranty period for normal landscape maintenance of the project.

### 3.11 FIELD QUALITY CONTROL

- A. Plants will be rejected when ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

END OF SECTION



## SECTION 32 94 00

### SITE FURNISHINGS

#### PART 1 GENERAL

##### 1.1 SUMMARY

A. The work in this section includes:

1. Site furnishings include but are not limited to bollards, tree grates, interpretive signs, ADA signage, area drain grates, and Owner furnished items.
2. Decorative Screen
3. Festival Canopy and poles.

B. References:

1. American Society of Testing and Materials (ASTM).

##### 1.2 SUBMITTALS

A. Product Data: Submit to Owner's Representative two sets of manufacturer's technical data and installation instructions for each item, with list of accessory items. Clearly indicate options of size, model, and finish.

##### 1.3 QUALITY ASSURANCE

A. Manufacturing Standards: Provide each item of equipment as a complete unit produced by a single manufacturer, including fittings, accessories, bases, and anchorage devices.

B. Construction: Construct each item and ship to the site in minimum number of sections.

##### 1.4 WARRANTY

A. Provide / submit to Owner's Representative the manufacturer's warranty for each product / item supplied by Contractor. Contractor shall warrant each product / item for one year minimum.

##### 1.5 PROJECT CONDITIONS

A. Existing Conditions: Locate all underground utilities and modify work, as approved by Owner's Representative, if necessary to avoid conflicts.

##### 1.6 MEASUREMENT AND PAYMENT

1. Lump sum price includes all Work described in this Section including incidental work necessary to construct Site furnishings including but not limited to bollards, tree grates, interpretive signs, ADA signage, area drain grates, and Owner furnished items.
2. Lump sum price includes all Work described in this Section including incidental work necessary to construct Decorative Screen, including concrete wall and footings.
3. Lump sum price includes all Work described in this Section including incidental work necessary to construct Owner provided Canopy and poles, including pole footings.

## PART 2 PRODUCTS

### 2.1 BIKE RACK

- A. Bike rack as manufactured by Landscape Forms, (800) 521-2546 powder coated dark bronze. Embed mount as shown on plans.

### 2.2 TREE GRATE

- A. Tree Grate as manufactured by Urban Accessories, product is OT-T24, 4'x6', ductile iron with rust conditioner finish, (877) 487-0488.
- B. Tree Grate frame as manufactured by Urban Accessories, product is Type "P", 4'x6', pedestrian loading, mild steel with raw finish, (877) 487-0488.

### 2.3 BOLLARDS

- A. Removable Bollard as manufactured by Tournesol Site Works (510) 240-6847.
  1. Removable Bollard is B-1, 4-inch schedule 40, 36-inch height, with collars and rivets, color: Dark Bronze powdercoated. Provide galvanized steel receiver, receiver cover and a lockwell cover.
- B. Bollard as manufactured by Tournesol Site Works (510) 240-6847.
  1. Bollard is B-1, 4-inch schedule 40, 36-inch height, embed mount, with collars and rivets, color: Dark bronze powdercoated.

### 2.4 DECORATIVE SCREEN FENCE

- A. Decorative Screen Fence as shown on Drawings.
  1. Provide shop drawings showing all fabrication, steel, fasteners and attachments.
  2. Unless otherwise noted: all steel to be ASTM A36.

3. Perforated Panel Type 1 available from the Western Group (503) 222.1644. ¼ gauge, ½-inch round perforations, 11/16-inch staggered centers held back 2-inches from edge.

4. Perforated Panel Type 2 available from the Western Group (503) 222.1644. Rectangular inline, opening ¾-inch by 2-3/8-inch center inline, gauge ¼-inch, held back 2-inches from edge.

B. All steel, fasteners, plates and screens to be powder-coated. Color TBD.

## 2.5 ADA SIGNAGE

A. All ADA signage to meet applicable Local, State and Federal Codes. ADA sign post to be powder coated, color TBD.

## 2.6 FESTIVAL CANOPY – OWNER PROVIDED; CONTRACTOR INSTALLED

A. The festival canopy includes site poles (fixtures not included – contractor supplied and installed), fabric canopy and attachments for the canopy. The site poles and canopy is being supplied by Northwest Playground (503) 991-3604. Reference specifications are included in the appendix for this Owner provided item. Contractor to supply and install all electrical including lights, duplexes and other equipment as shown on the electrical drawings.

1. The light poles and canopy are Owner Provided. Materials will be delivered to the Sherwood Public Works storage yard by March 1, 2023. Contractor is responsible for picking up, loading and delivering material to the site. Contractor is responsible for installing light poles and canopies per the drawings and specifications. Contractor is responsible for erection of the poles, site lighting and electrical lighting and footings.

## 2.5 INTERPRETIVE SIGN

A. Interpretive sign material include steel and interpretive sign as shown on Drawings. Sign to be manufactured by GXI Inc, (503) 238-1509. Text and photos for sign to be supplied in an eps format by the Architect.

## 2.6 AREA DRAIN GRATE

A. Area drain grate as manufactured by Urban Accessories, (877) 487- 0488, OT Title 24 ductile iron, 12-inch square with rust conditioner.

B. Area drain grate as manufactured by Urban Accessories, (877) 487- 0488, Standard ADA, ductile iron, 24-inch square with rust conditioner.

## 2.7 SKATE DETERRENTS

- A. Skate deterrent material to be A304 stainless steel and be fabricated as shown on Drawings.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Examine surfaces or conditions where Site Furnishings are to be erected. Notify the Owner's Representative of any conditions detrimental to the proper and timely completion of the work. Do not proceed with installation until unsatisfactory conditions have been corrected and are acceptable to the installer.

#### 3.2 INSTALLATION

- A. Install work in this section in accordance with the manufacturer's recommendations and as approved by the Owner's Representative. All furnishings to be installed plumb and true.
- B. Secure furnishings with expansion anchor bolts as recommended by manufacturer.

#### 3.3 FOOTINGS

- A. All site furnishings: unless specified otherwise by manufacturer, comply with the following:
  - 1. Excavate for concrete footing to neat, clean lines in undisturbed soil. Provide forms in unstable soil conditions.
  - 2. Footings shall be sized and installed, including reinforcement as recommended by manufacturer.
  - 3. Top of footing in unpaved areas: 1-inch above finish grade. Slope toward edge of footing to prevent water pooling.

#### 3.4 CLEAN-UP

- A. Clean up excess materials and debris from project site upon completion of work or sooner if directed.
- B. Leave in a neat and tidy condition daily.

END OF SECTION

SECTION 33 11 00  
WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
- C. Field quality-control test reports.
- D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- D. NSF Compliance:
  - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
  - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.4 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others.

## 1.5 COORDINATION

- A. Coordinate connection to water main with utility company. Connection shall be by city approved tapping contractor only. All work by general contractor.

## PART 2 - PRODUCTS

### 2.1 PIPE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.
  - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- B. Hard Copper Tube: ASTM B 88, Type K, water tube, drawn temper.
  - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- C. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- D. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Gaskets: AWWA C111, rubber.

- E. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
  - 1. Grooved-End, Ductile-Iron Pipe Appurtenances:
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - i. Anvil International, Inc.
      - ii. Victaulic Company of America.
  
- F. PVC, Schedule 80 Pipe: ASTM D 1785.
  - 1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
  - 2. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.
  
- G. PVC, AWWA Pipe: AWWA C900, Class 150, with bell end with gasket, and with spigot end.
  - 1. Comply with UL 1285 for fire-service mains if indicated.
  - 2. PVC Fabricated Fittings: AWWA C900, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  - 3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  - 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Gaskets: AWWA C111, rubber.
  - 5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

## 2.2 JOINING MATERIALS

- A. Refer to Division 2 Section "Piped Utilities - Basic Materials and Methods" for commonly used joining materials.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series.
- C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

## 2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

- B. Tubular-Sleeve Pipe Couplings:
  - 1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
    - a. Standard: AWWA C219.

## 2.4 WATER METERS

- A. Water meters will be furnished and installed by Tualatin Valley Water District.

## 2.5 BACKFLOW PREVENTERS

- A. Double-Check and double detector check, Backflow-Prevention Assemblies:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    - b. Conbraco Industries, Inc.
    - c. FEBCO; SPX Valves & Controls.
    - d. Flomatic Corporation.
    - e. Watts Water Technologies, Inc.
    - f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
  - 2. Standard: AWWA C510.
  - 3. Operation: Continuous-pressure applications, unless otherwise indicated.
  - 4. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
  - 5. Size: 3" and 4"
    - i. Configuration: Designed for horizontal, straight through flow.

## 2.6 WATER METER BOXES

- A. Water meter boxes will be furnished and installed by contractor, in accordance with Tualatin Valley Water District.

## 2.7 CONCRETE VAULTS

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
  - 1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.



## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Refer to Division 312000 Section "Earthwork" for excavating, trenching, and backfilling.

### 3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be any of the following:
  - 1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
  - 2. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.
- F. Vault Water-Service Piping NPS 3/4 to NPS 3 shall be hard copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
- G. Underground Fire-Service-Main Piping NPS 4 to NPS 8 shall be any of the following:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed joints.
  - 2. PVC, AWWA Class 150 pipe listed for fire-protection service; PVC fabricated or molded fittings of same class as pipe; and gasketed joints.
- H. Vault Fire-Service-Main Piping NPS 4 to NPS 8 shall be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

### 3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
  - 2. Use the following for valves in vaults and aboveground:
    - a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising stem.
    - b. Gate Valves, NPS 3 and Larger: AWWA, cast iron, OS&Y rising stem, metal seated.

### 3.4 PIPING INSTALLATION

- A. Water-Main Connection: Make connections in accordance with Tualatin Valley Water District standards and specifications.
- B. Comply with NFPA 24 for fire-service-main piping materials and installation.
  - 1. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- D. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- E. Bury piping with depth of cover over top at least 30 inches, with top at least below level of maximum frost penetration.
- F. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
  - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- G. Sleeves are specified in Division 2 Section "Piped Utilities - Basic Materials and Methods."
- H. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

### 3.5 JOINT CONSTRUCTION

- A. See Division 2 Section "Piped Utilities - Basic Materials and Methods" for basic piping joint construction.
- B. Make pipe joints according to the following:
  - 1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
  - 2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
  - 3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.

4. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
5. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Piped Utilities - Basic Materials and Methods" for joining piping of dissimilar metals.

### 3.6 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
  1. Concrete thrust blocks.
  2. Locking mechanical joints.
  3. Set-screw mechanical retainer glands.
  4. Bolted flanged joints.
  5. Heat-fused joints.
  6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
  1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
  2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
  3. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- C. MSS Valves: Install as component of connected piping system.
- D. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

### 3.8 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install bypass piping around backflow preventers.
- C. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

### 3.9 CONCRETE VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C 891.

### 3.10 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
  - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

### 3.11 IDENTIFICATION

- A. Install continuous detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 312000 Section "Earthwork."

### 3.12 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
  - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.

2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
  3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION

## SECTION 33 41 00

### STORM UTILITY DRAINAGE

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
  - 1. Piping materials.
  - 2. Cleanouts.
  - 3. Catch Basins and Area Drains.

##### 1.2 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports. Product Data: For each type of product indicated.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

##### 2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

##### 2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

##### 2.4 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings NPS 10 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
  - 1. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
  - 2. Corrugated PE Pipe and Fittings NPS 12 and Larger: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
  - 3. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

##### 2.5 PVC Type PSM Sewer Piping

- A. Pipe: ASTM D3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.

- B. Fittings: ASTM D3034, PVC with bell ends.
- C. Gaskets: ASTM F477, elastomeric seals.

## 2.6 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
  - 1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
  - 2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1. Available Manufacturers:
    - a. Dallas Specialty & Mfg. Co.
    - b. Fernco Inc.
    - c. Logan Clay Products Company (The).
    - d. Mission Rubber Company; a division of MCP Industries, Inc.
    - e. NDS Inc.
    - f. Plastic Oddities, Inc.

## 2.7 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  - 1. Available Manufacturers:
    - a. Josam Company.
    - b. MIFAB Manufacturing Inc.
    - c. Smith, Jay R. Mfg. Co.
    - d. Wade Div.; Tyler Pipe.
    - e. Watts Industries, Inc.
    - f. Watts Industries, Inc.; Enpoco, Inc. Div.
    - g. Zurn Industries, Inc.; Zurn Specification Drainage Operation.
  - 2. Top-Loading Classification(s): Heavy duty.
  - 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

## 2.8 CATCH BASINS

- A. Catch Basins:
  - 1. Description: welded 1/4-inch plate steel, trapped, coated inside and outside with asphaltic paint meeting Oregon Plumbing Code.
  - 2. Shop welded no-hub outlet with integral cleanout option.
  - 3. Grate: 24" Standard ADA grate by Urban Accessories or approved equal.
  - 4. Acceptable Manufacturers:
    - The Lynch Company.
    - a. Gratemaster, Inc.

- b. Gibson Steel Co.
- B. AREA DRAINS:
  - 1. Description: welded 10 gauge steel, trapped, coated inside and outside with asphaltic paint. Meeting Oregon Plumbing Code.
  - 2. Shop welded no-hub outlet with integral cleanout option.
  - 3. Grate: OT Title 24 by Urban Accessories 12" Square or approved equal.
  - 4. Acceptable Manufacturers:
    - The Lynch Company.
    - a. Gratemaster, Inc.
    - b. Gibson Steel Co.

## 2.9 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
  - 1. Cement: ASTM C 150, Type II.
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
  - 4. Water: Potable.
- B. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

## PART 3 EXECUTION

### 3.1 PIPING APPLICATIONS

- A. Pipe couplings and fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
  - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
  - 2. Unshielded flexible couplings for same or minor difference OD pipes.
  - 3. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
  - 4. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- B. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:
  - 1. ASTM D-3034
  - 2. NPS 3 to NPS 6: Hub-and-spigot, Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  - 3. NPS 3 to NPS 6: Corrugated PE drainage pipe and fittings, soiltight couplings, and coupled joints.
  - 4. NPS 8 to NPS 15: Hub-and-spigot, Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  - 5. NPS 8 to NPS 15: Corrugated PE drainage pipe and fittings, soiltight couplings, and coupled joints.



### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Install gravity-flow, nonpressure drainage piping according to the following:
- E. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
  - 1. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
  - 2. Install piping with 36-inch minimum cover.
  - 3. Install piping below frost line.
  - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
- F. Clear interior of piping and drains of dirt and superfluous material as work progresses.

### 3.3 PIPE JOINT CONSTRUCTION

- A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
  - 1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
  - 2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
  - 3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

### 3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  - 2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
  - 3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

### 3.5 WATER QUALITY CATCH BASIN

- A. Install per manufacturer's written instructions.

### 3.6 CONNECTIONS

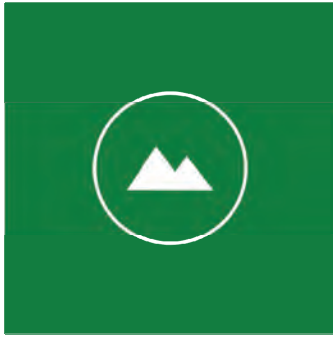
- A. Connect nonpressure, gravity-flow drainage piping to building's storm building drains specified in Division 15 Section "Storm Drainage Piping."

### 3.7 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  - 1. Submit separate report for each system inspection.
  - 2. Defects requiring correction include the following:
- B. Alignment: Less than full diameter of inside of pipe is visible between structures.
- C. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
- D. Crushed, broken, cracked, or otherwise damaged piping.
- E. Infiltration: Water leakage into piping.
- F. Exfiltration: Water leakage from or around piping.
  - 1. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  - 2. Reinspect and repeat procedure until results are satisfactory.
- G. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  - 4. Submit separate report for each test.
  - 5. Air Tests: Test storm drainage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
- H. Option: Test plastic gravity sewer piping according to ASTM F 1417.
- I. Leaks and loss in test pressure constitute defects that must be repaired.
- J. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

**END OF SECTION**

**Division Six**  
**Supplemental Information**



# Pali Consulting

June 30, 2022

Lango Hansen Landscape Architects  
Attn: Kurt Lango, Brett Hoornaert  
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Portland, OR 97209

## **Report of Geotechnical Engineering Services**

Sherwood Festival Plaza  
Sherwood, Oregon  
Project #163-22-001

## 1.0 INTRODUCTION

Pali Consulting, Inc. (Pali Consulting) presents this report of geotechnical services for the Sherwood Festival Plaza Project, located at the intersection of SW 1<sup>st</sup> Street and NW Pine Street in Sherwood, Oregon. The site is an approximately 8,000 square feet gravel parking lot that will be improved so that it can also be used as a temporary community space. The improvements are expected to include brick and concrete paving, light poles that will also support temporary canopy structures, and an art fence on a concrete footing / stem wall. The location of the site is shown on Figure 1.

Our scope of work included reviewing background information, completing machine drilled borings in representative locations throughout the site, completing laboratory testing on select samples, and preparing this report. Our work was completed in general accordance with our agreement with Lango Hansen Landscape Architects (Lango Hansen), dated April 25, 2022.



## 2.0 BACKGROUND REVIEW

### 2.1 GEOLOGY

The geology in the area is mapped on the Oregon Department of Geology and Mineral Industries' (DOGAMI) website (<https://gis.dogami.oregon.gov/maps/geologicmap/#>, accessed May 2022). The website maps the parcel within Missoula Flood deposits. This formation is described as fine-grained unconsolidated sediments associated with the Missoula Flood. Columbia River Basalt is mapped nearby and likely underlies the Missoula Flood Deposits at depth.

### 2.2 WELL LOG DATA

Boring logs for nearby wells were reviewed to evaluate nearby subsurface conditions (OWRD, accessed May 2022). In general, nearby well logs showed about 15-20 feet of sand overlying silt or sandy silt to depths of up to 60 feet. Static water levels were not noted in any of the well logs reviewed.

### 2.4 SOILS MAPPING

We reviewed soils mapped at the site on the Natural Resource Conservation Service (NRCS) website (<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>, accessed May 2022). Soil mapping shows that the site is entirely underlain by Aloha silt loam, which has a parent material of old loamy alluvium and is typically found on terraces. A typical profile of the soil consists of silt loam from 0 to 65 inches, with depths to the water table of around 18 to 24 inches and restrictive features of more than 80 inches. The soil is further described as being somewhat poorly drained with a moderately high capacity of the most limiting layer to transmit water (0.20 to 0.57 inches per hour)

## 3.0 SITE CONDITIONS

### 3.1 SURFACE CONDITIONS

The site consists of a gravel parking lot bound to the northeast by NW Pine Street, to the northwest by SW First Street, to the southwest by commercial buildings, and to the southeast by a paved alleyway. It lies on flat ground and the only existing vegetation is a row of trees along the southwest edge of the parking lot which create a screen between the lot and adjacent commercial buildings. Surface elevation at the site is approximately 200 feet above mean sea level (MSL).

### 3.2 SUBSURFACE CONDITIONS

To evaluate subsurface conditions, we completed four machine-drilled borings, designated B-1 through B-4, to depths ranging between approximately 21.5 feet to 26.5 feet below ground surface (bgs). Boring B-3 was split into borings B-3A and B-3B due to auger refusal in fill at 2.5 feet bgs in B-3A. The approximate locations of our explorations are shown on Figure 2.

Our site explorations were completed on May 20, 2022. Descriptions and logs of our subsurface explorations are included in Appendix A.

Our site explorations generally encountered fill to variable depths, underlain by silty soils with varying sand to up to 25 feet bgs. In general, sand content increased with depth and transitioning to silty sand in the bottom of the deepest boring. More detailed descriptions of the units we encountered are provided below.



### 3.2.1 *Fill*

Our explorations encountered variable fill to depths of 5 to 7.5 feet bgs, consisting of:

- 14 to 16 inches of granular base was encountered at the surface in all borings. In borings B-3A, B-3B, and B-4 crushed brick was present within the granular base. The granular base was very dense and auger refusal was met in boring B-3A at 2.5 feet bgs.
- Below the gravel/base rock, fill the following materials were encountered:
  - Crushed concrete, brick, and glass continued to about 5 feet bgs in B-3A/B and that was very dense,
  - Stiff to very stiff silt fill was present in the remaining borings; B-1, B-2, and B-4 from depths of 5 to 7.5 feet bgs. The silt fill appeared dry with two moisture content tests measuring 22 to 25 percent moisture. The silt fill appeared similar to the native silts, as described following, so the contact between these units is interpreted, and the actual contact may be variable.

### 3.2.3 *Silt*

Below the fill we encountered native silt with variable sand that extended to depths of approximately 21.5 to 25 feet bgs. This silt was primarily brown with frequent grey, tan, orange, red, and yellow mottles. The silt was moist to wet, with measured moisture contents ranging from 33 to 45 percent. The silt varied from medium stiff to stiff, with stiffness generally decreasing with depth. Blow counts (N-values) ranged from 1 to 9 in the borings, with an average of 5. The silt was determined to be non-plastic, based on Atterberg limits testing of two samples. Mottling of the soils was noted below the first few feet of the ground surface. The silt contained 15 to 25 percent sand (75 to 85 percent passed the Number 200 Sieve).

### 3.2.4 *Silty Sand*

Below the silt, we encountered silty sand in our deepest boring, B-4 from 25 to 26.5 feet bgs, the maximum depth of our explorations. The sand was brown and wet, with a moisture content of 30 percent in the sample tested. The silty sand was medium dense based on an SPT N-value of 11 in the one SPT measured. Fines content was measured at 35 percent in the sample tested (65 percent sand).

### 3.2.6 *Groundwater*

Groundwater was encountered in B1, B2, B-3B, and B4 at approximately 11, 10, 7.5, and 15 feet bgs, respectively. Seasonal groundwater is almost certainly higher than 7.5 feet bgs, and most likely there is intermittent saturation within 5 feet or less of the ground surface during the rainy season, based on soil mottling and moisture content. Saturation is expected to be intermittent and localized, however, with transient perched layers during the wet season.

We also note that groundwater elevations can vary due to the time of year, precipitation, and other factors.

## 4.0 CONCLUSIONS

Based on our explorations, testing, and analyses, it is our opinion that the proposed project is feasible from a geotechnical perspective, provided the recommendations in this report are included in design and construction. We offer the following general summary of our conclusions:

- The site is underlain by variable fill in the upper 5 to 7.5 feet, over native silt to about 25 feet bgs. The fill is dense and includes some construction debris, while the silt is generally medium stiff and non-plastic. The silt grades to sand at about 25 feet bgs and which is medium dense.



- Seasonal groundwater is estimated to be high, probably within about 5 feet bgs, with perched layers even above this depth during wetter periods of the year.
- Silt soils at the site are anticipated to undergo strain softening during a design seismic event and where submerged, based on N-values and their low plasticity. This will reduce lateral resistance but is anticipated to have minor effects on vertical bearing capacities.
- Excavation and handling of site soils should be readily accomplished with conventional earthwork equipment in good working condition. However, the upper fill is very dense and will require toothed excavation buckets and equipment of a sufficient size to excavate through it.
- Silt fill and native soils are expected to be moisture-sensitive, and the contractor should be responsible to protect them during wet weather/conditions.
- Native soils at the site are generally medium stiff/medium dense or better and should be capable of supporting anticipated structures and infrastructure without excessive deflections. The use of a shallow foundation system bearing on native soils or fill on such soils is suitable for the proposed art fence; however, footings should not be founded on the existing fill. Drilled piers should be suitable to support the luminaire/tent support foundations.
- Pavements can be supported on existing fill or on new/reconstructed fill. If placed on existing fill, there is some risk of future displacement that the owner should accept in exchange for the reduced cost of fill replacement compared to new/reconstructed fill. Pavement design and construction should follow the recommendations in this report.

The following sections provide our specific recommendations for geotechnical components of the project.

## 5.0 EARTHWORKS RECOMMENDATIONS

Based on the available information and existing grades, we anticipate that grading for the site will generally be limited to cuts and fills of less than 4 feet. All earthwork activities should be conducted in general accordance with City of Sherwood (City) Engineering Design and Standard Details Manual (September 2020) the Oregon Department of Transportation (ODOT) Standard Specifications for Construction (SSC). We recommend earthworks be completed per the requirements of the SSC 00330 – Earthwork and SSC 02600 – Aggregates, depending upon the application (ODOT, most recent edition), and the following recommendations.

### 5.1 SITE AND SUBGRADE PREPARATION

We understand that the site will have minimal grade change and be mostly covered with pavements except minor landscape areas. Preparation of subgrades for pavements and for foundations to support the art fence should be completed per *Sections 5.7.1 - Pavement Subgrade Preparation* and *6.1.1 - Footing Subgrade Preparation*, respectively, of this report.

The site is covered with very dense gravel fill, so subgrade disturbance is expected to be minimal where working from existing grades. However, if areas of thinner gravel fill are present or where excavations extend to or near finer-grained soils, subgrade disturbance could occur. If site preparation activities cause subgrade disturbance, recompaction of disturbed areas or replacement with structural fill might be necessary. Greater disturbance could occur if site preparation and earthwork are conducted during periods of wet weather when the moisture content of the soil could exceed optimum moisture content. Therefore, if site grading and fill placement occur during wet weather conditions, wet weather procedures should be used. Wet weather procedures could include working progressively across the site from the existing gravel fill or thickened gravel pads, if necessary, the use of track-mounted equipment, the use of granular



haul roads, or other methods to limit subgrade disturbance. We recommend that the contractor be responsible to protect the subgrade during construction by means and methods appropriate to their equipment, operations, and staging.

## **5.2 EXCAVATION**

Site soils within expected excavation depths will generally consist of gravel fill with some debris, overlying silty fill and native soils with varying moisture content. The gravel fill is expected to be very dense and silt soils medium stiff. It is our opinion that conventional earthmoving equipment in proper working condition should be capable of making necessary general excavations in these site soils. However, the earthwork contractor should be responsible to provide the equipment and procedures to excavate the site soils described in the exploration logs and text of this report. Loosened material or pumping subgrades at the base of excavations should be moisture-conditioned and compacted as structural fill or replaced with granular structural fill, as described elsewhere in this report, prior to placing additional fill or pouring concrete.

## **5.3 EXCAVATION DEWATERING**

Groundwater is not likely to occur within the depths of expected excavations during the dry season. During the wet season, however, perched groundwater could occur within planned excavation depths. If groundwater is encountered, sump pumps placed in the excavations should be sufficient for dewatering in most situations.

Surface water inflow to the excavations during the wet season could be problematic.

Provisions for temporary ground and surface water control should be included in the project plans and should be installed prior to commencing work.

## **5.4 EXCAVATION STABILITY**

Excavation sidewalls should stand near-vertical to a depth of approximately 4 feet, provided perched or near-surface groundwater seepage does not affect the sidewalls. All trench excavations should be made in accordance with applicable Occupational Safety and Health Administration (OSHA) and state regulations. On-site granular and silt soils are anticipated to be OSHA Type C and B, respectively. We recommend that excavations deeper than 4 feet be shored or laid back at inclinations of 1.5 horizontal to 1 vertical (1.5H:1V) and 1H:1V for Type C and B soils, respectively, or flatter.

While this report describes certain approaches to excavation, the contractor is responsible for selecting and designing the specific methods, monitoring the excavations for safety, and providing shoring required to protect personnel and adjacent structural elements.

## **5.5 STRUCTURAL FILL AND BACKFILL**

Structural areas include all areas beneath foundations, pavements, and any other areas intended to support structures or within the influence zones of structures.

Structural fill soils should be free of debris, roots, organic matter, frozen soil, man-made contaminants, particles with greatest dimension exceeding 4 inches, and other deleterious materials. The suitability of soil for use as structural fill will depend on the gradation and moisture content of the soil. As the fines content of the soil increases, the soil becomes increasingly more sensitive to small changes in moisture content and achieving the required degree of compaction becomes more difficult or impossible.





### 5.5.1 On-Site Soils

The on-site fill and native silt soils can be used as structural fill provided the material meets the above general requirements and the specific requirements of the intended application.

The crushed gravel fill can be re-used as structural fill if any deleterious material and oversized particles are removed and if it is well-graded.

The fine-grained fill and native soils may be used as structural fill but may be difficult to compact during the wet season because the material is sensitive to small changes in moisture content and is difficult or impossible to compact when just a few percentage points above optimum moisture. Based on our experience, the on-site silty soils will likely require moisture conditioning to achieve proper compaction. If the material cannot be properly moisture conditioned, we recommend using imported granular material for structural fill.

### 5.5.2 Imported Granular Fill

Imported granular material used as structural fill should be pit or quarry run rock, crushed rock, or crushed gravel and sand and should meet the specifications provided in SSC 00330.14 – Selected Granular Backfill or SSC 00330.15 – Selected Stone Backfill. The imported granular material should also be angular, fairly-well graded between coarse and fine material, have less than 6 percent by dry weight passing the U.S. Standard No. 200 Sieve, and have at least two mechanically fractured faces. The material should be placed and compacted in lifts with maximum uncompacted thicknesses and relative densities as recommended in the tables that follow. During dry weather, the fines content may be increased to a maximum of 12 percent.

### 5.5.3 Aggregate Base

Imported granular material used as aggregate base beneath pavements or footings should be clean, crushed rock or crushed gravel and sand that is fairly-well graded between coarse and fine. The base aggregate should meet the specifications of SSC 00641 – Aggregate Subbase, Base, and Shoulder Base Aggregate, depending upon application, with the exception that the aggregate have less than 5 percent by dry weight passing a U.S. Standard No. 200 Sieve based on the minus 3/4-inch fraction and have at least two mechanically fractured faces. The aggregate base should have a maximum particle size of 1 inch.

The aggregate base material should be placed and compacted in lifts with maximum uncompacted thicknesses and relative densities as recommended in the tables that follow.

### 5.5.4 Trench Backfill

Utility trench backfill for pipe bedding and in the pipe zone should consist of well-graded granular material with a maximum particle size of 3/4-inch and less than 10 percent fines. The pipe bedding and fill in the pipe zone should meet the pipe manufacturer's recommendations. Above the pipe zone imported granular fill or aggregate base rock may be used, consistent with the overlying use of the area. The pipe bedding and backfill should be placed and compacted in lifts with maximum uncompacted thicknesses and relative densities as recommended in Table 4.

## 5.6 FILL PLACEMENT AND COMPACTION

Structural fill should be placed and compacted in accordance with the following guidelines.

- Place fill and backfill on an approved subgrade prepared as recommended in *Sections 5.7.1 – Pavement Subgrade Preparation and 6.1.1 – Footing Subgrade Preparation*. Place fill or backfill in uniform horizontal lifts with a thickness appropriate for the material type and compaction equipment. Table 1 provides general guidance for lift thicknesses.



**Table 1. Guidelines for Uncompacted Lift Thickness**

Compaction Equipment	Guidelines for Uncompacted Lift Thickness (inches)		
	Native Soil	Granular and Crushed Rock (Maximum Particle Size < 1½")	Crushed Rock (Maximum Particle Size > 1½")
Plate Compactors and Jumping Jacks	4 – 8	4 – 8	Not Recommended
Rubber-Tire Equipment	6 – 8	10 – 12	6 – 8
Light Roller	8 – 10	10 – 12	8 – 10
Heavy Roller	10 – 12	12 – 18	12 – 16
Hoe Pack Equipment	12 – 16	18 – 24	12 – 16

Note:

- The above table is based on our experience and is intended to serve as a guideline. The information provided in this table should not be included in the project specifications.
- Use appropriate operating procedures to attain uniform coverage of the area being compacted.
  - Place fill at a moisture content within about 3 percent of optimum as determined in accordance with ASTM Test Method D 1557. Moisture condition fill soil to achieve uniform moisture content within the specified range before compacting. Compact fill to the percent of maximum dry densities as noted in Table 2
  - Do not place, spread, or compact fill soils during freezing or unfavorable weather conditions. Frozen or disturbed lifts should be removed or properly recompacted prior to placement of subsequent lifts of fill soil.

**Table 2. Fill Compaction Criteria**

Fill Type	Percent of Maximum Dry Density Determined in Accordance with ASTM D 1557		
	0 – 2 Feet Below Subgrade	>2 Feet Below Subgrade	Pipe Bedding and Pipe Zone
Mass Fill (native) <sup>1</sup>	92	90	----
Mass Fill (imported) <sup>1</sup>	95	92	----
Aggregate Base <sup>1</sup>	95	95	----
Trench Backfill	95	92	90
Nonstructural Trench Backfill	88	88	----
Retaining Wall Backfill <sup>1,2</sup>	95	95	----
Nonstructural Zones	88	88	90

Notes:

- Structural fill with more than 30 percent retained on the ¾-inch sieve should be compacted to a well-keyed dense state within 3 percent of optimum moisture content.
- Within 3 feet of the back of retaining walls, compact to a lower percent density of 92 percent to limit potential wall damage from high horizontal stresses.



During structural fill placement and compaction, a sufficient number of in-place density tests should be completed by Pali Consulting to verify that the specified degree of compaction is being achieved.

## 5.7 PAVEMENTS

We understand that project pavements will consist of rigid Portland cement concrete (PCC). We were not provided specific traffic counts for the project; therefore, we assumed some traffic loading based on our experience with similar projects. If these and other assumptions in the following section are inaccurate, please contact our office so that updated recommendations can be developed.

### 5.7.1 Pavement Subgrade Preparation

Our explorations encountered 14 inches or more of gravel fill across the site that was consistently very dense. We are not aware of records of fill placement and expect it was uncontrolled fill that is dense due to its use as a parking lot. Typically uncontrolled fill within subgrade areas should be removed and replaced with engineered fill to ensure suitable subgrade performance. Due to the dense nature of the existing granular fill and its historic use as a parking lot with similar traffic to the anticipated future traffic, the existing granular fill may perform suitably for pavement subgrade. With any uncontrolled fill, however, there remains a risk that undiscovered conditions could lead to poor subgrade and resulting pavement performance. We, therefore, provide two options for subgrade preparation, depending on the owner's risk tolerance.

**Option 1: Retain existing fill as subgrade.** Excavate areas to receive pavement to grade and compact to a dense state with multiple passes of a heavy smooth drum roller until well-keyed. Following compaction, complete a proofroll of the subgrade with a fully loaded rubber-tire dump truck or similar vehicle. Areas which deflect or rut under the proofroll should be identified by Pali Consulting and these areas should be overexcavated to dense/firm material and replaced with granular structural fill as recommended by Pali Consulting. With this option, there is a risk that an undiscovered condition will result in future poor pavement performance. This would most likely occur from undiscovered construction debris in the fill which degrades over time, such as lumber or organic material. If the owner chooses this option, they should accept the higher risk of subgrade failure in exchange for the lower cost compared to Option 2.

**Option 2: Remove existing fill and replace with controlled structural fill.** Excavate all areas to receive pavement to the base of the existing fill or 3 feet below subgrade, whichever is less. Conduct a proofroll and recompact or overexcavate areas which pump or rut per the recommendations of Option 1, above. Place structural fill to subgrade per *Section 5.6 – Fill Placement and Compaction*.

### 5.7.2 Pavement Design

We completed design of PCC pavements using the methods outlined in AASHTO Guide for Design of Pavement Structures (AASHTO 1993). We made the following assumptions regarding the design of pavements:

Construction occurs during a period of dry weather.

The subgrade is prepared per *Section 5.7.1 - Pavement Subgrade Preparation*.

A 20-year design life with equivalent single-axle loads (ESALs) and heavy truck traffic of 55,000 ESALs (up to approximately 1,000 cars and 5 delivery trucks per day).



A resilient modulus of 5,000 psi for the soil subgrade prepared in conformance with *Section 5.7.1 – Pavement Subgrade Preparation*.

A resilient modulus of 20,000 psi for the aggregate base.

Initial and terminal serviceability indices of 4.2 and 2.5, respectively.

Reliability and standard deviation of 85 percent and 0.45, respectively.

Minimum moduli of rupture and elasticity of 570 and 3,600,000 psi, respectively, for PCC.

Minimum compressive strength of 4,000 psi for PCC.

### **5.7.3 Pavement Section**

Where the soil subgrade is prepared as recommended in this report, the minimum PCC pavement section shall consist of 5.0 inches of PCC over 6.0 inches of aggregate base.

### **5.7.4 Pavement Materials**

Rigid PCC used for pavement should meet the specifications provided in OSS 00756 – Plain Concrete Pavement. The installed concrete should be Class 4000 1-1/2-inch paving concrete per OSS 02001 – Concrete. The PCC joints should have a maximum spacing of 12 feet and be constructed in accordance with OSS 00756.48 – Joints. The slabs shall be interlocked at contraction joints (e.g., continuous slab with no dowels). However, dowels should be used at construction and expansion joints.

Imported granular material used as base aggregate (base rock) should meet the criteria specified in *Section 5.5.3 – Aggregate Base* and *Section 5.6 – Fill Placement and Compaction* of this report. The base aggregate should be compacted to not less than 95 percent of the maximum dry density as determined by ASTM D 1557.

### **5.7.5 Pavement Construction**

Construction should be completed in general accordance with the SSC and the recommendations in this report. Construction traffic should not be allowed on new pavements. If construction traffic is to be allowed on newly constructed pavements, an allowance for additional traffic will need to be made in the design pavement section.

## **6.0 STRUCTURAL DESIGN RECOMMENDATIONS**

Proposed structures consist of an art fence and light poles, with the latter also intended to support temporary tents/covers. Based on our understanding of these improvements, shallow foundations and pier-type foundations are suitable for support of fence and pole footings, respectively. Recommendations for these footings are provided in the following sections.

### **6.1 SHALLOW FOUNDATIONS**

Foundations for the art wall may be a continuous or individual spread footings bearing on medium stiff or better, native silty soil or on compacted structural fill placed over these materials. We recommend that continuous wall footings have a minimum width of 18 inches and individual spread footings have a minimum width of 24 inches.



The bottom of the footings should be founded at least 18 inches below adjacent final permanent grade, which is greater than the frost depth.

### **6.1.1 Foundation Subgrade Preparation**

Variable fill is present across the site as noted in *Section 3.2 – Subsurface Conditions*. Although the fill was generally dense, we recommend it be removed beneath footing subgrades to medium stiff or better native material and either backfilled to footing subgrade with Aggregate Base per *Section 5.5.3*, or the footings founded on native soil. All soft, loose, or disturbed soils should be compacted in-place or removed before placing reinforcing steel and concrete. Where overexcavation is completed, the width of the excavated area should be equal to or greater than the width of the footing plus the depth of the over-excavated soil.

Compaction should be performed as described in *Section 5.6 – Fill Placement and Compaction*. Foundation bearing surfaces should not be exposed to standing water. If water infiltrates and pools in the excavation, the water, along with any disturbed soil should be removed before placing reinforcing steel. A thin layer of crushed rock can be used to provide protection to the subgrade from weather and light foot traffic.

We recommend that Pali Consulting observe all foundation excavations before placing concrete forms and reinforcing steel to determine that bearing surfaces have been adequately prepared and that the soil conditions are consistent with those observed during our explorations.

### **6.1.2 Bearing Capacity**

We recommend that footings be proportioned using a maximum allowable bearing pressure of 2,000 pounds per square foot (psf). This bearing pressure applies to the total dead and long-term live loads and may be increased by one-third when considering earthquake or wind loads. This is a net bearing pressure. The weight of the footing and overlying backfill can be ignored in calculating footing sizes.

### **6.1.3 Footing Settlement**

Footings designed and constructed as recommended are expected to experience movement (settlement or expansion) of less than 1 inch. Differential settlement up to ½-inch can be expected between adjacent footings supporting comparable loads.

### **6.1.4 Lateral Resistance**

Lateral loads on footings can be resisted by passive earth pressure on the sides of footings and by friction on the bearing surface. We recommend that passive earth pressures be calculated using an equivalent fluid weight of 300 pounds per cubic foot (pcf) if confined by native soils or structural fill. We recommend using a friction coefficient of 0.35 for foundations placed on the native soils and 0.50 for foundations placed on imported crushed rock fill. The passive earth pressure and friction components may be combined provided that the passive component does not exceed two-thirds of the total.

The passive earth pressure value is based on the assumptions that the adjacent grade is level and that static groundwater remains below the base of the footing throughout the year. The top 12 inches of soil should be neglected when calculating passive lateral earth pressures unless the foundation area is covered with pavement or is inside the building. The lateral resistance values do not include safety factors.



## 6.2 DRILLED PIER FOUNDATIONS

Drilled piers to support the light poles can be designed using ODOT standard details and specifications (Broms method) or p-y curves as described below.

### 6.2.1 ODOT/Broms Method

Table 3 contains our recommended values to determine embedment depth of pole foundations. Although fill and native soils are both present, the native soils were found to have weaker properties than the fill. However, since fill can be variable, we recommend the properties of the weaker material be used, unless the existing fill is removed and replaced. Based on the native soil properties and modeling the subsurface as a homogeneous single material, we recommend the following soil properties be used for design along the full length of the shafts.

**Table 3. Soil parameters for embedment depth using Brom’s method (AASHTO 2006).**

Parameter	Value
Soil Unit Weight ( $\gamma$ )	115 pcf above water table
	52.6 pcf below water table
Soil Friction Angle ( $\phi$ )	30 degrees
Lateral Bearing Coefficient ( $K_p$ )	3.0

We followed the recommendations in the GDM (ODOT, 2018), which references the Brom’s method to calculate the embedment depth using a triangular earth pressure distribution (AASHTO, 2006). Brom’s method calculates the lateral resistance using the formula  $3(K_p)(\gamma)(D)(L)$  where D is the diameter and L is the embedment depth (AASHTO, 2006). The other parameters are defined and listed in Table 1.

For long-term design of the signal poles, we recommend the designer assume that the seasonal high groundwater table is located 5 feet below grade. During extreme precipitation events the groundwater could be higher. We expect such conditions to be of short duration however, so a depth of 5 feet is a reasonable likely maximum groundwater level under most conditions, in our opinion.

### 6.2.2 P-Y Methods

As an alternative method of calculating embedment depth, the use of p-y curves is allowed by AASHTO (2006). The computer program LPILE by Ensoft, Inc. allows the structural designer to calculate the lateral deflection profile using various soil parameters. Table 4 contains our recommended input parameters for pole foundations based on the subsurface conditions we encountered.

**Table 4 - Recommended LPILE Inputs**

Layer	Depth (feet)	Model Soil Type	Effective Unit Weight (pcf)	Friction Angle, $\phi$ (degrees)	Strain Value, $e_{50}$	Cohesion, $c$ (psf)	Soil Modulus, $k$ (pci)
1	0 to 2.5	Gravel (fill) (above WT)	115	32	NA	0	200
2	2.5 to 5	Silt (fill and native above WT)	115	NA	0.01	1,000	NA
3	>5	Silt (native below WT)	42.6	NA	0.01	1,000	NA

Notes: pcf = pounds per cubic foot; psf = pounds per square foot; pci = pounds per cubic inch, WT = water table, NA = not applicable.

Note that the depths referenced in the tables above are from the approximate ground elevation at the exploration locations. They also assume that conditions near the surface are not significantly changed from their current conditions by construction. The foundation designer should account for any differences in elevations and surface conditions between those at our explorations and the final pole locations.

### 6.2.3 Construction Methods

Construction should be completed per ODOT Standard Specifications for Construction (SSC). In general, SSC Sections 00512, 00900 (especially 00963 – Signal Support Drilled Shafts), and 02000 contained in the 2008 edition are applicable. Specific recommendations are as noted below.

We recommend the use of temporary casing during shaft installation to reduce the potential for caving. The LPILE parameters provided above assumed that steel casing will not be left in the excavation. If the casing cannot be extracted, the LPILE parameters should be adjusted, and we can provide revised recommendations, depending on conditions at that time.

We anticipate that the shafts will extend below the depth of groundwater. If heaving of the subgrade occurs during excavation. We recommend the use of quarry spalls or other aggregate as a stabilization material to increase the stability of the base of the excavation. Base stabilization material should meet the specifications of SSC Sections 00330.14 – Selected Granular Backfill or 00330.15 - Selected Stone Backfill and placed per SSC Section 00510.46 and 00510.48. If heaving becomes problematic during excavation, stabilization slurry per SSC Section 00512.14 may be needed to maintain base stability until a stabilization layer can be placed.

## 6.3 SEISMIC DESIGN

We recommend that seismic design be performed using the 2019 Oregon Structural Specialty Code (SSC, 2019). We obtained the seismic hazard from the National Seismic Hazard Maps (USGS 2016) for





Latitude 45.356654 degrees and Longitude -122.841093 degrees for the 2,475-year return period. The code-based seismic design parameters are included below in Table 5 and are only appropriate for code-level seismic design.

**Table 5. Seismic Design Parameters.**

Parameter	Value
Site Class	E
Spectral Response Acceleration, $S_s$	0.832g
Spectral Response Acceleration, $S_1$	0.393g
Site Coefficient, $F_a$	1.2*
Site Coefficient, $F_v$	1.4*
Spectral Response Acceleration (Short Period), $S_{DS}$	0.721
Spectral Response Acceleration (1-Second Period), $S_{D1}$	0.421*
Unfactored Peak Ground Acceleration, PGA	0.380
Site Coefficient, $F_{PGA}$	1.44
Maximum Considered Earthquake Geometric Mean PGA, $PGA_M$	0.547

Note: \* Values are for Site Class C per ASCE 7-16, Section 11.4.8

## 7.0 LIMITATIONS

We have prepared this geotechnical evaluation for use by Lango Hansen and their affiliates for the proposed Sherwood Festival Plaza improvements, as described in this report. Our work was completed in general accordance with our services agreement for the project. Our report is intended to provide geotechnical recommendations for design of the project in accordance with our scope of work. However, geotechnical conditions can vary between exploration locations and our report should not be construed as a warranty of subsurface conditions. Favorable site performance in the near term does not imply a certainty of long-term performance, especially under conditions of adverse weather or other factors.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty, express or implied, should be understood.

Any electronic form, facsimile, or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by Pali Consulting and will serve as the official document of record.





## 8.0 REFERENCES

American Association of State Highway Transportation Officials (AASHTO), AASHTO Guide for Design of Pavement Structures, 1993.

City of Sherwood (City) Engineering Design and Standard Details Manual, September 2020.

Natural Resource Conservation Service (NRCS) website. Accessed May 2022 at <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.

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Oregon State Department of Transportation (ODOT) 2018. Geotechnical Design Manual (GDM).

Oregon Water Resources Department, Well Report Query. Accessed at [https://apps.wrd.state.or.us/apps/gw/well\\_log/Default.aspx](https://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx), May 2022.

United States Geologic Survey (USGS), National Seismic Hazard Maps (USGS 2016).



## 9.0 CLOSING

We appreciate the opportunity to submit this report for your project. Please contact us if you have any questions or need additional information.

Sincerely,



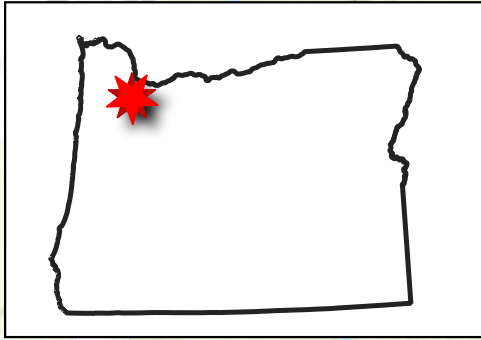
Timothy W. Blackwood, PE, GE, CEG  
President/Principal Engineer

### Attachments

Figures 1 - 2

Appendix A – Field Explorations

Document ID: 163-22-001GeotechnicalReport



Note:  
All locations approximate.  
Base map ©ESRI .

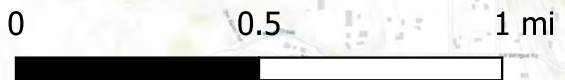
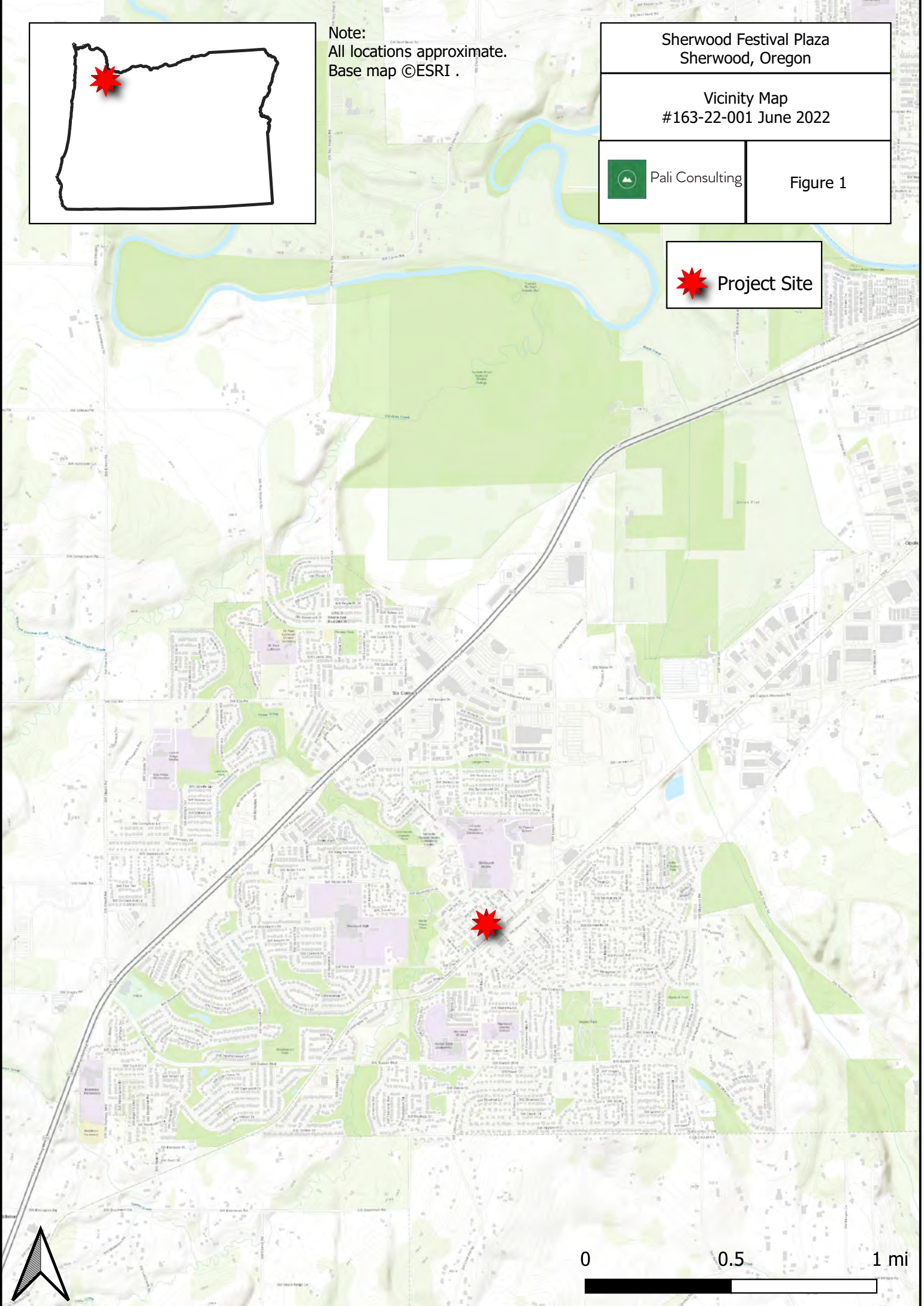
Sherwood Festival Plaza  
Sherwood, Oregon

Vicinity Map  
#163-22-001 June 2022



Figure 1

 Project Site









Sherwood Festival Plaza  
Sherwood, Oregon

Site Map  
#163-22-001 June 2022



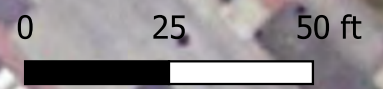
Pali Consulting

Figure 2

-  Project Area
-  Boring Locations



**Note:**  
All locations approximate.  
Base map ©Google





## **APPENDIX A - FIELD EXPLORATIONS, LABORATORY AND INFILTRATION TESTING**

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## FIELD EXPLORATIONS

### GENERAL

We evaluated subsurface conditions at the site by completing four machine-drilled borings on May 20, 2022. The machine-drilled borings were completed with a trailer mounted solid stem auger rig operated by Dan J. Fisher Excavations, Inc. The locations of the explorations are shown on Figure 2 of the report and were estimated based on field measurements.

The field explorations were coordinated by a geologist on our staff, who classified the various soil units encountered, obtained representative soil samples for geotechnical testing, and maintained a detailed log of each boring. Exploration logs are included in this Appendix.

### SAMPLING AND LOGGING

The exploration logs within this Appendix show our interpretation of the drilling, sampling, and testing data. They indicate the depth where the soils change. Note that the change may be gradual. In the field, we classified the samples taken from the explorations according to the methods presented on the *Key to Exploration Logs* in this Appendix. The key also provides a legend explaining the symbols and abbreviations used in the logs.

Materials encountered in the explorations were classified in the field in general accordance with American Society for Testing and Materials (ASTM) International Standard Practice D 2488 “Standard Practice for the Classification of Soils (Visual-Manual Procedure).” Soil classifications and sampling intervals are shown in the exploration logs in this Appendix.

Soil samples were obtained from the borings using a SPT sampler completed in general conformance with ASTM Test Method D 1586 “Standard Method for Penetration Test and Split-Barrel Sampling of Soils.” The sampler was driven with a 140-pound cathead operated hammer falling 30 inches. The N-value, or number of blows required to drive the sampler 1 foot or as otherwise indicated into the soils, is shown adjacent to the sample symbols on the boring logs. Disturbed samples were obtained from the sampler for subsequent classification and testing.

## LABORATORY TESTING

### GENERAL

Soil samples obtained from the explorations were evaluated to confirm or modify field classifications, as well as to evaluate their engineering properties. Representative samples were selected for laboratory testing. The tests were performed in general accordance with the test methods of the ASTM or other applicable procedures. Test results are indicated on the boring logs and as described below.

### SOIL CLASSIFICATIONS

Soil samples obtained from the explorations were visually classified in the field and in our geotechnical laboratory based on the USCS and ASTM classification methods. ASTM Test Method D2488 was used to classify soils using visual and manual methods. ASTM Test Method D2487 was used to classify soils based on laboratory test results.





## **LABORATORY TESTING**

### **Moisture Content**

Moisture contents of samples were obtained in general accordance with ASTM Test Method D 2216. The results of the moisture content tests completed on samples from the explorations are presented on the exploration logs included in this Appendix.

### **Wet and Dry Density**

Wet and dry densities of samples were obtained in general accordance with ASTM Test Method D 7263. The results of the density tests completed on samples from the explorations are presented on the exploration logs included in this Appendix.

### **Fines Content Analyses**

Fines content analyses were performed to determine the percent of soils finer than the U.S. No. 200 Sieve, the boundary between coarse- and fine-grained soils. The tests were performed in general accordance with ASTM Test Method D 1140. The test results are indicated on the exploration logs included in this Appendix.

### **Atterberg Limits**

Atterberg limits tests were performed on select samples to evaluate shear strengths of soil. The tests were performed in general accordance with ASTM D 4318. The results of the Atterberg limits tests completed on samples from the explorations are presented on the exploration logs included in this Appendix.

# KEY TO EXPLORATION LOGS



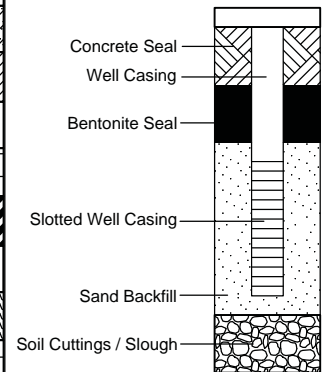
Pali Consulting

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Oregon City, OR 97045  
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## SOIL CLASSIFICATION CHART

MATERIAL TYPES	MAJOR DIVISIONS		GROUP SYMBOL	SOIL GROUP NAMES & LEGEND		OTHER MATERIAL SYMBOLS	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	GW	WELL-GRADED GRAVEL		<b>OTHER MATERIAL SYMBOLS</b> Concrete Asphalt Topsoil	
		GRAVELS WITH FINES, >12% FINES	GP	POORLY-GRADED GRAVEL			
		SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	GM	SILTY GRAVEL		
			GRAVELS WITH FINES, >12% FINES	GC	CLAYEY GRAVEL		
	CLEAN SANDS <5% FINES		SW	WELL-GRADED SAND			
	SANDS AND FINES >12% FINES		SP	POORLY-GRADED SAND			
	FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	INORGANIC	CL	LEAN CLAY		
			ORGANIC	ML	SILT		
SILTS AND CLAYS LIQUID LIMIT >50		INORGANIC	OL	ORGANIC CLAY OR SILT			
		ORGANIC	CH	FAT CLAY			
		INORGANIC	MH	ELASTIC SILT			
		ORGANIC	OH	ORGANIC CLAY OR SILT			
HIGHLY ORGANIC SOILS		PT	PEAT				

### WELL SYMBOLS



Note: Multiple symbols are used to indicate borderline or dual classifications

### MOISTURE MODIFIERS

Dry - Absence of moisture, dusty, dry to the touch  
 Moist - Damp, but no visible water  
 Wet - Visible free water or saturated, usually soil is obtained from below the water table

### SEEPAGE MODIFIERS

None -  
 Slow - < 1 gpm  
 Moderate - 1-3 gpm  
 Heavy - > 3 gpm

### CAVING MODIFIERS

None -  
 Minor - isolated  
 Moderate - frequent  
 Severe - general

### MINOR CONSTITUENTS

Trace - < 5% (silt/clay)  
 Occasional - < 15% (sand/gravel)  
 With - 5-15% (silt/clay) in sand or gravel  
 15-30% (sand/gravel) in silt or clay

### SAMPLE TYPES

	Dames & Moore
	Standard Penetration Test (SPT)
	Shelby Tube
	Bulk or Grab
	Modified California Sampler

### LABORATORY/ FIELD TESTS

ATT	-	Atterberg Limits
CP	-	Laboratory Compaction Test
CA	-	Chemical Analysis
CN	-	Consolidation
DD	-	Dry Density
DS	-	Direct Shear
HA	-	Hydrometer Analysis
OC	-	Organic Content
PP	-	Pocket Penetrometer (TSF)
P200	-	Percent Passing No. 200 Sieve
SA	-	Sieve Analysis
SW	-	Swell Test
TV	-	Torvane Shear
UC	-	Unconfined Compression

### GROUNDWATER SYMBOLS

	Water Level (at time of drilling)
	Water Level (at end of drilling)
	Water Level (after drilling)

### STRATIGRAPHIC CONTACT

	Distinct contact between soil strata or geologic units
	Gradual or approximate change between soil strata or geologic units

### Notes:

Blowcount (N) is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted) per ASTM D-1586. See exploration log for hammer weight and drop.

N for oversize samplers is approximately correlated to equivalent SPT N by 50% reduction in N (Modified California and Dames & Moore samplers).

Refer to the report text and exploration logs for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the exploration locations at the time the explorations were made. The logs are not warranted to be representative of the subsurface conditions at other locations or times.



Pali Consulting B-1				Sherwood Festival Plaza Sherwood, Oregon								
Project: Lango Hansen				Driller: Dan Fisher								
Proj No. 163-22-001				Date: 5/20/2022								
Drilling Method: Solid Stem Auger				Elevation: 177'								
Diameter: 4"		Water Table: 11'		Logged by: JLE								
Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks	
S1		66		4-4-6	10		0		Well-graded gravel	25	LL = ND, PL = Nonplastic	
S2		66		3-4-5	9		5		Stiff, mottled gray, brown, red, yellow with black and white flecks, dry SILT (Fill)  Increasing charcoal, crumbly texture			
S3		66		2-3-3	6		10		Medium stiff, brown with slight gray mottling, dry SILT (Native)	33		
S4		100		1-2-3	5		11		Blue-gray, moist	36		
S5		100		1-1-3	4		15		Brown, wet, dilatent	40		LL = ND, PL = Nonplastic
S6		66		1-2-3	5		20		Becomes mottled	35		
									End of Boring at 21.5' BGS. Groundwater encountered at 11' BGS.			

Figure A-1

Pali Consulting B-2				Sherwood Festival Plaza Sherwood, Oregon							
Project: Lango Hansen				Driller: Dan Fisher							
Proj No. 163-22-001				Date: 5/20/2022							
Drilling Method: Solid Stem Auger				Elevation: 177'							
Diameter: 4 inches		Water Table: 10'		Logged by: JLE							
Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
S1		66		1-2-5	7		0		GW Well-graded gravel		
S2		50					5		ML Medium stiff, mottled brown, red, gray, dry, SILT (Fill)	33	DD=83.8 pcf
S3		66		2-3-4	7				ML Medium stiff, mottled brown, red, gray, moist SILT (Native)		
S4		66		2-3-4	7		10		Mottled brown, moist to wet		
S5		66		1-3-4	7		15		Grades to wet, with sand	44	%F=75%
S6		66		1-1-3	4		20		Brown with lenses of silty sand	43	
									End of Boring at 21.5' BGS. Groundwater encountered at 10' BGS.		

Figure A-2

File: C:\Users\Jame\Pali Consulting Dropbox\1-Projects\Active-Projects\163-LangoHansen\163-22-001\Sherwood Festival Plaza Boring Logs.log Date: 6/30/2022

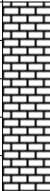









Pali Consulting B-3A / B				Sherwood Festival Plaza Sherwood, Oregon								
Project: Lango Hansen				Driller: Dan Fisher								
Proj No. 163-22-001				Date: 5/20/2022								
Drilling Method: Solid Stem Auger				Elevation: 177'								
Diameter: 4"		Water Table: 7.5'		Logged by: JLE								
Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks	
							0		CC Dense concrete fill with brick, glass			
S0		66			50+							
S1		66			40						Auger refusal at 2.5' on dense fill.	
S2		66			9		5		ML Grades to stiff, mottled brown, gray, orange, dry SILT (Native)		Relocated boring 10' north (B-3B)	
S3		66			6				Grades to medium-stiff, brown, moist SILT with fine sand	34	%F=77%	
S4							10		Becomes wet	37	DD=84.2 pcf	
S5							15					
S6		100			4		20		Grades to sandy silt at bottom of sampler	39		
									End of Boring at 21.5' BGS. Groundwater encountered at 7.5 feet BGS.			
								25				
								30				

Figure A-3

File: C:\Users\jane\Pali Consulting Dropbox\1-Projects\Active-Projects\163-22-001\Sherwood Festival Plaza Boring Logs.log Date: 6/30/2022

Pali Consulting B-4				Sherwood Festival Plaza Sherwood, Oregon							
Project: Lango Hansen				Driller: Dan Fisher							
Proj No. 163-22-001				Date: 5/20/2022							
Drilling Method: Solid Stem Auger				Elevation: 177'							
Diameter: 4"		Water Table: 15'		Logged by: JLE							
Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
S1		66		4-6-9	15		0		Crushed concrete and brick fill	22	
S2		66		5-7-8	15		5		Stiff to very stiff, mottled brown, tan, gray, dry SILT with brick fragments (Fill)		
S3		66		2-2-3	5		10		Mottled gray, brown, red SANDY SILT with charcoal flecks	37	
S4		66		1-2-2	4		15		Medium stiff, moist, sandy silt grading to SILT (Native)	30	%F=85%
S5		100		1-1-0	1		20		Slightly mottled, brown and gray with black and red flecks	45	SPT taken in disturbed material from attempted Shelby at 15'
S6		100			3		25		Brown, wet, SANDY SILT with mica		
S7		33		2-1-2	11		26.5		Soft, mottled brown and red, SILT	30	%F=35%
									End of Boring at 26.5' BGS. Groundwater encountered at 15' BGS.		

Figure A-4

# Pre-Engineered Fabric Shade Products

## **Part 1 – General**

### 1.1 Related Documents

Drawings and general provisions of the Contract, including General Conditions and Division 1 Specifications Sections, apply to this section.

### 1.2 Summary

The shade structure contractor shall be responsible for design, engineering, fabrication and supply of the work specified herein. The intent of this specification is to have only one manufacturer be responsible for the aforementioned functions.

### 1.3 Submittals

#### 1.3.1 Pre-Bid Submittals

- A. Provide proof of installed reference sites with structures for similar scope of project and installation that are engineered to International Building Code (IBC) specifications. Include in reference list of structure dimensions with install dates and project locations.
- B. Provide information to establish desired fabric color and powder coat color.
- C. Provide proof of all quality assurance items including:
  - 1. A list of at least six (6) public municipal installations where manufacturer's product as proposed pursuant to this bid has been installed and has been in continuous use for a minimum of five (5) years each.
  - 2. All manufacturers shall provide proof of a minimum \$ 2,000,000.00 (AG) General Public Liability Insurance, \$ 2,000,000.00 Professional Liability (PL) insurance, \$ 100,000.00 Inland Marine Insurance, and additional \$ 5,000,000.00 Umbrella Liability insurance.

#### 1.3.2 Award of Contract Submittals

- A. Make available wet-sealed structural engineering drawings and calculations
- B. Provide fabric color and powder coat color selections for final order.

#### 1.4 Project Conditions

- A. Field Measurements: verify layout information for shade structures shown on the drawings in relation to the property survey and existing structures. Verify locations by field measurements prior to construction.

#### 1.5 Warranty

- A. The successful bidder shall provide a one (1) year warranty on all labor and materials.
- B. A supplemental non-prorated warranty from the manufacturer shall be provided for a period of ten (10) years on fabric including stitching and twenty (20) years on the structural integrity of the steel, from date of substantial completion.
- C. The warranty shall not deprive the Owner of other rights the Owner may have under the provisions of the Contract Documents, and will be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contractor documents.
- D. Because of surety requirements, any performance and payment bond that might be required will cover only the first year of the warranty. The manufacturer's warranty will be a separate document and will be executed at the time of completion of the work.

### **Part 2 – Products**

#### 2.1 General

- A. The shade products shall be designed and manufactured to the most exacting specifications by skilled craftsmen, and certified by Professional Engineers for structural soundness of designs. All shade products are shipped knocked-down, with complete assembly instructions, and ready for easy in-field installation.

Bidder's products must be completely manufactured entirely in its own factory by its own employees, including powder-coating, thereby ensuring complete quality control. Bidder must certify that no aspect of its production – including powder-coating – is contracted out to third parties.

The proposed structure(s) manufactured by Shade Systems, Inc.<sup>TM</sup> or approved equal, shall be modular and pre-fabricated, and include the structural steel frame, fabric roof, steel cables and all fasteners.

- B. Or Equal: Standard for approved equal. Ten (10) day prior approval required for substitution of product design, materials and features specified above. Submittals must include plans, drawings, cut sheets, material data sheets, testing results and samples. Bids failing to meet this requirement will be deemed non-responsive.

- C. Structures are engineered to meet or exceed the requirements of International Building Code (IBC), and the following standard specifications:

Wind Speed (Frame only): 165 M.P.H.

Wind Speed (Frame w/canopy): 90 M.P.H.

Live Load: None

Snow Load: None

*Optional designs with greater wind speeds, live loads, and snow loads are available.*

- D. **Material:** All materials shall be structurally sound and appropriate for safe use. Product durability shall be ensured by the use of corrosion-resistant metals such as stainless steel, and coatings such as zinc-plating, galvanizing, and powder-coating on steel parts, subject to the Product-Specific requirements. Fabrics used shall include UV-stabilizers and fire retardants for longevity and safety.
- E. **Packaging:** All metal posts, rafters and beams shall be wrapped in plastic and cardboard to protect the powder coat finish during shipping.
- F. **Weldments:** All tubing members are factory-welded by Certified Welders to American Welding Society (AWS) specifications and to the highest standards of quality workmanship. Weldments are finished with a zinc-rich galvanized coating. No field welding is required in the assembly of the shade products.
- G. **Posts, Structural Frame Tubing, and Hardware:** All tubing used shall be cold-formed and milled per ASTM A-135 and ASTM A-500. Material testing is in accordance with ASTM E-8. Minimum yield is 40,000 psi with a minimum tensile strength of 45,000 psi on all posts. All tubing shall be pre-cut to appropriate lengths, and all outside surfaces shall be galvanized, with an interior corrosion-resistant zinc-rich coating. Where required, support pipes shall be schedule 40 hot-dip galvanized or powder-coated black steel. All fastening hardware shall be stainless steel.
- H. **Architectural Powder-coating Process:** All powder-coated parts undergo a rigorous multi-step process to ensure colorfastness and durability per the specific sequential steps itemized below. All parts are completely sandblasted, pre-treated, and coated with coastal primer prior to powder coating. Powder-coating is then electrostatically applied and oven-cured at 375 to 425 degrees Fahrenheit. Powders shall meet or exceed ASTM standards for Adhesion, Hardness, Impact, Flexibility, Overbake Resistance, and Salt Spray Resistance. Colors shall be specified.

The following seven (7) specific steps shall occur in sequence:

1. **Sandblasting.** All powder-coated parts shall be completely sandblasted with the use of 80 grit garnet abrasives.
2. **Mechanical smoothing.** A traditional mechanical method shall be used for removing remaining foreign matter for surface preparation by use of sanding, grinding, and rounding rough edges to smoothness.
3. **Initial Surface Preparation.** A heavy-duty liquid cleaner such as *Calvary Industries Inc Cal Clean 675* shall be applied for initial surface preparation.
4. **Corrosion resistant Coating.** A liquid detergent iron phosphate, such as *Calvary Industries Inc, Cal Prep 63*, shall be applied, thereby resulting in a superior quality corrosion resistant coating.
5. **Final Surface Preparation.** All parts shall then be sealed using a reactive, non-chrome sealer product such as *Calvary Industries, Advantech S1488E Sealer*. The sealer enhances corrosion protection and increases paint adhesion, effectively increasing salt spray hours on all metal substrates.
6. **Coastal Primer.** Prior to powder-coating, a rust inhibiting coastal primer shall be applied on all parts, such as *PPG Envirocron™*. The coastal primer coating provides a combination of good physical and chemical resistance properties, and is the ideal solution for smooth, low-bake durability and physical property requirements for the most demanding environments.

Primer attributes:

Gloss (ASTM D-523):	0-10 @ 60°
Adhesion (ASTM D-3359):	100% (5B Pass)
Hardness (ASTM D-3363):	2H Pencil (Eagle)
Impact Resistance (ASTM D-2794):	80 In.-lbs. Direct
Conical Mandrel (ASTM D-522):	1/8" - No Cracking
Salt Spray (ASTM B-117):	4000 Hours Pass 1000 Hours (degrease only)
Humidity (ASTM D-1735):	100F, 100% RH-2000+ Hours
Scab Corrosion (SAE-J2334):	120 Cycles - Pass
Film Properties (Thickness):	2 mils



7. **Application of Powder-Coating.** Lastly, *PPG Envirocron™ Ultradurable* powder coatings shall be used to provide a combination of excellent physical and chemical resistance properties, outstanding resistance to outdoor weathering, and a durable and uniform final coat.

Powder Coat Characteristics:

Gloss (ASTM D-523):	80 Minimum @ 20°
Gloss (ASTM D-523):	80 Minimum @ 60°
Adhesion (ASTM D-3359):	100% (5B Pass)
Hardness (ASTM D-3363):	2H Pencil (Eagle)
Impact Resistance (ASTM D-2794):	40 In.-lbs. Direct 20 In.-lbs. Reverse
Conical Mandrel (ASTM D-522):	1/8" Mandrel - No Cracking
Salt Spray (ASTM B-117):	1000 Hours Pass < 1/8" Scribe Creep No Blisters
Humidity (ASTM D-1735):	1000 Hours Pass < 1/16" Scribe Creep No Blisters
Film Properties (Thickness):	3 mils

- I. Standard Footings: Footings shall be designed per stringent International Building Code (IBC) for the specified structure. Columns will be provided as standard direct embedment. Other footing designs are available.
- J. Roofing: Structural frames and/or fabric sails are designed by Shade Systems only for use with Coolnet™ polyethylene shade fabric. Fabric is attached to frame or columns using stainless steel and clear vinyl coated cable. Cable fasteners are zinc-plated copper for maximum corrosion resistance.

2.2 Fastening System (**Frame Structure**)

- A. Coolnet™ Shade Fabric shall be delivered complete with independent cables pre-inserted in fabric hems. Each cable shall be looped and clamped at each end. Fastening System to consist of the Turn-N-Slide™ fastening device which is factory installed at each roof rafter corner. The Turn-N-Slide features a concealed mechanism which allows the attachment hook and sleeve at each rafter corner to move along a track in the rafter. Cables are attached to hook which is welded to the moving sleeve, thereby distributing tension evenly over rafters and not directly onto the mechanism. Rafters are sealed with no penetrations on the top side, thereby preventing water from entering. Such moving sleeve with hook allows the looped ends of each cable to slide over the hook when the sleeve is at its upper position, and

then by turning the concealed fastener within the rafter, moves the sleeve with hook outward (toward end of rafter), thereby tensioning the cables and securing the fabric at the proper tautness. A locking cap is secured at the end of each rafter with a vandal-resistant bolt (special wrench provided by the manufacturer) to prevent unauthorized access to the Turn-N-Slide mechanism. To remove the canopy, the cap is removed, and the mechanism rotated counter-clockwise. The sleeve with hook moves inward (toward peak of roof), thereby de-tensioning the cables, and allows fast removal of the canopy. Continuous one-piece cables, cables which are not independent per side and pre-looped and clamped at the factory, and/or cables which must be tensioned with the use of turnbuckles or tools not provided by the manufacturer are not acceptable. Structures which do not feature the Fastening Mechanism on each and every rafter, or fastening mechanisms which do not feature a sealed top rafter and moving outer sleeve such as the Turn-N-Slide, are not acceptable.

- B. Fastening System Instructional Video: Product must be delivered complete with a minimum 5-minute instructional video on an USB Flash Drive. Video must show the viewer the exact procedure for removing and re-attaching canopy using an actual shade structure in the field. Submittals which do not include the video on an USB Flash Drive are not acceptable.

### 2.3 Fastening System (**Sail Structure**)

- A. CoolNet™ Shade Fabric shall be delivered complete with fastening system installed. Fastening System to consist of factory-formed stainless steel tensioning plates pre-attached to fabric canopies at each corner, and cables per the above hemmed into the fabric at the factory and terminating in the bracket. Posts shall be equipped with an adjustable 360-degree swivel and pivot attachment mechanism to which the tensioning plate fastens. Tensioning plate includes a stainless steel adjustment bolt which, when turned, tensions the fabric for a taut fit. Fabrics, cables, and brackets which are not pre-assembled at the factory are not acceptable. Cables which attach to posts with u-bolts or 'S' hooks, and which do not use a stainless steel bracketing system similar to the above are not acceptable.

## 2.3 Fabric

- A. Shade Fabric: Knitted of monofilament and tape construction high density polyethylene with Ultra-Violet (U.V.) stabilizers and flame retardant. Coolnet™ offers the ultimate combination of maximum sun protection, strength and durability to ensure maintenance free long-life performance. UV- Block Factor varies by standard color offered from 90% to 97%.

### Coolnet™ Properties:

Nominal Fabric Mass:		Min. 340 g/m <sup>2</sup> // 10 oz/yd <sup>2</sup>
Fabric Thickness:	ASTM D5199-12	.06 inch
Temperature Range:		22 <sup>o</sup> F to 155 <sup>o</sup> F
Roll Width:		9 ft. 10 in.
Roll Length:		131 ft.
Tensile Strength:	ASTM D5034-09	Warp (202.4 lbf) / Weft (403.2 lbf)
Elongation:	ASTM D5034-09	Warp (112.3%) / Weft (50.8%)
Tongue Tear:	ASTM D2261-13	Warp (47.9 lbf) / Weft (50.1 lbf)
Burst Strength:	ASTM D6797-15	383.0 lbf
Flammability:	ASTM E-84 Class A	
Lead:		PASS
Phthalate:		PASS

**Coolnet™ Shade Fabrics** meet the most stringent Fire Standards for shade fabrics including CSFM 1237.1 and NFPA 701 across all color variants.



All hems and seams are double row lock stitched using exterior grade UV- stabilized polyethylene GORE™ TENARA™ sewing thread (GORE and TENARA are trademarks of W.L. Gore & Associates).

<b>Color</b>	<b>Weight (oz/yd<sup>2</sup>)</b>	<b>Shade Factor %</b>	<b>UVR Block %</b>
Canary Yellow	10	78	93
Eggshell White	10	78	94
Lime Green	10	88	91
Fire Orange	10	81	92
Onyx Black	10	95	95
Grape Purple	10	88	91
Desert Sand	10	86	93
Rivergum Green	10	90	94
Bright Red	10	80	90
Mocha Brown	10	94	96
Charcoal Grey	10	94	94
Bora Bora Blue	10	90	93
Terracotta	10	87	93
Stormy Grey	10	95	97
Bamboo Brown	10	88	94
Bright White	10	77	95
Brick Red	10	91	92
Silver Grey	10	90	92
Light Blue	10	91	94
Navy Blue	10	93	94
Aquatic Blue	10	88	92
Forest Green	10	93	94

### **Part 3 – Execution**

#### 3.1 Installation

Installations of shade structure(s) shall be performed by an installer who shall comply with the manufacturer’s instructions for assembly, installation, and erection, per approved drawings.

##### A. Concrete

1. Concrete work shall be executed in accordance with the latest edition of the American Concrete Building Code, ACI 318.
2. All reinforcement shall conform to ASTM A-615, Grade 60.
3. Reinforcing steel shall be detailed, fabricated, and placed in accordance with the latest ACI Detailing Manual, and Manual of Standard Practice.



## TECHNICAL SPECIFICATIONS:

**GENERAL:** Shade Systems™ products are designed and manufactured to the most exacting specifications by skilled craftsmen, and certified by Professional Engineers for structural soundness of designs. All Shade Systems are shipped knocked-down, with complete assembly instructions, and ready for easy in-field installation.

**ENGINEERING DATA:** Structures are engineered to meet or exceed the requirements of the International Building Code (IBC), with the following specifications:

Wind speed	Frame only:	165 m.p.h.
	Frame w/canopy:	90 m.p.h.

Live Load:	None
Snow Load:	None

Optional designs with greater wind speeds, live loads, and snow loads are available.

**MATERIAL:** All materials shall be structurally sound and appropriate for safe use. Product durability shall be ensured by the use of corrosion-resistant metals such as stainless steel, and coatings such as zinc-plating, galvanizing, and powder-coating on steel parts, subject to the Project-Specific requirements below. Fabrics used shall include UV-stabilizers and fire retardants for longevity and safety.

**WELDMENTS:** All tubing members are factory-welded by Certified Welders to American Welding Society (AWS) specifications and to the highest standards of quality workmanship. Weldments are finished with a zinc-rich galvanized coating. No field welding is required in the assembly of Shade Systems products.

**POSTS, STRUCTURAL FRAME TUBING, AND HARDWARE:** All tubing used shall be cold-formed and milled per ASTM A-135 and ASTM A-500. Material testing is in accordance with ASTM E-8. Minimum yield is 40,000 psi with a minimum tensile strength of 45,000 psi on all posts. All tubing shall be pre-cut to appropriate lengths, and where applicable all outside surfaces shall be galvanized, with an interior corrosion-resistant zinc-rich coating. Where required, support pipes shall be schedule 40 hot-dip galvanized or powder-coated black steel. All fastening hardware shall be stainless steel.

**ARCHITECTURAL POWDER-COATING PROCESS:** All powder-coated parts undergo a rigorous multi-step process to ensure colorfastness and durability per the specific sequential steps itemized below. All parts are completely sandblasted, pre-treated, and coated with coastal primer prior to powder coating. Powder-coating is then electrostatically applied and oven-cured at 375 to 425 degrees Fahrenheit. Powders shall meet or exceed ASTM standards for Adhesion, Hardness, Impact, Flexibility, Overbake Resistance, and Salt Spray Resistance. Colors shall be specified.

The following seven (7) specific steps shall occur in sequence:

1. **Sandblasting.** All powder-coated parts shall be completely sandblasted with the use of 80 grit garnet abrasives.
2. **Mechanical smoothing.** A traditional mechanical method shall be used for removing remaining foreign matter for surface preparation by use of sanding, grinding, and rounding rough edges to smoothness.
3. **Initial Surface Preparation.** A heavy-duty liquid cleaner such as *Calvary Industries Inc Cal Clean 675* shall be applied for initial surface preparation.
4. **Corrosion resistant Coating.** A liquid detergent iron phosphate, such as *Calvary Industries Inc, Cal Prep 63*, shall be applied, thereby resulting in a superior quality corrosion resistant coating.
5. **Final Surface Preparation.** All parts shall then be sealed using a reactive, non-chrome sealer product such as *Calvary Industries, Advantech SI488E Sealer*. The sealer enhances corrosion protection and increases paint adhesion, effectively increasing salt spray hours on all metal substrates.
6. **Coastal Primer.** Prior to powder-coating, a rust inhibiting coastal primer shall be applied on all parts, such as *PPG Envirocron™*. The coastal primer coating provides a combination of good physical and chemical resistance properties, and is the ideal solution for smooth, low-bake durability and physical property requirements for the most demanding environments.

Primer attributes:

Gloss (ASTM D-523):	0-10 @ 60°
Adhesion (ASTM D-3359):	100% (5B Pass)
Hardness (ASTM D-3363):	2H Pencil (Eagle)
Impact Resistance (ASTM D-2794):	80 In.-lbs. Direct
Conical Mandrel (ASTM D-522):	1/8" - No Cracking
Salt Spray (ASTM B-117):	4000 Hours Pass
1000 Hours (degrease only)	
Humidity (ASTM D-1735):	100F, 100% RH-2000+ Hours
Scab Corrosion (SAE-J2334):	120 Cycles - Pass
Film Properties (Thickness):	2 mils

7. **Application of Powder-Coating.** Lastly, *PPG Envirocron™ Ultradurable* powder coatings shall be used to provide a combination of excellent physical and chemical resistance properties, outstanding resistance to outdoor weathering, and a durable and uniform final coat.

Powder Coat Characteristics:

Gloss (ASTM D-523):	80 Minimum @ 20°
Gloss (ASTM D-523):	80 Minimum @ 60°
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Hardness (ASTM D-3363):	2H Pencil (Eagle)
Impact Resistance (ASTM D-2794):	40 In.-lbs. Direct
20 In.-lbs. Reverse	
Conical Mandrel (ASTM D-522):	1/8" Mandrel - No Cracking
Salt Spray (ASTM B-117):	1000 Hours Pass
< 1/8" Scribe Creep	
No Blisters	
Humidity (ASTM D-1735):	1000 Hours Pass
< 1/16" Scribe Creep	
No Blisters	
Film Properties (Thickness):	3 mils

**STANDARD FOOTINGS:** Footings shall be designed per stringent International Building Code (IBC) for the specific structure. Columns will be provided as standard direct embedment or optional pier mount (anchoring hardware not supplied by Shade Systems). Other footing methods are available upon request.

**ROOFING:** Structural frames and/or fabric sails are designed by Shade Systems only for use with CoolNet™ polyethylene shade fabric. Fabric is attached to frame or columns using the Fastening Systems below in conjunction with vinyl covered stainless steel cables. Cable fasteners are zinc-plated copper for maximum corrosion resistance.

**FASTENING SYSTEM (Frame Structure):** Coolnet™ Shade Fabric shall be delivered complete with independent cables pre-inserted in fabric hems. Each cable shall be looped and clamped at each end. Fastening System to consist of the Turn-N-Slide™ fastening device which is factory installed at each roof rafter corner. The Turn-N-Slide features a concealed mechanism which allows the attachment hook and sleeve at each rafter corner to move along a track in the rafter. Cables are attached to hook which is welded to the moving sleeve, thereby distributing tension evenly over rafters and not directly onto the mechanism. Rafters are sealed with no penetrations on the top side, thereby preventing water from entering. Such moving sleeve with hook allows the looped ends of each cable to slide over the hook when the sleeve is at its upper position, and then by turning the concealed fastener within the rafter, moves the sleeve with hook outward (toward end of rafter), thereby tensioning the cables and securing the fabric at the proper tautness. A locking cap is secured at the end of each rafter with a vandal-resistant bolt (special wrench provided by the manufacturer) to prevent unauthorized access to the Turn-N-Slide mechanism. To remove the canopy, the cap is

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removed, and the mechanism rotated counter-clockwise. The sleeve with hook moves inward (toward peak of roof), thereby de-tensioning the cables, and allows fast removal of the canopy. Continuous one-piece cables, cables which are not independent per side and pre-looped and clamped at the factory, and/or cables which must be tensioned with the use of turnbuckles or tools not provided by the manufacturer are not acceptable. Structures which do not feature the Fastening Mechanism on each and every rafter, or fastening mechanisms which do not feature a sealed top rafter and moving outer sleeve such as the Turn-N-Slide, are not acceptable.

**FASTENING SYSTEM INSTRUCTIONAL VIDEO:** Product must be delivered complete with a minimum 5-minute instructional video on an USB Flash Drive. Video must show the viewer the exact procedure for removing and re-attaching canopy using an actual shade structure in the field. Submittals which do not include the video on an USB Flash Drive are not acceptable.

**FASTENING SYSTEM (Sail Structure):** CoolNet™ Shade Fabric shall be delivered complete with fastening system installed. Fastening System to consist of factory-formed stainless steel tensioning plates pre-attached to fabric canopies at each corner, and cables per the above hemmed into the fabric at the factory and terminating in the bracket. Posts shall be equipped with an adjustable 360-degree swivel and pivot attachment mechanism to which the tensioning plate fastens. Tensioning plate includes a stainless steel adjustment bolt which, when turned, tensions the fabric for a taut fit. Fabrics, cables, and brackets which are not pre-assembled at the factory are not acceptable. Cables which attach to posts with u-bolts or ‘S’ hooks, and which do not use a stainless steel bracketing system similar to the above are not acceptable.

**CoolNet™ SHADE FABRIC:** Knitted of monofilament and tape construction high density polyethylene with Ultra-Violet (U.V.) stabilizers and flame retardant. Coolnet™ offers the ultimate combination of maximum sun protection, strength and durability to ensure maintenance free long-life performance. UV- Block Factor varies by standard color offered from 90% to 97%.



Coolnet™ Properties:

Nominal Fabric Mass:		Min. 340 g/m <sup>2</sup> // 10 oz/yd <sup>2</sup>
Fabric Thickness:	ASTM D5199-12	.06 inch
Temperature Range:		22°F to 155°F
Roll Width:		9 ft. 10 in.
Roll Length:		131 ft.
Tensile Strength:	ASTM D5034-09	Warp (202.4 lbf) / Weft (403.2 lbf)
Elongation:	ASTM D5034-09	Warp (112.3%) / Weft (50.8%)
Tongue Tear:	ASTM D2261-13	Warp (47.9 lbf) / Weft (50.1 lbf)
Burst Strength:	ASTM D6797-15	383.0 lbf
Flammability:	ASTM E-84 Class A	
Lead:		PASS
Phthalate:		PASS

**Coolnet™ Shade Fabrics** meet the most stringent Fire Standards for shade fabrics including CSFM 1237.1 and NFPA 701 across all color variants.



All hems and seams are double row lock stitched using exterior grade UV-stabilized polyethylene GORE™ TENARA® sewing thread (GORE and TENARA are trademarks of W. L. Gore & Associates).

**INSURANCE:** Manufacturer must show acceptable evidence of the following minimum insurance coverages, all written on the Occurrence Form:

- Commercial Product Liability/Completed Operations of \$1,000,000 per claim and \$2,000,000 aggregate;
- Professional Liability (Errors & Omissions) of \$2,000,000 per claim;
- And an additional \$5,000,000 umbrella coverage.

**WARRANTY:** Shade Systems, Inc. warrants that the equipment sold will conform in kind and quality to the specifications listed in the Order Acknowledgment and will be free of defects in workmanship or materials. Shade Systems further warrants:

- LIMITED 20 YEAR WARRANTY on all upright posts, cables, and tensioning plates against failure due to rust-through corrosion.
- LIMITED 10 YEAR WARRANTY on all CoolNet™ fabric and GORE™ TENARA® stitching thread against degradation, cracking or material breakdown resulting from ultra-violet exposure. This warranty excludes failure of fabric due to chemical erosion or as a result of flying objects.
- LIMITED 1 YEAR WARRANTY on powder-coating, or any other product or part not covered by one of the above warranties.

The above warranties are not pro-rated. Please refer to the full text of our complete Limited Warranty for additional details and other important warranty information.

**MANUFACTURER EXPERIENCE:** Bidder must show evidence of at least six (6) public municipal installations where manufacturer's product as proposed pursuant to this bid has been installed and has been in continuous use for a minimum of five (5) years each.

**MANUFACTURING FACILITY:** Bidder's products must be completely manufactured entirely in its own factory by its own employees, including powder-coating, thereby ensuring complete quality control. Bidder must certify that no aspect of its production – including powder-coating – is contracted out to third parties.

**ALTERNATE PRODUCT APPROVAL PROCEDURE:** Ten (10) day prior approval required for substitution of product design, materials and features specified above. Submittals must include plans, drawings, cut sheets, material data sheets, testing results and samples. Bids failing to meet this requirement will be deemed non-responsive.