

CITY OF SEATTLE



Seattle
Department of
Transportation



AWARD BOOK

Improvement of:

Union Street Pedestrian Bridge

PW#: 2020-003

Funded by: Local

Bids Open: April 1, 2020

City of Seattle

Department of Finance and Administrative Services



EXPIRES 10/04/ 2020

Project Manual

for

Union Street Pedestrian Bridge

As Authorized by Ordinance No. 125806

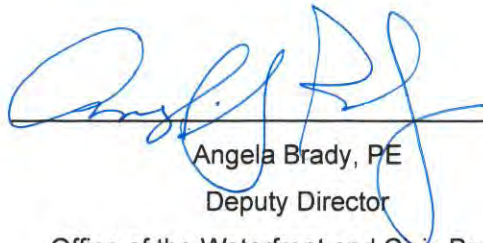
Funding Source: Local

PW#: 2020-003

Prepared by:

Seattle Department of Transportation

Approved:


Angela Brady, PE
Deputy Director

Date: 2/24/20

Office of the Waterfront and Civic Projects

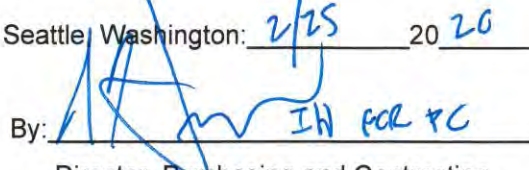
Seattle Department of Transportation

APPROVED FOR ADVERTISING

Liz Alzeer

Purchasing and Contracting

Seattle, Washington: 2/25 2020

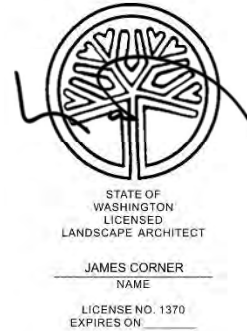
By:  IN FOR PC

Director, Purchasing and Contracting



2/21/2020

Mike Colyn is the Engineer responsible for all Special Provisions not explicitly listed as the responsibility of other Engineers



James Corner is the Landscape Architect responsible for the following Special Provisions 1-06.7, 8-02, 8-35, 8-36 and 9-14



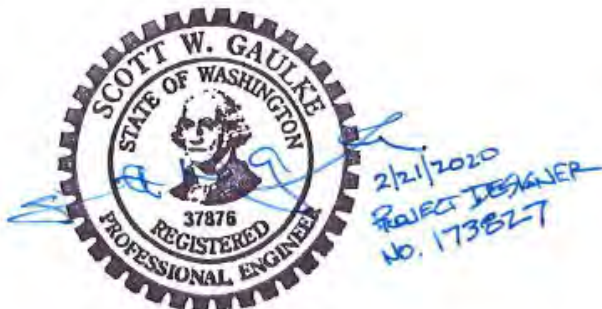
2/21/2020

Angela Diamond is the Engineer responsible for the following Special Provision 7-05



2/21/2020

Dustin Foster is the Engineer responsible for the following Special Provisions 8-30, 8-71, and 9-31



Scott Gaulke is the Engineer responsible for the following Special Provisions 1-07.29 thru 1-07.34



Brittney Horn is the Engineer responsible for the following Special Provisions 2-02, 5-05, 7-20, 8-22, and 8-31



Mark Johnson is the Engineer responsible for the following Special Provisions 2-03 and 8-35



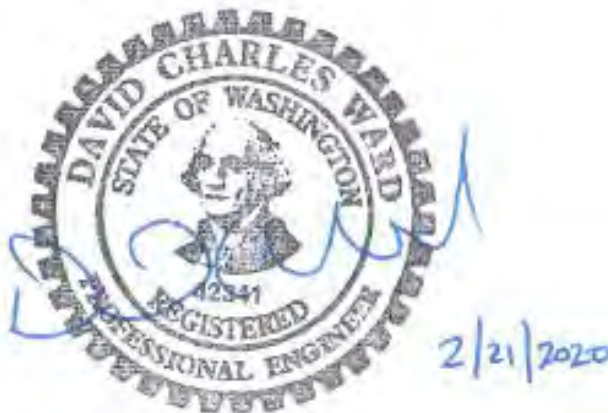
Mark Mariano is the Architect responsible for the following Special Provisions 8-37, 8-38, 8-41, 8-43 thru 8-61, and 8-72



Dylan Turner is the Engineer responsible for the following Special Provisions 8-63 thru 8-70



Schaun Valdovinos is the Engineer responsible for the following Special Provision, Division 6, 8-39, 8-40, 8-42, and 9-39



David Ward is the Engineer responsible for the following Special Provisions 2-19



Beth Weitensteiner is the Engineer responsible for the following Special Provisions 8-03 and 9-15

Advertisement for Bids

City of Seattle

Union Street Pedestrian Bridge

Bid Opening Date: April 1, 2020 at 2:00 pm

PW #: 2020-003

This Project is a Covered Project subject to the City of Seattle's Community Workforce Agreement (CWA) and Priority Hire SMC 20.37.

PROJECT LOCATION: The project is located in Downtown Seattle – Union Street between Alaskan Way and Western Avenue. The Alternate Additives are located on Marion Street between Alaskan Way and Western Avenue.

PROJECT DESCRIPTION: The scope of the project includes a new pedestrian bridge, elevator, railings, drilled shafts, micropiles, excavation, pavement and sidewalk removal, roadway paving, sidewalks, curb ramps, lighting, landscaping, furnishings, irrigation, channelization, storm drains, electrical, and other work. Alternate Additive #1 includes three drilled shafts on Marion Street. Alternate Additive #2 includes partial removal of the Marion Street Pedestrian Bridge.

A/E ESTIMATE BASE BID (SCHEDULE A): \$6,500,000 - \$7,000,000

A/E ESTIMATE ADDITIVE 1 (SCHEDULE B): \$900,000 - \$1,000,000

A/E ESTIMATE ADDITIVE 2 (SCHEDULE C): \$200,000-\$250,000

PRE-BID SITE INSPECTION/MEETING: There is a MANDATORY pre-bid meeting for this project. All those that wish to bid on the project will need to attend one of the pre-bid meetings. Bids will not be accepted from Bidders who have not attended one of the pre-bid meetings. The first pre-bid meeting is scheduled for Thursday, 4 PM, March 5, 2020, the second pre-bid meeting is scheduled for Friday, 9 AM, March 6, 2020. Please meet at 626 Alaskan Way, Seattle, WA 98104.

INCLUSION PLAN: For purposes of the Inclusion Plan, this is considered a **Bridge** type of project with a Past Performance of **10** Percent WMBE utilization rates based on completed projects. For questions on the Inclusion Plan please contact Miguel Beltran at Miguel.beltran@seattle.gov or 206-684-4525. Back-up contact is Carmen Kucinski at carmen.kucinski@seattle.gov or 206-684-0188.

PAID SICK AND SAFE TIME: Bidders must understand the requirements of SMC 14.16 and RCW 49.46 and demonstrate compliance prior to award.

BID DOCUMENTS: Contract Documents, contacts and Bid Instructions are available at <https://www.ebidexchange.com/seattle>.

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APPENDIX

City Forms

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360 Review Form (01-2020)	8 pages
Supplemental Bidder Responsibility Criteria Form (1/2020)	8 pages
Priority Hire Workforce Projections Forms (2)	2 pages
Apprentice Utilization Proposal Plan	1 page
WMBE Inclusion Plan (6/11/19)	5 pages
Public Works WMBE Inclusion Plan Change Request Form (8/8/14)	2 pages
Public Works Prevailing Wage Certification & Subcontractor List (01-2020)	1 page
King County Waste Characterization Form	4 pages

Community Workforce Agreement (November 29, 2017)	34 pages
Pre Job Conference Form	4 pages
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Dual Benefits Reimbursement Form (3/24/17).....	2 pages

SDOT/City Construction Administration Documents

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SDOT/City Standard Plan Amendments

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040 AUG 2017.....	1 page
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SCL Construction Standard

0214.00 Clearances Between SCL Underground Structures and Other Structures.....	16 pages
0223.33 CIP Concrete Vault Collar	4 pages
0224.07 Requirements For Secondary Conduit Installation	6 pages
0231.01 Secondary Handhole Installation and Grounding	10 pages
0461.10 Grounding Electrodes for Handholes and Vaults	6 pages
6688.7 Conductor, Fittings, Copper Parallel Tap, Split Bolt Cable Connectors.....	1 page
6762.15 Clamps for 5/8 Inch Ground Rods.....	1 page
6762.25 Ground Rods, Copper-Covered, Sectional	1 page
7015.05 Schedule 40 PVC Conduit and Fittings.....	8 pages
7015.80 Conduit Spacers for PVC and FG Conduit	1 page
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Drawings Details, Tables, & Miscellaneous Information

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Union Structure – April 2019 Pot Holing	16 pages
Retaining Wall Across Union Street at Western Avenue	1 page
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Waterfront Seattle Alaskan Way – Elliott Way S King St to Bell St Plans	19 pages

Marion Street Pedestrian Bridge As-Builts	49 pages
Union Electrical Service Memo and Drawing	14 pages
Union Pedestrian Bridge Existing Utility Report and Plans	9 pages
Good Faith Inspection Letter Commuter Building and Adjacent Garage – Jan 9, 2020.....	79 pages

Permits and Agreements

Consent Decree	75 pages
Washington Department of Fish and Wildlife Hydraulic Project Approval SDOT 2018-4-291+01	5 pages
Seattle Department of Construction and Inspections Master Use Permit 3026658-LU.....	1 page
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Alaskan Way, Promenade and Overlook Walk, Seattle, King County, Washington (070215.22-KI) Archaeological Resources Monitoring Plan / Inadvertent Discovery Plan	49 pages

Informational Documents, Logs, & Test Results

Geotechnical Data (Soil Borings, test results) – Union Pedestrian Bridge	20 pages
Table C.1-1 Summary of Soil Chemical Testing Performed for Waterfront Seattle Program...	11 pages
Table C.1-2 Summary of Polycyclic Aromatic Hydrocarbon Soil Testing Performed for Waterfront Seattle Program	7 pages
Geotechnical Data (Soil Borings, test results) – Union Pedestrian Bridge	37 pages

Addenda

Union Street Pedestrian Bridge - Addendum 1
Union Street Pedestrian Bridge - Addendum 2
Union Street Pedestrian Bridge - Addendum 3
Union Street Pedestrian Bridge - Addendum 4

- 1-R** *Insert the 11-page Miscellaneous Art Screen and Art Sculpture Sketches and update the table of contents accordingly.*

1-S *Insert the 25-page Ice & Cold Storage Plant As-Builts and update the table of contents accordingly.*

1-T *Insert the 17-page Public Storage Permit Set and update the table of contents accordingly.*

2-O *Insert the 41 page "Asbestos, Lead and PCB Survey - Madison Street Pedestrian Bridge, Seattle WA" report and update the table of contents accordingly.*

Bid Requirements

BID REQUIREMENTS

0-01.1 INSTRUCTIONS TO BIDDERS

I. GENERAL

This Contract will be administered by the Director of the Seattle Department of Transportation, subject to the approval and acceptance of the Director of Finance and Administrative Services. **All questions must be e-mailed and be directed to the following:**

Before Bid Opening:	Amy Yamabe Seattle Department of Transportation Amy.Yamabe@seattle.gov
After Bid Opening and Before Execution:	Judy Keefe Purchasing and Contracting Judy.Keefe@seattle.gov 206-684-8032
After Execution:	Jessica Murphy Office of the Waterfront and Civic Projects Jessica.Murphy@seattle.gov

Inclusion Plan: All questions on the Inclusion Plan must be directed to Miguel Beltran at Miguel.beltran@seattle.gov or 206-684-4525. Backup contact is Carmen Kucinski at carmen.kucinski@seattle.gov or 206-684-0188.

Pre-bid questions must be submitted no later than 3-days prior to bid opening.

II. BID OPENING

The authorized Bid Form must be submitted as specified in Section 1-02.9(1). In accordance with Section 1-02.12, Bids will be opened and read orally immediately after 2:00 p.m. on April 1, 2020 at the following address:

City of Seattle Purchasing and Contracting
Seattle Municipal Tower Suite 4112
700 Fifth Avenue
Seattle, Washington 98104

III. TIME OF COMPLETION

Work must begin immediately on the Notice To Proceed Date in the Written Notice from the Engineer and after the date of such notice must be physically completed within the following period per Section 3 of the Agreement:

350 WORKING DAYS

No adjustment to the Working Days will be made based on the City's option of awarding Additive 1 and/or Additive 2.

IV. LIQUIDATED DAMAGES

If the successful Contractor fails to complete Work within the time set forth above, (s)he will be charged Liquidated Damages per Section 4 of the Agreement and Section 1-08.9. See Section 1-08.9 for method for determining cost of liquidated damages.

V. SUBSURFACE INFORMATION

Refer to Section 1-02.4(2) for information about any geotechnical or environmental reports, soil boring data, soil sample test data, or other data accumulated by the Engineer.

VI. ITEMS OF INTEREST TO BIDDERS

Reference

Addenda	1-02.6
Additive, Alternate, Deductive	1-02.11
Award of Contract	1-03.2
Bidder, Responsible	1-02.1
Bidder/Subcontractor List	1-02.9(3)
Bid, Form and Style of	1-02.5
Bid Guaranty	1-02.7
Bid Guaranty, Return of	1-03.5
Bids, Public Opening of	1-02.12
Bid Submittal	1-02.9(1)
Bid Submittal Date, Change of	1-02.9(2)
Bid Tabulation	1-03.1(1)
Bid, Modification or Withdrawal of	1-02.10
Bidders, Disqualification of	1-02.14
Bidders, Qualifications of	1-02.1
Bids, Irregular	1-02.13
Bond, Bid — see Bid Guaranty	1-02.7
Bond, Payment and Performance	1-03.3(2)
Contract, Execution of	1-03.3
Contract, Failure to Execute the	1-03.4
Equal Benefits, Affirmative Efforts, Equal Employment Opportunity and Non-Discrimination Requirements	1-07.11
Error, Claim of	1-03.1(2)
Examination of Bid Documents and Project Site	1-02.4
Information, Pre-Award	1-03.1(4)
Evidence of Insurance	1-03.3(1)
Liquidated Damages	Agreement Form, Section 4 and 1-08.9
Non Collusion Requirement	1-02.8
Inclusion Plan	1-02.9(4), 1-02.13, 1-03.1(4), 1-07.11(2)
Supplemental Bidder Responsibility Criteria	1-02.2
Owner, Rights of the	1-03.1(4)
Responsible Bidder Requirements	1-02.1
Quantities, Estimated	1-02.3
Time for Completion	Agreement Form, Section 3 and 1-08.5
Wages, Prevailing Wages	1-07.9(1)

VII. USE OF RECYCLED MATERIALS

Refer to Section 9-03.16 for information on the use of recycled Materials in Aggregates.

Refer to Sections 5-05.3(1) and 6-02.3(1) for information on the use of pozzolans in cement concrete.

Other Sections of the Contract may also allow for the use of recycled Materials.

VIII. REQUIREMENTS TO RECYCLE MATERIALS

Refer to Section 1-07.3(4) for information on requirements to recycle materials.

Other Sections of the Contract may also require the recycling of materials.

IX. CONSENT DECREE ACKNOWLEDGMENT

The City of Seattle (“City”), the United States Environmental Protection Agency (“EPA”) and the Washington State Department of Ecology (“Ecology”), have entered into a Consent Decree to settle the Complaint filed against the City by the United States in the United States District Court for the Western

District of Washington, captioned United States of American and the State of Washington v. City of Seattle, Civil Action No. 2:13-cv-678, ("Consent Decree"). The Complaint alleged that the City of Seattle ("City") violated Sections 301 and 402 of the Clean Water Act, 33 U.S.C. §§1311 and 1342 ("CWA"), and the conditions and limitations of its National Pollutant Discharge Elimination System ("NPDES") permit issued to the City by Ecology as authorized by EPA under Section 402(b) and the CWA.

Article II, Section 7 of the Consent Decree establishes that "any action taken by any entity retained by the City to implement the City's obligations under this Consent Decree shall be considered an action of the City for purposes of determining compliance with the Consent Decree."

Article II, Section 6 of the Consent Decree requires that the City provide a copy of the Consent Decree to all agents of the City, as well as to any engineering, consulting, or contracting firms or any other entity hired by the City to perform work that might reasonably require compliance with any provision of the Consent Decree. Section 6 expressly requires that "the City shall condition any contract upon performance of the work in conformity with the terms of this Consent Decree."

The Consent Decree requires, among other things, that the City, its agents and its contractors operate in a manner that does not cause sanitary sewer overflows ("SSOs") or dry weather overflows ("DWOs"). These requirements are incorporated into this contract, and the Contractor is required to comply with these and all terms of the Consent Decree.

Based on the foregoing, the City has determined that this contract must be and is subject to the provisions of the Consent Decree, and that the Contractor is expressly required to comply with all terms of the Consent Decree as a condition of this contract with the City, and that a copy of the Consent Decree is attached to this contract as an Appendix.

By signing this contract, Contractor acknowledges receipt of the Consent Decree, and affirmatively represents that it has read the same, understands the requirements of the Consent Decree, and agrees that all Work in this contract must be performed in conformity with the terms of the Consent Decree. Contractor further acknowledges that in the event that actions by the Contractor causes a violation of the Consent Decree that results in increased costs to the City through increased contractor costs, penalties or other claims, the City reserves all rights and legal remedies to recover such costs.

0-01.2 CHECKLIST FOR BIDDERS

The following items must be completed:

1. Bid Form – Unit Prices (Section 0-01.3):

- Include unit prices and unit price extensions for each Bid item on all Bid Schedules (when indicated) and Additives (when indicated).
- Complete Bid summary.

2. Declaration (Section 0-01.3(1))

- Acknowledge all Addenda issued as a part of this Contract
- Complete and sign Declaration. Signer must be authorized to legally bind the Bidder.

3. Bid Guaranty (Section 1-02.7):

- Must not be less than 5% of the maximum Bid amount including retail sales tax.

4. With regard to Section 0-01.4 INCLUSION PLAN:

- a. Have you completed the Inclusion Plan? This form must be submitted with your bid if the Owner has estimated the Project will cost over \$300,000. The Inclusion Plan is a condition of Award for this Contract.

5. Bidder / Subcontractors List (Section 0-1.5):

- Complete and sign Bidder / Subcontractor list.
- Submit Bidder / Subcontractor list with Bid or separately to PC within one hour of Bid submittal.

6. Supplemental Bidder Responsibility Criteria (Section 1-02.2):

- The Supplemental Bidder Responsibility Criteria Form and any additional documentation must be submitted to PC within three (3) Business Days of receipt of request.

Submitting Bid: Bids must be submitted on authorized Bid Form provided on eBid site and must be submitted to City of Seattle Purchasing and Contracting at one of the following addresses by 2:00 p.m. on the date designated for receipt of Bids in the Advertisement for Bids:

Post Office Box: Seattle Municipal Tower, PO Box 94687, Seattle, WA 98124-4687

OR:

Street Address: 700 — 5th Avenue Room 4112, Seattle Municipal Tower, Seattle, WA 98104.

If sending by courier (UPS, FedEx, etc.) the street address must be used. If sending by United States Postal Service (USPS), the Post Office Box must be used. Bidders are responsible for ensuring that the proper Zip code is used. The City of Seattle will not be responsible for a late bid.

~~Bids received after the deadline will be returned unopened.~~

Bid Opening: Bids received by 2:00 P.M. on April 1, 2020 will be publicly opened and read immediately after 2:00 P.M. on April 1, 2020.

Department of Finance and Administrative Services
Purchasing and Contracting
Seattle Municipal Tower Suite 4112
700 Fifth Avenue
Seattle, Washington 98104

Add 4-A

Replace the last sentence of section Submitting Bid with the following:

In order to comply with social distancing practices, bidder access into the Seattle Municipal Tower will be limited to the 5th Avenue entry (4th Floor). Bids must be accepted by FAS at the 4th floor security desk of the Seattle Municipal Tower (SMT) by no later than 2 p.m.

- Bids arriving between 12 p.m. and 2pm will be received by FAS staff assigned at the 4th floor security desk.
- Bids arriving prior to 12 p.m., will need to call 206-684-4245 to coordinate bid acceptance.

Replace the first sentence in the last paragraph of the section Bid Opening with the following:

Bidders wishing to attend the bid opening in person will require an escort to the 41st floor. Escorts will bring bidders attending bid opening to the 41st floor approximately 10 minutes prior to the 2pm bid opening(s). Late arrivals will not be escorted to the 41st floor.

0-01.3 BID FORM

TO THE DIRECTOR OF FINANCE AND ADMINISTRATIVE SERVICES OF THE CITY OF SEATTLE:

- A. The undersigned Bidder hereby certifies to have personally and carefully examined the Bid Documents issued for: Union Street Pedestrian Bridge , as authorized under Ordinance Number(s) 125806.
- B. The Bidder has examined the Project Site where the Work is to be performed and the conditions affecting the Work;
- C. Understanding that the quantities shown in the Bid are estimates only, being given for the purposes of comparing Bids, the Bidder hereby proposes to furnish all Material and labor and to perform all Work which may be required, and to complete the Work within the time fixed and upon the terms and conditions provided in the Bid Documents for the following prices:
- D. The Bidder has attached a Bid Guaranty in the amount of five percent (5%) of the Total Bid including retail sales tax in the form of cashier's check, certified check, or Bid bond;

(NOTE: The letters "SP" whenever appearing in the Bid item number column of the Bid Form indicate that additions or revisions to the Standard Specifications applicable to that Bid item are included in the Standard Supplemental Specifications and Special Provisions. The Contractor is advised to review those requirements regarding Bid items so designated.

The number to the left of the Bid item description denotes the "Bid item code" for that particular Bid item. If it is a six-digit number, the first three digits indicate the associated Specification division and section number. If it is a seven-digit number, the first digit denotes the schedule number and the next three digits indicate the associated Specification division and section number. The last three digits comprise the identification number for that item within the particular Section.

An asterisk (*) appearing in the first column of the Bid Form denotes those items in which the Owner will pay retail sales tax in accordance with the excise tax Rule 170 (refer to Section 1-07.2(3) of the Specifications). For all other Bid items, the Contractor must include retail sales tax in accordance with the excise tax Rule 171 (refer to Section 1-07.2(2) of the Specifications)

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

page 6

Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
BASE BID - SCHEDULE A						
SP 1	105005	CONSTRUCTION SURVEYING	1	LS	53,000.00	53,000.00
SP 2	105s01	CONTRACTOR ELECTRICAL SAFETY OBSERVER	100	HR	160.00	16,000.00
SP 3	107005	SAFETY AND HEALTH PROGRAM	1	LS	10,000.00	10,000.00
SP 4	107s01	OFFSITE DISPOSAL OF CONTAMINATED MATERIAL DESIGNATED AS TYPE A WASTE	1526	TN	16.00	24,416.00
5	108005	CRITICAL PATH SCHEDULE UPDATE, MIN. BID = \$1500 per EA	18	EA	1,500.00	27,000.00
6	109005	MOBILIZATION	1	LS	~~700,000.00~~	~~700,000.00~~
7	110005	MAINTENANCE AND PROTECTION OF TRAFFIC CONTROL INCLUDING FLAGGING	1	LS	52,000.00	52,000.00
8	202025	REMOVE ASPHALT OVERLAY	400	SY	14.00	5,600.00
SP 9	202045	REMOVE PAVEMENT	1320	SY	22.00	29,040.00
10	202150	REMOVE CURB, GRANITE WITH SALVAGE	80	LF	120.00	9,600.00
11	202190	REMOVE PIPE	25	LF	330.00	8,250.00
12	202250	REMOVE BOLLARD	7	EA	390.00	2,730.00
13	202270	REMOVE CATCH BASIN OR SAND BOX	1	EA	9,600.00	9,600.00
14	202365	REMOVE PAINT LEGEND/SYMBOL	3	EA	500.00	1,500.00
SP 15	202s02	REMOVE MISC. ITEMS AT TOP OF WESTERN AVE WALL	1	LS	8,800.00	8,800.00
SP 16	202s03	REMOVE METAL STAIRWAY	1	LS	21,000.00	21,000.00

Walsh Construction Company II, LLC

Bidder: _____

Page Subtotal: \$978,536.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

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Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension

BASE BID - SCHEDULE A

SP 17	202s04	REMOVE VAULT CASTING	1	LS	4,000.00	4,000.00
SP 18	202s06	REMOVE TIMBER PILING	20	EA	540.00	10,800.00
SP 19	202s07	REMOVE LIGHT POLE AND RECTANGULAR RAPID FLASHING BEACON	1	LS	11,000.00	11,000.00
SP 20	203s01	REMOVING PORTIONS OF EXISTING WESTERN AVENUE RETAINING WALL	1	LS	6,200.00	6,200.00
21	204005	COMMON EXCAVATION	145	CY	12.00	1,740.00
22	204020	STRUCTURE EXCAVATION	105	CY	190.00	19,950.00
23	207010	SAFETY SYSTEMS IN TRENCH EXCAVATION, MIN. BID = \$0.80 per SF	60	SF	0.80	48.00
SP 24	219s01	SETTLEMENT MONITORING (UNION ST PED BRIDGE)	1	LS	40,000.00	40,000.00
SP 25	219s02	PRE-CONSTRUCTION STRUCTURE INSPECTION (UNION ST PED BRIDGE)	1	LS	30,000.00	30,000.00
26	401002	MINERAL AGGREGATE, TYPE 2	500	TN	100.00	50,000.00
27	401017	MINERAL AGGREGATE, TYPE 17	139	TN	52.00	7,228.00
28	504045	PAVEMENT, HMA (CL 1/2 IN)	180	TN	150.00	27,000.00
29	504055	PAVEMENT, HMA (CL 1 IN)	360	TN	140.00	50,400.00
30	505224	ROADWAY CEM CONC BASE, 10 IN	150	SY	200.00	30,000.00
SP 31	505s01	CONCRETE COLLARS	1	LS	14,000.00	14,000.00
SP 32	602s01	SUPERSTRUCTURE (UNION ST PED BRIDGE & STAIRS)	1	LS	1,165,000.00	1,165,000.00

Bidder: Walsh Construction Company II, LLC

Page Subtotal: \$1,467,366.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

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Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
BASE BID - SCHEDULE A						
SP 33	602s03	CONCRETE CURB AT EXISTING WESTERN AVENUE WALL	1	LS	32,000.00	32,000.00
SP 34	602s06	CONC. CLASS 4000 FOR BRIDGE (UNION ST PED BRIDGE)	34	CY	4,900.00	166,600.00
SP 35	602s07	STEEL REINFORCING BAR FOR BRIDGE (UNION ST PED BRIDGE)	30700	LB	1.00	30,700.00
SP 36	602s08	CONC CLASS 5000 FOR BRIDGE (UNION ST PED BRIDGE)	57	CY	3,000.00	171,000.00
SP 37	612s01	MICROPILE	15	EA	13,000.00	195,000.00
SP 38	612s02	MICROPILE PROOF LOAD TESTING	3	EA	16,000.00	48,000.00
SP 39	619s01	CONSTRUCTING 3.94' DIAM. SHAFT (UNION ST PED BRIDGE)	90	LF	1,900.00	171,000.00
SP 40	619s02	CONSTRUCTING 4.92' DIAM. SHAFT (UNION ST PED BRIDGE)	150	LF	1,700.00	255,000.00
SP 41	619s03	QA SHAFT TEST (UNION ST PED BRIDGE)	5	EA	1,100.00	5,500.00
SP 42	619s04	REMOVING SHAFT OBSTRUCTIONS (UNION ST PED BRIDGE)	1	EST	<u>\$63,000.00</u>	<u>\$63,000.00</u>
SP 43	701s01	PIPE, SUBSURFACE DRAIN, SLOTTED PVC, 6 IN	40	LF	84.00	3,360.00
44	705451	INLET, TYPE 250B	1	EA	4,800.00	4,800.00
SP 45	705s01	CATCH BASIN, TYPE 241 WITH BEEHIVE GRATE	1	EA	4,400.00	4,400.00
SP 46	705s02	CATCH BASIN, TYPE 241 WITH SOLID COVER	2	EA	4,400.00	8,800.00
SP 47	705s03	CATCH BASIN, TYPE 241 WITH ADA GRATE	1	EA	4,200.00	4,200.00
SP 48	708058	PIPE, CB CONN, D.I., CL 50, 8 IN	17	LF	540.00	9,180.00

Bidder: Walsh Construction Company II, LLC

Page Subtotal: \$1,172,540.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

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Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
BASE BID - SCHEDULE A						
SP 49	708108	PIPE, CB CONN, PVC, C900, 8 IN	70	LF	1,100.00	77,000.00
SP 50	708258	PIPE, INLET CONN, D.I., CL 50, 8 IN	13	LF	850.00	11,050.00
51	717008	BEDDING, CL B, 8 IN PIPE	70	LF	51.00	3,570.00
52	717888	TEE, 8 IN, CUT-IN EXISTING CONC PIPE	4	EA	6,900.00	27,600.00
53	717s01	TELEVISION INSPECTION	240	LF	9.50	2,280.00
54	719006	SEWER CLEANOUT, 6 IN	2	EA	2,900.00	5,800.00
55	720005	ADJUST EXISTING MH, CB, OR VC	20	EA	2,300.00	46,000.00
56	720020	ADJUST EXISTING VALVE BOX	10	EA	1,500.00	15,000.00
57	720045	ADJUST EXISTING HANDHOLE	1	EA	2,300.00	2,300.00
SP 58	720s01	ADJUST EXISTING VAULT CASTING	6	EA	1,900.00	11,400.00
59	801001	CONSTRUCTION STORMWATER & EROSION CONTROL PLAN (CSECP)	1	LS	16,000.00	16,000.00
60	801003	SPELL PLAN (SP)	1	LS	10,000.00	10,000.00
SP 61	801004	TEMPORARY DISCHARGE PLAN (TDP)	1	LS	26,000.00	26,000.00
62	802121	SHRUB, DECIDUOUS, 1 GAL	265	EA	16.00	4,240.00
63	802123	SHRUB, DECIDUOUS, 3 GAL	20	EA	39.00	780.00
64	802154	GROUND COVER, 4 IN POT	119	EA	6.00	714.00

Bidder: Walsh Construction Company II, LLC

Page Subtotal: \$259,734.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

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Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
BASE BID - SCHEDULE A						
65	802700	LANDSCAPE ESTABLISHMENT, MIN. BID = \$5,000	1	LS	5,000.00	5,000.00
SP 66	802s01	BULB, BARE ROOT	230	EA	3.00	690.00
SP 67	802s02	BIORETENTION SOIL	37	CY	88.00	3,256.00
SP 68	802s03	MULCH	6	CY	100.00	600.00
SP 69	803005	IRRIGATION SYSTEM, AUTOMATIC	1	LS	7,100.00	7,100.00
70	804005	CURB, CEM CONC	80	LF	60.00	4,800.00
71	804015	CURB AND GUTTER, CEM CONC	50	LF	70.00	3,500.00
SP 72	814024	CURB RAMP	15	SY	350.00	5,250.00
73	814030	DETECTABLE WARNING PLATE	24	SF	45.00	1,080.00
74	814205	SIDEWALK, CEM CONC W/ 25% POZZOLANS	110	SY	120.00	13,200.00
75	814210	SIDEWALK, THICKENED EDGE W/ 25% POZZOLANS	80	LF	20.00	1,600.00
76	822004	PAVEMENT MARKING, PAINT, 4 IN STRIPE	130	LF	6.00	780.00
77	822006	PAVEMENT MARKING, PAINT, 6 IN STRIPE	80	LF	6.50	520.00
78	822008	PAVEMENT MARKING, PAINT, 8 IN STRIPE	680	LF	18.00	12,240.00
79	822020	PAVEMENT MARKING, THERMOPLASTIC, LEGEND/SYMBOL	4	EA	310.00	1,240.00
SP 80	822s01	PAVEMENT MARKING, MMA, CROSSBIKE	50	SF	31.00	1,550.00

Bidder: Walsh Construction Company II, LLC

Page Subtotal: \$62,406.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

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Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
BASE BID - SCHEDULE A						
SP 81	830s01	ELECTRICAL SYSTEMS	1	LS	176,000.00	176,000.00
SP 82	830s02	SITE LIGHTING	1	LS	140,000.00	140,000.00
SP 83	830s03	ELECTRICAL AND COMMUNICATIONS SERVICE CONNECTIONS	1	LS	41,000.00	41,000.00
SP 84	832s01	FOUNDATION, RRFB	2	EA	4,700.00	9,400.00
SP 85	835s01	WESTERN AVENUE BENCH	1	LS	175,000.00	175,000.00
SP 86	836s01	BOULDER - TYPE 1	21	EA	310.00	6,510.00
SP 87	836s02	BOULDER - TYPE 2	5	EA	380.00	1,900.00
SP 88	837s01	BRIDGE RAILING, GUARDRAIL TYPE A	192	LF	600.00	115,200.00
SP 89	837s02	METAL RAILING, GUARDRAIL TYPE B	37	LF	600.00	22,200.00
SP 90	838s01	UNION ELEVATOR STRUCTURE	1	LS	620,000.00	620,000.00
SP 91	843s01	UNION ELEVATOR HOISTWAY AND MECHANICAL ROOM FINISHES	1	LS	670,000.00	670,000.00
SP 92	863s01	UNION ELEVATOR	1	LS	250,000.00	250,000.00
SP 93	864s01	UNION MECHANICAL PLUMBING AND VENTILATION	1	LS	84,000.00	84,000.00
SP 94	871s01	FIRE ALARM SYSTEM	1	LS	41,000.00	41,000.00
SP 95	873s01	INSTALL OWNER FURNISHED ART SCREEN	1	LS	65,000.00	65,000.00
SP 96	873s02	ACCOMMODATE OWNER FURNISHED AND INSTALLED ART SCULPTURE	1	LS	14,000.00	14,000.00

Bidder: Walsh Construction Company II, LLC

Page Subtotal: \$2,431,210.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

page 12

Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
ADDITIVE 1 - SCHEDULE B						
SP 97	107s01	OFFSITE DISPOSAL OF CONTAMINATED MATERIAL DESIGNATED AS TYPE A WASTE	600	TN	20.00	12,000.00
98	109005	MOBILIZATION	1	LS	1,000.00	1,000.00
99	110005	MAINTENANCE AND PROTECTION OF TRAFFIC CONTROL INCLUDING FLAGGING	1	LS	7,500.00	7,500.00
100	110020	TRAFFIC CONTROL PEACE OFFICERS	160	HR	110.00	17,600.00
101	202480	REMOVE TREE	1	EA	2,000.00	2,000.00
SP 102	220s01	MOVEMENT MONITORING (MARION ST PED BRIDGE)	1	LS	5,000.00	5,000.00
SP 103	220s02	VIBRATION MONITORING (MARION ST PED BRIDGE)	1	LS	5,000.00	5,000.00
SP 104	220s03	PRE-CONSTRUCTION AND POST-CONSTRUCTION STRUCTURE INSPECTION (MARION ST PED BRIDGE)	1	LS	1,100.00	1,100.00
SP 105	220s04	STRUCTURE INSPECTION SURVEYS (MARION ST PED BRIDGE)	1	LS	46,000.00	46,000.00
SP 106	619s05	CONSTRUCTING 7.0' DIAM. SHAFT (MARION ST PED BRIDGE)	225	LF	2,400.00	540,000.00
SP 107	619s06	QA SHAFT TEST (MARION ST PED BRIDGE)	3	EA	1,200.00	3,600.00
SP 108	619s07	REMOVING SHAFT OBSTRUCTIONS (MARION ST PED BRIDGE)	1	EST	<u>\$69,000.00</u>	<u>\$69,000.00</u>

Bidder: Walsh Construction Company II, LLC

Page Subtotal: \$709,800.00

ADDENDUM 2

BID FORM 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

page 13

Bid Item	Bid Item Code	Bid Item Description	Estimated Quantity	Units	Unit Price	Unit Price Extension
<u>ADDITIVE 2 - SCHEDULE C</u>						
SP 109	107005	SAFETY AND HEALTH PROGRAM	1	LS	500.00	500.00
SP 110	107s02	LEAD ABATEMENT	1	FA	<u>\$20,000.00</u>	<u>\$20,000.00</u>
111	107s03	REMOVE AND DISPOSE OF ASBESTOS CONTAINING MATERIALS	1	FA	<u>\$20,000.00</u>	<u>\$20,000.00</u>
SP 112	202s05	ABANDON EXISTING UNDERGROUND ELECTRICAL CONDUIT	2	EA	1,500.00	3,000.00
SP 113	203s02	REMOVING PORTIONS OF THE EXISTING MARION STREET PEDESTRIAN BRIDGE	1	LS	48,000.00	48,000.00

Bidder: Walsh Construction Company II, LLC

Page Subtotal: 91,500.00

ADDENDUM 2

BID FORM SUMMATION 2020-003

SECTION 0-01.3

Union Street Pedestrian Bridge

page 14

BASE BID		
A.	BASE BID - SCHEDULE A (items 1 through 96 inclusive)	\$ <u>6,371,792.00</u>
B.	State Sales Tax (10.1%)	<u>N/A</u>
C.	BASE BID TOTAL (WITHOUT TAX)	\$ <u>6,371,792.00</u>

ADDITIVES AND ALTERNATES		
D.	ADDITIVE 1 - SCHEDULE B (items 97 through 108 inclusive) - This work includes foundations for Marion Street Pedestrian Bridge)	\$ <u>\$709,800.00</u>
E.	State Sales Tax (10.1%)	<u>N/A</u>
F.	SUBTOTAL (WITHOUT TAX	\$ <u>\$709,800.00</u>

G.	ADDITIVE 2 - SCHEDULE C (item 109 through 113 inclusive) - This work includes the removal of portions of the Marion Street Pedestrian Bridge)	\$ <u>\$91,500.00</u>
H.	State Sales Tax (10.1%)	<u>N/A</u>
I.	SUBTOTAL (WITHOUT TAX	\$ <u>\$91,500.00</u>

J.	TOTAL BID: LINE C + LINE F + LINE I	\$ <u>7,173,092.00</u>

0-01.3(1) DECLARATION

I declare, under penalty of perjury under the Laws of the State of Washington, as follows:

A. **BID:** I agree to perform the Work in compliance with the Bid Documents, for the prices stated in Section 0-01.3(1) of the Bid Form.

B. **NON-DISCRIMINATION:** I agree to ensure equal opportunity for employment and to engage in Affirmative Efforts in the solicitation of women and minorities and WMBE firms for participation on this Contract in accordance with SMC Ch. 20.42 and RCW 35.22.650.

C. **NON COLLUSION:** I have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in the preparation and submission of a Bid to the Owner for consideration in the award of a contract on the improvement described in the Bid Documents.

D. My bid takes into account the requirements imposed by Section 1-07.18, Subsection 6 which waives, with respect to the Owner only, the Contractor's immunity under RCW Title 51, (Industrial Insurance) of the Revised Code of Washington.

E. I agree to comply with the requirements regarding subcontracting, and the purchase of supplies or materials from firms that are not disqualified or otherwise debarred from doing business with the City under the provisions of SMC Ch. 20.42 or SMC Ch. 20.70.

F. **Responsible Bidder Requirements:** My bid acknowledges that I am in compliance with all of the responsible bidder requirements under RCW 39.04.350, including: having a certificate of registration under RCW 18.27 prior to bidding; a UBI number; industrial insurance coverage if required under Title 51 RCW; an employment security number under Title 50; at the time of Bid submittal, have received training on the requirements related to public works and prevailing wage by Labor & Industries or approved training provider per RCW 39.04.350 and chapter 39.12 RCW or am exempt from this requirement; and a state excise tax registration number under Title 82. I affirm I am not disqualified from bidding on any public works contract under RCW 39.06 or RCW 39.12.065(3) or on the System for Award Management (SAM.gov). I will provide proof of these requirements if requested.

G. **Community Workforce Agreement (CWA):** By submitting my Bid I agree to comply with the terms and conditions of the City of Seattle's Community Workforce Agreement and Priority Hire.

GENERAL BUSINESS INFORMATION

Business Name: Walsh Construction Company II, LLC
Business Street Address: 16400 Southcenter Parkway, Suite 501, Seattle WA 98188
Business Mailing Address: 16400 Southcenter Parkway, Suite 501, Seattle WA 98188
Business Phone, general: (206) 394-7300 **Business Fax:** (206) 394-7398

If the above address is not in the State of Washington please fill in the following:

Washington State Office Address: 16400 Southcenter Parkway, Suite 501, Seattle WA 98188
State in which the Company is formed: Illinois
State of WA UBI No.: 603 050 702
State of WA Contractor Registration No.: WALSHCC907PR
Employment Security Department No. 398656-00-3
City of Seattle Business License No.: 769100

CONTACT INFORMATION

Primary Contact for Award (Name and Title): Ray Riojas, Program Manager
Primary Contact Phone: (206) 394-7357 **Email:** rriojas@walshgroup.com
Administration Contact (Name and Title): Ray Riojas, Area Manager
Administration Contact Phone: (206) 394-7357 **Email:** rriojas@walshgroup.com
Social Equity Contact (Name and Title): Ray Riojas, Area Manager
Social Equity Phone: (206) 394-7357 **Email:** rriojas@walshgroup.com

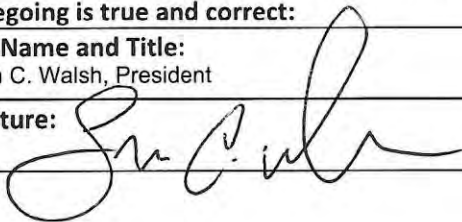
INSURANCE INFORMATION

Name of Insurance Company: Arch Insurance Company
Name of Insurance Contact: Richard Subak, CPCU, ARM
Insurance Contact Phone: (312) 381-4380 **Email:** rick.suback@aon.com

Receipt is hereby acknowledged of Addenda No(s).:

1 2 3 4 _____

OFFICIAL AUTHORIZED TO SIGN FOR BIDDER:

I certify (or declare) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct:	
Location or Place Executed (City, State): Chicago, Illinois	Print Name and Title: Sean C. Walsh, President
Date: 4/1/2020	Signature: 

AIA[®] Document A310[™] – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

Walsh Construction Company II, LLC
16400 Southcenter Parkway, Suite 501
Seattle, WA 98188

OWNER:

(Name, legal status and address)

City of Seattle
700 Fifth Avenue, Suite 4112
Seattle, WA 98104-5042

BOND AMOUNT: \$ Five Percent (5%) of the Total Bid
(including sales tax)

PROJECT:

(Name, location or address, and Project number, if any)

Union Street Pedestrian Bridge

PW#: 2020-003

Ordinance No. 125806

SURETY:

(Name, legal status and principal place of business)

Travelers Casualty and Surety Company of America
One Tower Square
Hartford, CT 06183

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

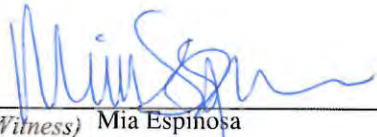
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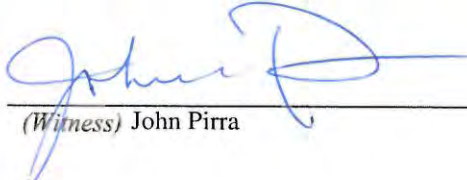
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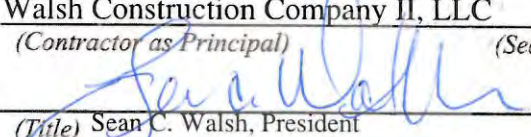
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Signed and sealed this 1st day of April, 2020

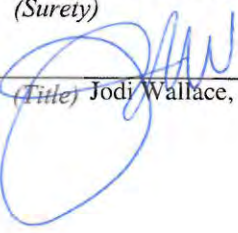

(Witness) Mia Espinosa


(Witness) John Pirra

Walsh Construction Company II, LLC
(Contractor as Principal) (Seal)


(Title) Sean C. Walsh, President

Travelers Casualty and Surety Company of America
(Surety) (Seal)


(Title) Jodi Wallace, Attorney-in-Fact

Init.

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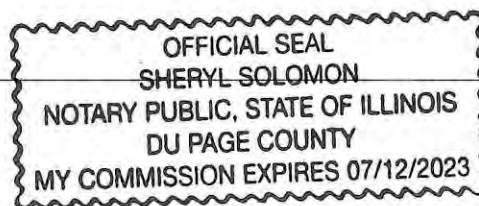
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State of Illinois
County of Cook

On this 7 day of April, 2020, before me personally appeared Jodi Wallace,
known to me to be the Attorney-in-Fact of **TRAVELERS CASUALTY AND SURETY COMPANY OF
AMERICA**, the corporation that executed the within instrument and acknowledged to me that such corporation
executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this
certificate first written above.


Sheryl Solomon





**Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company**

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Jodi Wallace of Chicago, Illinois**, their true and lawful Attorney-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **3rd** day of **February**, 2017.



State of Connecticut

City of Hartford ss.

By: _____

Robert L. Raney, Senior Vice President

On this the **3rd** day of **February**, 2017, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

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

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



Marie C. Tetreault
Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or undertaking to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this 1

day of April

, 2020



Kevin E. Hughes
Kevin E. Hughes, Assistant Secretary

**To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney-in-Fact and the details of the bond to which the power is attached.**

0-01.4 INCLUSION PLAN

Bidders must complete and submit the Inclusion plan form with their bid. Carefully read the attached instructions.

0-01.4(A) SOCIAL EQUITY PLAN

Bidders must complete and return this Social Equity Plan to PC within 3 days of Notice of Intent to Award.

0-01.5 BIDDER/SUBCONTRACTOR LIST

In compliance with RCW 39.30.060 for all projects estimated to cost \$1,000,000 or more, all Bidders shall complete and submit the Bidder/Subcontractor List. The completed Bidder/Subcontractor list shall identify all Subcontractors that the Bidder will directly contract with for the performance of HVAC, plumbing, and electrical work or indicate that the Bidder intends to self-perform the work, if awarded the Contract. If the HVAC, plumbing, or electrical specialty is left blank (either the name of a subcontractor is blank or a checkbox is not checked), the City shall accept the blank as "self performance." If left blank, the City shall determine through clarification whether HVAC, plumbing, or electrical work is required to execute the project; if so, the Bidder must be licensed and qualified to self-perform at the time of Bid submittal or the Bid shall be rejected. The Bidder shall be bound to self-performance of that specialty for the duration of the Project. The Bidder may contract with more than one Subcontractor in each of these trades, but may not list more than one Subcontractor for each category of work. If Subcontractors vary with Bid Alternates, Additives, or Deductives, the Bidder must indicate on a separate Bidder/Subcontractor List which Subcontractor(s) will be used for which Alternate, Additive, or Deductive.

The Bidder/Subcontractor List must be submitted to the City Purchasing & Contracting Services (PC) with the Bid, or separately within one hour of the time and date for Bid submittal. Failure to complete and submit the Bidder/Subcontractor List by the required time will result in the Bid being declared non-responsive and rejected. The Bidder is responsible for the timely delivery of the Bidder Subcontractor List. If awarded the contract, the Bidder agrees to utilize the subcontractors identified on the Bidder/Subcontractor List unless the City agrees to a substitution.

Bidders may submit the Bidder/Subcontractor List to PC in person or by courier at 700 Fifth Ave, Suite 4112, Seattle, WA 98104, by fax to (206) 684-4511, or by submitting a signed PDF version of the form to Judy.Keefe@Seattle.gov. Clearly mark the Project Name and Bidder's name to ensure the form is routed correctly.

Trade	You must check one box for each trade. If subcontracting, you must name the subcontractor(s) you will use and the category of work.
Heating, Ventilation & Air Conditioning (HVAC)	☒ Name of Sub: <u>Holmberg Company</u> Subcontractor UBI# <u>174-003-387</u> Category of Work: <u>HVAC</u> ☐ Bidder will self-perform this work ☐ N/A (this project does not include this work)
Plumbing	☒ Name of Sub: <u>Holmberg Company</u> Subcontractor UBI# <u>174-003-387</u> Category of Work: <u>Plumbing</u> ☐ Bidder will self-perform this work ☐ N/A (this project does not include this work)
Electrical	☒ Name of Sub: <u>Service Electric Co INC</u> Subcontractor UBI# <u>179-023-787</u> Category of Work: <u>ELECTRICAL</u> ☐ Bidder will self-perform this work ☐ N/A (this project does not include this work)

2020-003

PW#

Sean C. Walsh

Name of Bidder's Representative

President

Title of Bidder's Representative

Walsh Construction Company II, LLC

Bidder's Business Name

Signature of Bidder's Representative



City of Seattle
City Purchasing and Contracting Services (CPCS)

Inclusion Plan
Construction – Public Works

Bidders must complete and submit this form with their bid. Carefully read all instructions.

For questions or assistance contact:

- Miguel Beltran, City Contract Compliance Manager, 206-684-4525 (Miguel.Beltran@seattle.gov)
- Carmen Kucinski, 206-684-0188 (carmen.kucinski@seattle.gov)

Bidder Company Name	Walsh Construction Company II, LLC
Public Works Number	2020-003
Project Title	Union Street Pedestrian Bridge
Name of person authorized to speak on behalf of the company regarding this Plan	Ray Riojas, Program Manager
Email	rriojas@walshgroup.com
Phone	(206) 394-7357

Aspirational WMBE GOALS. Total available score: 6 points.

Identify the Aspirational WMBE Goals Bidder believes can reasonably be achieved through good faith efforts during this project. It is not mandatory that these goals be achieved; they are not contractually or legally binding. Goals must be developed in good faith and represented as attainable by reasonable efforts.

Estimated percentage of the base bid to Minority Owned contractors and suppliers	8 %
Estimated percentage of the base bid to Woman Owned contractors and suppliers	1 %
Total estimated percentage of the base bid to all WMBE contractors and suppliers	9 %

BUSINESS SUPPORT STRATEGIES. Total available score: 4 points

Each of the two options below is worth 2 points. Bidder may select one, both, or neither. Once selected, it applies to:

1. Registered as a Women or Minority Owned Business in the City Online Business Directory, and/or
2. Small Business Concern as certified by King County, and/or
3. Disadvantaged Business Enterprise of any definition certified by the State of Washington, and/or
4. Women or Minority Owned Business Enterprise as certified by the State of Washington; and/or
5. Small Business Concern certified by the State of Washington.

Business Support Strategy	Accept (Y / N)
Early Retainage Release. The prime (and any sub-tier primes) will release retainage held for the subcontractor, within thirty (30) days of acceptance of the work performed by the qualified subcontractor.	Y
Advance Mobilization Pay: The Prime (and any sub-tier primes) shall advance 10% of the specified and agreed-upon mobilization costs that were identified by line item within the WMBE firms bid, to each qualified firm at least 5 days in advance of the mobilization event.	Y

WMBE GUARANTEES. Total available score: 6 points.

A Bidder may offer to guarantee work to WMBE firms for the project, by identifying the WMBE and minimum dollar value of such work in the table below. You may add additional rows.

WMBE Business Name	Minimum Guaranteed Dollar Amount
ST Fabrication Inc	\$ 279,000.00
OMA Construction Inc	\$ 20,000.00
O'Bunco Engineering Inc.	\$ 80,000.00
Northwest Asphalt	\$ 77,000.00
PNW Reinforcing Inc	\$ 215,000.00
	\$
TOTAL	\$ 671,000.00

**City of Seattle: Public Works
Women and Minority Business
Inclusion Plan Instructions**

Carefully review all instructions. All Bidders must complete this form. The City public works inclusion plan requires the Bidder identify the good faith efforts the Bidder will use to include woman-owned and minority-owned business (WMBE) firms on the City project. There are 3 options for evidencing good faith efforts. Each option is worth points which can vary depending on information supplied by the Bidder. There are a maximum of 16 points available. The Bidder must earn at least 10 points. Bidders that earn less than 10 points will be found non-responsive and the Bid will be rejected. This Inclusion Plan becomes a material part of the Bidder's contract if the project is awarded to Bidder.

WMBE firms are state certified or self-identified firms that are at least 51% WMBE owned (per SMC 20.42). A WMBE need not be self-identified within the City Online Directory at bid time, but in such case must self-identify and register by time of award. These resources may assist bidders:

City On-Line Directory: <http://web6.seattle.gov/fas/registration/>

OMWBE Directory: <https://omwbe.diversitycompliance.com/>

1. INSTRUCTIONS

- a. All Bidders (including WMBE Primes) must complete and submit this form as part of the Bid for City design-bid-build public works project having an Engineer's Estimate of \$300,000 or greater, unless the City expressly instructs otherwise in the bid package.
- b. There are three commitments Bidders can use to establish an Inclusion Plan – Aspirational WMBE Goals, Business Support Strategies, and WMBE Guarantees:
 1. Aspirational WMBE Goals are goals Bidder believes can be achieved by good faith efforts. This option is worth a maximum of 6 points;
 2. Business Support Strategies are those the Bidder commits to employ for qualified firms. This option is worth a maximum of 4 points;
 3. WMBE Guarantees identify WMBE firms the Bidder guarantees to contract with for this project, with agreement reached about the work and pricing for the WMBE scope, including any terms and conditions important to the WMBE for their performance. This option is worth a maximum of 6 points.
- c. Work performed by a WMBE must be commercially useful and a distinct element of work that includes managing and supervising the work. The Contractor should evaluate the amount of work subcontracted, industry practices, and other relevant factors to determine whether the work is commercially useful.
- d. A Bidder scored less than 10 points will be deemed non-responsive. See Scoring section below.
- e. All dollars cited shall exclude sales tax (including references to the Total Bid Cost and estimates made by Prime when completing this form).

2. SCORING INSTRUCTIONS

- a. The average percentage of WMBE utilization on past City projects has been calculated by CPCS and is provided in the table below. This average is used to score the points that will be awarded for the aspirational goals and guarantees. These percentages are updated annually. Note that these averages include total WMBE utilization, not subcontracting alone, since aspirational goals may include prime self-performance.
- b. In addition to the Past Performance, scoring also recognizes an intent to exceed past performance by at least 2 percentage points above past performance.
- c. If the project is characterized by work of various types, CPCS may calculate a unique utilization rate for the project given the weight of each. CPCS determination is not subject to challenge.
- d. The project type and percentage of past WMBE utilization will be stated in the bids advertisement and documents.
- e. If past utilization for a project type was zero, an Aspirational Goal above two percent will receive 6 points. Bidder must still identify Business Support Strategies and Guarantees it is willing to employ and will be scored accordingly.
- f. Points awarded for WMBE Guarantees will be calculated based upon total available work for subcontract given past performance. This section can be awarded as many as 6 points.
- g. A Bidder who has received a formal Deficiency Report issued by the City as a result of unfulfilled WMBE Inclusion Plan commitments on past projects will lose one point from the total score.
- h. When calculations are used to evaluate the points, the City will calculate points to the nearest tenth decimal place. The City will round up to the nearest tenth.

2019	Roadway	Facility	Parks*	Under ground	Boundary	Structural Paint	Structural	Natural Habitat	Roof	Trenchless / Sewer Lining
3 year average Past performance	20%	25%	25%	14%	1%	4%	9%	16%	24%	6%

Note: Boundary refers to projects performed in Pend Oreille County (Boundary). Parks utilization rate excludes the mandatory self-performed WMBE work for a prime.

3. ASPIRATIONAL WMBE GOAL INSTRUCTIONS

- Aspirational WMBE Goals represent a serious commitment to use good faith efforts to reach the stated goals.
- The City will rely upon the Total WMBE Goal to determine responsiveness. The City will correct the Total WMBE Goal if that provided by the Bidder does not match the MBE and WBE goals.
- Aspirational WMBE Goals are a percentage of the Base Bid and during the course of the project will apply to the total contract amount including all contract change orders, additives, alternates and deductives. Contractor may seek a goal adjustment if such changes may merit a greater or lesser goal; CPCS will consider such requests, approve if appropriate, and modify the Plan accordingly.
- A WMBE Bidder may include in their goals and guarantees that percentage of contract base bid for work which the WMBE intends to self-perform that is in excess of the mandatory 30% they are otherwise required to perform as required by the City Specifications Section 1-08.1(3).
- Bidder will receive between 0 and 6 points for its Aspirational WMBE Goals, with proportional points based on a straight line formula to Past Performance (plus 2%) identified for the project as advertised in the bid solicitation. Bidder receives 3 points if the Total Aspirational Goal is half of Past Performance + 2%. Six points are awarded if the Bidder meets or exceeds Past Performance by 2 or more percentage points. For example, a project with Past Performance of 14%, would receive 3 points if the Total Aspirational Goal was 8% or 6 points if the Total Aspirational Goal was 16%.

$$P_A = 6A / (P + 2),$$

Where P_A = Points awarded for Bidder's Aspiration Goal

A = Bidder's Aspiration Goal (%)

P = Applicable Past Performance Trend (%)

4. BUSINESS SUPPORT STRATEGIES INSTRUCTIONS

The Bidder may elect to provide the business support identified on Page 2 for qualified firms. The City will provide two points for each choice selected. There are two options, allowing a total of 4 points if both options are chosen:

- Early Retainage Release. The prime and any sub-tier primes will release retainage held for the subcontractor, within thirty (30) days of acceptance of the work performed by the qualified subcontractor.
- For mobilization, the Prime and any sub-tier primes will pay all qualified firms five days in advance of the on-site performance, except if a unique situation prohibits such as an emergency or event requiring an immediate mobilization response. In those events, the Prime (including any sub-tier primes) shall deliver the payment no later than 5 days after job mobilization begins.

5. WMBE GUARANTEE INSTRUCTIONS

- This guarantees the City and WMBE that they shall be used for at least the amount given, following the remaining rules below.
 - A WMBE Guarantee expects the Bidder achieved agreement about scope, terms and cost of the work for the WMBE at bid time. The burden is upon the Bidder to resolve any differences, once the guarantee is given.
 - The amount guaranteed to WMBEs is not conditional on award of additives, deductives or alternates.
 - The Prime should clearly document in writing, agreements made with the WMBE firm upon which the guarantee was predicated, such as unit price or lump sum pricing as applicable, scope, terms or conditions, and subcontractor concurrence. This protects both parties when completing and executing the resultant subcontract before work begins.
 - The City may contact the WMBE firm or Prime after Bid opening to verify the firm has agreement to perform work as described in the plan. Failure to have agreement may result in rejection of the Inclusion Plan, rendering the Bid non-responsive.
 - A bidder will receive between 0 and 6 points for WMBE Guarantees, receiving a proportional number of points based on a straight line formula to Past Performance. A bidder will receive 3 points if the dollar-value of the Guarantees equals half of the Past Performance percentage. Six points are awarded if the Bidder commitments meet or exceed Past Performance.

$$P_G = 6 G / P$$

Where P_G = Points awarded for Bidder's Guaranteed Goal

G = Bidder's Guaranteed WMBE Goal (%)

P = Applicable Past Performance Trend (%)

- b. A WMBE bidder may only include self-performed work above 30%. This is based on the self-performance minimum required by the City Specifications Section 1-08.1(3).
 - c. Substitution or reduction of a Guaranteed WMBE firm is prohibited absent a waiver granted by the CPCS as a result of:
 1. Bankruptcy of the WMBE firm;
 2. Failure of the WMBE firm to provide the required bond;
 3. The WMBE firm cannot perform the work because they are debarred, not properly licensed, does not meet the subcontractor approval criteria, or in some other way is ineligible to work;
 4. Failure of the Subcontractor to comply with a requirement of law applicable to subcontracting;
 5. Death or disability of the principal of the WMBE firm rendering it unable to perform the work;
 6. Dissolution of the WMBE firm;
 7. Failure of the WMBE firm to perform satisfactorily in previous projects not known to Bidder at the time of bid;
 8. Failure or refusal of the WMBE to perform work for reasons other than contract term or pricing disputes;
 9. A change in scope of the contract which removes the guaranteed work from the project.
 10. WMBE Subcontractor does not execute an offered contract that reflects the terms and pricing that was agreed upon as a condition of the Guarantee. The Prime must evidence that the WMBE Subcontractor failed to execute a contract offered by the Prime which reflected such agreements, after the Subcontractor was given adequate time to execute the offered subcontract.
 11. Change order that reduces the scope of work of a WMBE guarantee or other reason if approved by CPCS Director.
-

6. INCORPORATION OF PLAN INTO CONTRACT AND REPORTING REQUIREMENTS

- a. CPCS may discuss the Plan with the Apparent Successful Bidder before incorporating into the contract and may amend the Plan by mutual consent.
- b. CPCS reserves the right to require a completed Social Equity Plan as a condition for contract execution if no WMBE guarantees are provided in order to demonstrate results of good faith efforts.
- c. The Contractor must provide reports and documents as required by CPCS within 15 days.
- d. CPCS will evaluate Contractor's WMBE utilization throughout the project.
- e. Contractor may not substitute a WMBE firm identified in the guaranteed portion of the plan unless the substitution is approved by CPCS. Such a substitution will not be considered unless Contractor can demonstrate clear necessity for such substitution. A Contractor granted permission to substitute for a guaranteed WMBE firm shall use good faith efforts to recruit another WMBE firm to perform the Work.
- f. If CPCS determines the Contractor is not making good faith efforts, it may take action as described in the project specification such as withholding invoice payments and breach of contract.
- g. The City will evaluate the WMBE utilization at close-out and may assign a Deficiency rating for failure to demonstrate good faith efforts. Deficient ratings are used by the City to determine Bidder responsibility on future work and debarment. To avoid a deficiency rating, the Contractor must demonstrate:
 1. A good faith effort to achieve Aspirational goals. Attainment under 80% of the goal will likely be considered deficient;
 2. Timely submittal of required and requested materials and reports to CPCS;
 3. Having advance agreements with each WMBE Guarantee, such that the WMBE understands and agrees that the WMBE Guarantee represents mutual agreement at time of the bid submittal;
 4. Using all "WMBE Guarantees" named in the Inclusion Plan, unless Prime received written authorization from CPCS for substitution;
 5. WMBE relationships are harmonious, clearly communicated and free of undue dispute; and
 6. WMBE work was commercially useful as defined above.

CONTRACT REQUIREMENTS

0-02.1 AGREEMENT (CONTRACT) FORM

This agreement by and between the Director of the Department of Finance and Administrative Services, acting on behalf of The City of Seattle, a municipal corporation of the State of Washington, hereinafter referred to as the Owner, and Walsh Construction Company II, LLC

Walsh Construction Company II, LLC, hereinafter referred to as the Contractor, witnesseth that in accordance with the terms and conditions of Contract PW# 2020-003 awarded the 10th Day of December, 20 20 the parties agree as follows:

SECTION 1. That the Contractor must do or cause to be done all Work and must furnish or cause to be furnished all tools, Materials, Equipment, Supplies and labor necessary to improve

Union Street Pedestrian Bridge

as ordered by Ordinance No. 125806 in all respects, in accordance with and as described in the Contract Documents now on file in the office of the Engineer for the following Awarded Contract Price:

Base Bid - Schedule A	\$ <u>6,371,792.00</u>
Additive 1 – Schedule B	\$ <u>709,800.00</u>
Additive 2 – Schedule C	\$ <u>N/A</u>
Sub Total of Additives	\$ <u>709,800.00</u>
Awarded Contract Price	\$ <u>7,081,592.00</u>

The Contractor must provide and bear the expense of all Equipment, Material, Supplies, work, and labor of any sort whatsoever that may be required for the transfer of Materials and for constructing and completing the Work provided for in this Contract and every part thereof, except such as are mentioned in the Contract Documents furnished by the Owner.

SECTION 2. The parties are bound by the Constitution and Laws of the State of Washington and the Charter, Ordinances, Rules and Regulations of the City of Seattle and by all applicable federal laws and government regulations, which provisions are incorporated by reference herein.

For the convenience of the parties of this Contract it is mutually agreed that any claims or causes of action which the Contractor has against the Owner arising from this Contract must be brought within 180 Calendar Days from the Completion Date of the Contract. It is further agreed by the parties that any such claims, disputes, or causes of action which cannot be resolved pursuant to the procedures set forth in the Contract Documents must be brought only in the Superior Court of King County. The parties understand and agree that the Contractor's failure to bring suit within the time period provided shall be a complete bar to any such claims or causes of action.

SECTION 3. The Contractor must begin the Work of the Contract on the Notice to Proceed Date stated in the Notice to Proceed issued to said Contractor by the Engineer, and to carry said Work on regularly and without interruption thereafter (unless the Engineer specifically directs otherwise, in writing) with such forces as to physically complete said Work within

350 WORKING DAYS

after such notice to begin Work; the time of beginning, rate of progress, and time of completion being essential and material provisions of the Contract.

Milestone(s):

1. All work associated with Additive 1 and Additive 2 must be complete by January 15, 2021.

Milestones must be shown on the Contractor's critical path schedule, see Section 1-08.3 for additional details.

SECTION 4. If the Work is not completed within the time specified, the Contractor must pay to the Owner, as Liquidated Damages, the sum dependent upon the Contract Award amount in accordance with Section 1-08.9, for each and every Working Day the Work remains uncompleted after expiration of the specified time, exclusive of those Days wherefore the Engineer has granted an extension of time.

The Contractor hereby agrees the amount set forth above is a reasonable estimate of actual damage which would be caused by the failure to complete the work on time, and that the amount indicated is for Liquidated Damages and is not a penalty.

SECTION 5. The Owner agrees to employ the Contractor to complete the Work in accordance with the Contract Documents and agrees to pay for the same according to the schedule of unit, lump sum, or itemized prices listed in the Bid Form, at the time and in the manner and upon the conditions provided for in the Contract.

The Contractor must inform all Subcontractors who work on the Improvement named in Section 1 of this Agreement of the manner and method of payment and the manner and method of measuring or computing the quantities of subcontracted work.

SECTION 6. In accordance with Chapter 39.12 RCW, the City Charter, and the Project Manual, the Contractor must pay, or cause to be paid to persons employed on or in connection with this Work, not less than the prevailing rate of wage for an hour's work specified for the labor performed.

SECTION 7. The Contractor on behalf of his or her heirs, executors, administrators, successors, and assigns, does hereby agree to the full performance of all the covenants to which the Contractor is obligated under the terms of the Contract.

SECTION 8. It is further provided that no liability will attach to the Owner by reason of entering into this Contract except as expressly provided herein.

SECTION 9. If the Contractor violates any material covenant or any provision of this Contract the Owner may: withhold payment due on any work done under the Contract until the Contractor complies with the Contract; order that the Work may be stopped, terminate the Contract, debar the Contractor in accordance with SMC 20.70.

SECTION 10: The Contractor shall acknowledge that they have received and read the Consent Decree between the city and the United States of America and agree that all Work in this Contract shall be performed in conformity with the terms of the Consent Decree.

ADDENDUM 4

Contractor must declare option for management of statutory retained percentage of this Contract by checking applicable box below.



Contractor elects to submit a bond in lieu of retained funds.



Contractor hereby elects to have the retained percentage of this Contract held in a non-interest bearing fund by The City of Seattle until sixty (60) Days following the Completion Date.



Contractor hereby elects to have The City of Seattle invest the retained percentage of the Contract from time to time as such retained percentage accrues and in accordance with RCW 60.28.011, .021 and .051. Contractor hereby designates:

Name of Financial Institution

Street Address, City, State, Zip Code

City, State, Zip Code of Financial Institution

as the repository for the escrow of said funds. Contractor hereby further agrees to be fully responsible for payment of all costs or fees incurred as a result of placing said retained percentage in escrow and investing it as authorized by statute. The City of Seattle shall not be liable in any way for any cost or fees in connection therewith.

IN WITNESS WHEREOF, the Owner has caused these presents to be signed by the designee of Director of Finance and Administrative Services ; and the Contractor has hereunto affirmed his or her signature.

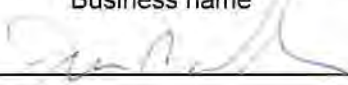
THE CITY OF SEATTLE
Director of Finance and Administrative Services

By 
Director, Purchasing and Contracting

Date 1-26-2021

CONTRACTOR

Walsh Construction Company II, LLC
Business name

By  Sean C. Walsh Date 12/23/2020

Title Manager

0-02.3 PLANS, DRAWINGS AND SPECIFICATIONS

The Work must be accomplished in accordance with these General Special Provisions (GSP) and Special Provisions (SP) together with the provisions, insofar as they are applicable, of the following documents:

1. The Engineering Drawing No. 782-290, Sheets 1 through 124.
2. The City of Seattle Standard Plans and Standard Specifications, which are comprised of:
 - a. “2017 edition City of Seattle Standard Specifications for Road, Bridge and Municipal Construction” (hereinafter referred to as the Standard Specifications).
 - b. “2017 edition City of Seattle Standard Plans for Municipal Construction” (hereinafter referred to as the Standard Plans) except modified, updated, or additional Standard Plans included in the appendix. Standard Plans included in the appendix of the Contract must be considered Standard Plans for this Contract.
 - c. City of Seattle Traffic Control Manual for In-Street Work, 2018 edition, which supplements and is to be utilized in conjunction with the 2009 version of the “Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD),” as modified and adopted by the Washington Department of Transportation (WSDOT). The Revised Code of Washington (RCW) 47.36, requires traffic control devices along city streets to conform to the WSDOT adopted standards to the extent possible.
3. The terms and conditions of such permits, agreements, ordinances, regulations, instructions and requirements as may be included in the appendix or otherwise attached hereto.
4. Right of Way Opening and Restoration Rule effective at the Bid advertisement date: The Seattle Transportation Director’s Rule may be found at:
http://seattle.gov/transportation/stuse_pavementopen.htm
5. Director’s Rules based on the City of Seattle “Stormwater Code”, SMC Chapters 22.800 through 22.808.
6. SDOT Pedestrian Mobility in and around Work Zones Director’s Rule (10-2015) which may be found: **<http://www.seattle.gov/transportation/drules.htm>**

The Contractor must obtain copies of these publications at Contractor’s own expense.

0-02.4 LOCATION OF PROJECT

The project is located in Downtown Seattle – Union Street between Alaskan Way and Western Avenue. The Alternate Additives are located on Marion Street between Alaskan Way and Western Avenue.

0-02.5 NATURE OF IMPROVEMENT

The scope of the project includes a new pedestrian bridge, elevator, railings, drilled shafts, micropiles, excavation, pavement and sidewalk removal, roadway paving, sidewalks, curb ramps, lighting, landscaping, furnishings, irrigation, channelization, storm drains, electrical, and other work. Additive #1 includes three drilled shafts on Marion Street. Additive #2 includes partial removal of the Marion Street Pedestrian Bridge.

S p e c i a l P r o v i s i o n s

DIVISION 1: GENERAL REQUIREMENTS

1-01 DEFINITIONS AND TERMS

1-01.1 GENERAL (GSP 03-09-16)

Add the following:

General Special Provisions (GSP) The General Special Provisions are supplemental provisions or modifications to the Standard Specifications. General Special Provisions are commonly used without modification when applicable. All number references in the General Special Provisions refer to the section and subsection of the Standard Specifications.

Special Provisions (SP) The Special Provisions are the job specific modifications to the Standard Specifications. Special Provisions are typically developed or significantly modified for a specific Project. All number references in the Special Provisions refer to the section and subsection of the Standard Specifications.

Titles or headings of the sections and subsections used in the Specifications are intended for convenience of reference and are not considered as having any bearing on the interpretation of the section or subsection. Dates indicate the date creation or last modification.

1-01.3 DEFINITIONS (GSP 08-15-18)

Remove the following definition and refer to section 1-01.1:

SPECIAL PROVISIONS

Add the following definitions:

ACCEPTABLE WORK SITE

A Work Site that is appropriate, productive, safe, free from bullying, hazing or harassment. An Acceptable Work Site is free from behaviors that may impair production or undermine the integrity of the work conditions including but not limited to job performance, safety, productivity, or efficiency of workers.

CITY

The City of Seattle.

ENCAMPMENT

An identifiable area within the City of Seattle occupied by one or more tents, structures, or assemblies of camping equipment or personal property which appears to a reasonable person as being used for camping. Encampments do not include sites a reasonable person would conclude are no longer in use for camping because remaining materials are garbage, debris, or waste.

ENCAMPMENT IMMEDIATE HAZARD

An Encampment in which people camping outdoors are at risk of serious injury or death beyond that caused by increased exposure to the elements, or their presence creates a risk of serious injury or death to others; including Encampments at highway shoulders and off-ramps, areas exposed to moving vehicles, areas that can only be accessed by crossing driving lanes outside of a legal crosswalk, and landslide-prone areas.

ENCAMPMENT OBSTRUCTION

People, tents, personal property, garbage, debris, or other objects related to an Encampment that: are in a City park or on a public sidewalk; interfere with the pedestrian or transportation purposes of public

rights-of-way; or interfere with areas that are necessary for or essential to the intended use of a public property or facility.

MOCK-UPS

Full-size physical assemblies that are constructed on-site or in a fabrication facility either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

OPEN-SHOP APPRENTICE

An employee of an Open-Shop Contractor that meets the criteria established under Article XI, Section 2 of the CWA.

PRE-APPRENTICE TRAINING PROGRAM

An education-based program, recognized by the State of Washington Apprenticeship and Training Council and endorsed by one or more registered apprenticeship sponsors, with a focus on educating and training students to meet or exceed minimum qualifications for entry into an Apprentice Training Program.

WORK SITE

The Project Site and any field or company offices used for the Project, or other locations used in conjunction with the project where Work is performed.

Delete the definition for Priority Hire and replace it with the following:

PRIORITY HIRE

The Priority Hire ordinance (SMC Ch. 20.37) prioritizes workers living in economically distressed ZIP codes and preferred entry candidates for hire on Covered Projects and sets aspirational goals for hiring women and people of color.

Delete the definition for Community Workforce Agreement and replace it with the following:

COMMUNITY WORKFORCE AGREEMENT (CWA)

The CWA is the agreement executed between the Director, on behalf of the City, and signatory labor unions that represent the trades and crafts that have workers who typically perform on City public works projects.

Revise the title for "JOBS COORDINATOR" to "JOB AND TRAINING ADVISOR".

1-02 BID PROCEDURES AND CONDITIONS

1-02.1 RESPONSIBLE BIDDER (GSP 12-9-19)

Revise the current #5 to #6 and add the following:

5. Prior to Notice of Intent to Award, have received training on the requirements related to public works and prevailing wage by Labor & Industries or approved training provider per RCW 39.04.350, chapter 39.12. Bidders are exempt from training if Bidder has been in business with active

Unified Business Identifier (UBI) number for three or more years and have performed work on three (3) or more public works projects.

1-02.2 SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA FORM (SBRC) (GSP 08-15-18)

Delete the first paragraph under item 1. and replace it with the following:

1. Work Experience

If specific work experience criteria are required in the Project Manual, the Bidder must document on the SBRC that it meets the specified criteria.

The Owner will verify that the specified work experience criteria is met by the apparent low Bidder. It is the Bidder's responsibility to verify that the names and phone numbers provided for references are current to ensure the Owner's ability to contact references and verify Bidder work experience. If the Owner is unable to contact references to verify Bidder or Subcontractor experience due to circumstances beyond its control, the Owner reserves the right to determine work experience based on the information available to the Owner.

1-02.4 EXAMINATION OF BID DOCUMENTS AND PROJECT SITE

1-02.4(1) GENERAL (GSP 10-16-00)

Add the following:

There is a MANDATORY pre-bid meeting for this project. All those that wish to bid on the project will need to attend one of the pre-bid meetings. Bids will not be accepted from Bidders who have not attended one of the pre-bid meetings. The first pre-bid meeting is scheduled for Thursday, 4 PM, March 5, 2020, the second pre-bid meeting is scheduled for Friday, 9 AM, March 6, 2020. Please meet at 626 Alaskan Way, Seattle, WA 98104.

1-02.4(2) SUBSURFACE INFORMATION (GSP 08-24-10)

Add the following:

Logs of soil borings, testing results, and/or other raw data are located in the Appendix.

1-02.9 BID SUBMITTAL

1-02.9(4) INCLUSION PLAN (GSP 12-31-13)

Add the following:

For purposes of the Inclusion Plan, this is considered a **Bridge** Type of project with a Past Performance of **10 %** WMBE utilization rates based on completed projects.

1-02.14 DISQUALIFICATION OF BIDDERS (GSP 08-15-18)

Delete the contents of this section and replace with the following:

A Bidder will be deemed not responsible and its Bid rejected if:

1. The Bidder does not meet the mandatory responsibility criteria in RCW 39.04.350(1) as amended and as specified in Section 1-02.1;
2. The Bidder (apparent low Bidder only) does not meet the Supplemental Bidder Responsibility Criteria as specified in Sections 1-02.1 and 1-02.2, did not provide the completed and signed SBRC or required documentation to evaluate the Bidder qualifications, or fails to disclose or submits false or misleading information on the SBRC or in the attached documentation;
3. Evidence of collusion exists with any other Bidder or potential Bidder; or
4. The Bidder failed to attend a mandatory pre-bid conference, if applicable.

A Bidder may be deemed not responsible and its Bid rejected if:

- a. More than 1 Bid is submitted for the same project from a Bidder under the same or different names;
- b. An unsatisfactory performance record exists as shown by past or current Work for the Owner, or for others, as judged from the standpoint of the conduct of the Work, environmental or safety compliance records, workmanship, progress, social equity, Community Workforce Agreement, or equal employment opportunity practices; or termination for cause;
- c. The Bidder has failed to settle bills for labor or Materials on past or current contracts;
- d. The Bidder has failed to complete a public contract;
- e. The Bidder has been convicted of a crime arising from a previous public contract;
- f. The Bidder is unable, financially, or otherwise, to perform the Work; or
- g. For any other reason deemed proper by the Owner.

The Owner will notify the Bidder by email if the Bidder is determined to be not responsible under this Section.

1-03 AWARD OF CONTRACT

1-03.1 CONSIDERATION OF BIDS

1-03.1(4) PRE-AWARD INFORMATION AND RIGHTS OF THE OWNER (GSP 08-15-18)

Insert the following item after item 4:

5. A Social Equity Plan

1-03.3 REQUIRED DOCUMENTS TO ESTABLISH EXECUTION DATE (GSP 08-15-18)

Delete the contents of this Section and replace with the following:

Within 10 Business Days of the Owner's issuance of the Notice of Intent to Award, unless extended by mutual agreement, the apparent low Bidder must submit to PC: proof of insurance, fully executed original Payment and Performance Bond, Retainage Bond if applicable, and the original signed Agreement Form. The apparent low Bidder must also submit the Social Equity Plan as specified in Section 1-03.3(4).

Add the following new section:

1-03.3(4) SOCIAL EQUITY PLAN (GSP 08-15-18)

The apparent low Bidder must submit to PC a completed Social Equity Plan within 3 Business Days of the Owner's issuance of the Notice of Intent to Award. A completed plan must include all sections applicable to the project including the Inclusion Plan Supplement, Apprenticeship, and Workforce Projections when required. The Social Equity Plan must indicate the firms and scopes with estimated dollars for all WMBE subcontractors, and must, if applicable, list all apprentice trade assignments and estimated hours. See Section 1-07.11. The apparent low Bidder should contact PC for help preparing the Plan to ensure completeness. The Social Equity Plan must be approved by PC prior to the Execution Date.

1-03.3(5) LETTER OF ASSENT TO CWA (GSP 04-09-18)

The apparent low Bidder must submit to PC the signed Letter of Assent. All Subcontractors are required to sign a Letter of Assent prior to starting Work as part of the Pre-Job Package process. See Section 1-07.10.

1-03.4 FAILURE TO EXECUTE THE CONTRACT (GSP 04-09-18)

Delete item 1. and replace it with the following:

1. Execute the Agreement Form and sign the Letter of Assent within the required time period;
or

1-04 SCOPE OF WORK

1-04.2 COORDINATION OF CONTRACT (GSP 02-28-17)

Replace item d in the third paragraph of this Section with the following:

- d. General Special provisions and Special Provisions (GSPs and SPs) included in the Project Manual

1-04.3 CHANGES (GSP 08-15-18)

Delete the second paragraph after the list in this Section and replace it with the following:

Changes in the Work will be incorporated into the Contract by Change Order. The exception is that a Change Order is not required for changes noted on field stakes or variations from estimated quantities that are less than 25 percent of the original Bid quantity. Changes noted on field stakes or variations from estimated quantities that are less than 25 percent of the original Bid quantity will be paid at the Bid Item prices that apply. The Contractor must respond immediately to changes shown on field stakes and proceed with the Work without waiting for further notice.

1-04.4 DISPUTE AND CLAIMS RESOLUTION PROCESS (GSP 04-09-18)

Insert the following paragraph after the first paragraph in this Section:

Disputes subject to the labor relationship provisions of the CWA must be addressed through the process under the CWA, Article VIII or Article IX.

1-05 CONTROL OF WORK

1-05.1 AUTHORITY OF THE ENGINEER (GSP 04-09-18)

Delete and replace the last sentence of the first paragraph in this Section with the following:

Whenever it is so provided in this Contract, the decision of the Engineer is final, provided that such decision may be disputed as specified in Section 1-04.4 or as provided for labor relations topics covered under the CWA.

1-05.2 AUTHORITY OF ASSISTANTS AND ELECTRICAL SAFETY OBSERVER

1-05.2(2) AUTHORITY OF ELECTRICAL SAFETY OBSERVER (SP 01-29-20)

Supplement this Section with the following:

The Contractor must provide a supervisor meeting the qualifications of WAC 296-24-957-985. This supervisor must be responsible for electrical safety when working in or within 5 feet of energized underground distribution and transmission infrastructure, within 10 feet of energized overhead distribution and transmission infrastructures, or as otherwise deemed necessary by the Engineer. This supervisor must also be referred to as the Contractor Electrical Safety Observer and must assume the responsibilities of and replace the need for an On Site Electrical Lead.

Where the Contractor plans to excavate within 10 feet of SCL's energized underground transmission infrastructure, the exact alignment and depth of these lines must be verified by potholing using vacuum excavation prior to construction.

Submittals: The Contractor's **Project General Safety and Health Plan (PGSHP)** required by Section 1-07.1(4) must include a plan covering all work in or within 5 feet of energized underground distribution and transmission infrastructures and 10 feet of energized overhead distribution and transmission infrastructures. The Safety Plan must, at a minimum, describe the following:

- The work to be performed, the work duration, and equipment to be used for the work.

- The means for maintaining appropriate minimum clearances between energized, exposed or overhead transmission and distribution infrastructure

The physical barriers to be used to isolate and protect energized, exposed, or overhead distribution and transmission infrastructure, in accordance with WAC 296-155-444.

Physical protection of SCL facilities and the conduct of the Contractor Electrical Safety Observer must be to the satisfaction of the Engineer in coordination with the SCL Electrical Safety Observer. All costs related to providing a Contractor Electrical Safety Observer must be included in the Bid Item Contractor Electrical Safety Observer.

1-05.2(2)A MEASUREMENT

Measurement for "Contractor Electrical Safety Observer" will be per hour.

1-05.2(2)B PAYMENT

1. "Contractor Electrical Safety Observer", per hour

The Bid Item price for "Contractor Electrical Safety Observer" must include all costs for the work required to provide the observer as specified in Section 1-05.2.

1-05.3 SUBMITTALS

1-05.3(1)E GENERAL SUBMITTAL DISTRIBUTION AND FORMAT SUMMARY

Replace this Section with the following:

1-05.3(1)E GENERAL SUBMITTAL DISTRIBUTION AND FORMAT SUMMARY (GSP 06/25/18)

The following table identifies the format required for a submittal or item of correspondence to be considered the official, governing document and thus trigger the Engineer's review/approval period when applicable. This table also provides a general overview of typical format and distribution requirements for various documents and submittals that may be required by the Contract and for correspondence and responses from the Engineer. However, specific submittal requirements are more fully described in the Specification sections pertaining to them, and to the extent there are conflicts between the table below and the detailed Specification requirements, the detailed Specification requirements will govern on submittal requirement content and the table below will govern on the submittal process.

GENERAL SUBMITTAL DISTRIBUTION AND FORMAT SUMMARY TABLE

Submittal/Correspondence Description		Required Format For Review Period Or Formal Action To Begin		Cover Form
		Required	Follow-up	
FROM CONTRACTOR	All Oversize documents (larger than 11" x 17"), regardless of submittal type	PDF	Paper Copy	ST&R Form
	As-built Drawings	PDF	Contractor's option –paper copy	ST&R Form
	Bulk Samples & Paint Color Chips	Sample w/ ST&R Form	Electronic ST&R Form	ST&R Form
	Catalog Cut Sheets & Certifications	PDF	Contractor's option –paper copy	ST&R Form
	Change Orders (signed)	Paper	Electronic ¹	N/A
	Corrective Action Response	RFI Word Document - Electronic Form Submitted	Contractor's option –paper copy	N/A

Submittal/Correspondence Description	Required Format For Review Period Or Formal Action To Begin		Cover Form
	Required	Follow-up	
CPM Schedules (Baseline & Updates)	Electronic Software File & PDF of CPM & Narrative	Paper of CPM; Contractor's option – Narrative paper copy	ST&R Form
E-mails (coordination only)	Electronic	N/A	N/A
Construction Stormwater Pollution Prevention Submittals: CSECP, TVSPP, SP, TDP, & DWP	PDF	Contractor's option –paper copy	ST&R Form
Field Memos	PDF	Paper	N/A
Health and Safety Plans	PDF	Contractor's option –paper copy	ST&R Form
Letters, Formal Correspondence	PDF	Paper Copy	N/A
Miscellaneous Plans (paving plan, pour plan, etc....non-shop drawing)	PDF	Contractor's option –paper copy	ST&R Form
Modification Proposal	PDF-letter	Paper Copy	N/A
Operations and Maintenance Manuals	Paper Copy (# specified)	PDF is available	ST&R Form
Progress Estimate	PDF	Contractor's option –paper copy	ST&R Form
Reports	PDF	Contractor's option –paper copy	ST&R Form
Request for Information (RFI)	RFI Word Document - Provided Electronic Form	Contractor's option –paper copy	N/A
Request for Material Source Approvals	PDF – Provided Form	Contractor's option –paper copy	ST&R Form
Lump Sum Breakdown, Project Labor List, & Project Equipment List	PDF – Provided Form	Contractor's option –paper copy	ST&R Form
Shop Drawings with Professional Engineering Stamp	PDF	Paper Copy	ST&R Form
Shop Drawings without Professional Engineering Stamp requirement	PDF	Paper Copy	ST&R Form
Subcontractor Approval Requests	PDF – Provided Form	Contractor's option –paper copy	ST&R Form
Submittal Control Document	PDF	Contractor's option –paper copy	ST&R Form

Submittal/Correspondence Description		Required Format For Review Period Or Formal Action To Begin		Cover Form
		Required	Follow-up	
	Substitution Requests	PDF - letter	Paper copy	N/A
	Surveying Notes (Contractor's)	Paper copy	Contractor's option –PDF	N/A
	Test Results (not for acceptance)	PDF	Contractor's option –paper copy	N/A
	Test Results (for acceptance)	PDF	Contractor's option –paper copy	ST&R Form
	Three-Week Look-Ahead Schedule	PDF	Contractor's option –paper copy	ST&R Form
	Traffic Control Plan	PDF	Contractor's option –paper copy	ST&R Form
	Warranties	PDF	Paper copy	N/A

NOTES:

1. The Engineer requires originals of signed pages for this document. The Contractor may submit an electronic version to expedite the process, but must then provide a paper version with original signature prior to completion of the Engineer's approval process. All Change Orders are proposals until all signatures are signed by the Engineer and the Owner. The Owner reserves all rights if proposed Change Order is not completely signed.

Submittal/Correspondence Description		Required Format for Review Period or Formal Action to Begin		
		Standard	Follow-Up	
FROM ENGINEER	Change Orders	Electronic ²	Paper ²	
	Design Changes (non-cost clarifications or for cost proposal)	Electronic	Paper (stamped drawings)	
	E-mails (coordination)	Electronic	N/A	
	Field Directive	Paper	PDF	
	Field Memos	Paper	PDF	
	Inspection Reports	PDF		
	Letters, Formal Correspondence	PDF	Paper	
	Preconstruction Meeting Announcement	PDF	Paper	
	Progress Meeting Minutes	PDF		
	RFI Responses (RFI form)	Electronic		
	Submittal Review Responses (ST&R Form)	Electronic		

NOTES:

2. The Engineer may submit an electronic version change order proposal and will provide a hard copy for signatures. Change Orders are non-binding proposals until signed by the Engineer and the Owner.

All correspondence being sent to the Engineer from the Contractor must be numbered with a serial letter number beginning with one (1) for referencing; for example; Serial Letter 1, Serial Letter 2, etc... or CSL-1, CSL-2, etc...

All correspondence or letters being sent to the Contractor from the Engineer will be numbered with a serial letter number beginning with one (1) for referencing; for example; Serial Letter 1, Serial Letter 2, etc... or ESL-1, ESL-2, etc...

PC required submittals must be made directly to PC.

1-05.3(5) EARLY SUBMITTALS (GSP 04-09-18)

Delete Item 5 from the numbered list in this Section

Supplement this section with the following:

CWA early submittals are required before any early Subcontractor may start work, including:

- (1) Pre-Job Package submittal for all Subcontractors as applicable; see Section 1-07.10. For Subcontractors, the Pre-Job Package includes the Subcontractor's signed Letter of Assent.

1-05.3(11) SHOP DRAWINGS (GSP 06-25-18)

In the second sentence, revise paper size of 24x36 inches to 22x34 inches.

1-05.4 CONFORMITY WITH AND DEVIATIONS FROM DRAWINGS AND STAKES (GSP 05-21-11)

Replace this Section with the following:

The Contractor must provide all construction surveying specified in Section 1-05.5(3). The Engineer will provide primary survey control as described in the Contract. If control points are missing or damaged, the Contractor must notify the Engineer in writing upon discovery and allow the Engineer five (5) Working Days to investigate and, if necessary, establish new or additional control points. The Contractor must confirm Control points at least five (5) Working Days prior to beginning surveying. The Engineer will not provide construction staking services. The Engineer may provide additional points at the Engineer's sole discretion or upon written request by the Contractor. The Contractor is responsible for all construction stakes and marks needed to establish the lines, grades, slopes, cross-sections, and curve superelevations. The Contractor must take full responsibility for detailed dimensions, elevations, and slopes measured from them.

All work performed must be in conformity with the lines, grades, slopes, cross sections, superelevation data, and dimensions as shown in the Drawings. If the Drawings, or Specifications state specific tolerances, then the work must be performed within those limits. The Engineer's decision on whether the work is in conformity is final, as provided in Section 1-05.1.

The Contractor must not deviate from the approved Drawings and working drawings unless the Engineer approves the deviation in writing. However, prior to beginning any Work at a new location, the Contractor must verify Drawing geometrics with existing field conditions. The Contractor must promptly provide written notice to the Engineer of any conflict, error, discrepancy, or omission.

If the Engineer determines the Contractor's surveying is inadequate, the Engineer may require additional surveying and/or staking without additional cost to the Owner.

The Contractor must provide enough safe areas to permit the Engineer to perform any checks of the surveying performed by the Contractor.

1-05.5 CONSTRUCTION STAKES

Replace this Section with the following:

1-05.5 CONSTRUCTION STAKES (GSP 10-10-10)

1-05.5(1) GENERAL (GSP 04-21-08)

All work must be performed with NAVD88 as the vertical datum and NAD83 (1991) as the horizontal datum or as shown on the Drawings.

The Contractor must provide a work site that has been prepared to permit construction staking to proceed in a safe and orderly manner.

The Contractor must keep updated survey field notes in a standard field book and in a format approved by the Engineer in advance. The Contractor must allow five (5) Working Days for approval.

For each applicable element of work, upon request by the Engineer or when desired by the Contractor, the Contractor must provide copies of field notes and grade sheets. Contractor must provide these copies at least 2 Working Days prior to commencing construction of the element of work. The Contractor must provide all grade sheets and field notes for all survey work performed by the Contractor's surveyor in establishing line, grade and slopes for the construction work. Any review or check of the Contractor's surveying by the Engineer will be performed at the sole discretion of the Engineer and if performed will not relieve the Contractor of the requirements of this Section and the Contract Documents.

See Section 1-07.16(1) regarding protection of monumentation and requirements for Washington Department of Natural Resources permits.

Any claim by the Contractor for extra compensation by reason of alterations or reconstruction work allegedly due to error in the Engineer's line and grade, will not be allowed unless the original control points set by the Engineer still exist and show no evidence of disturbance, or unless other satisfactory documented substantiating evidence to prove the error is furnished to the Engineer.

Three consecutive points set on line or grade will be the minimum points used to determine any variation from a straight line or grade. An adequate number of points must be used to provide curvature as shown in the Drawings. Upon discovery, any variation from the line and grades shown in the Drawings must be reported to the Engineer in accordance with Section 1-04.2. In the absence of such report, the Contractor will be liable for any error in alignment or grade.

1-05.5(2) ENGINEER PROVIDED SURVEY CONTROL POINTS (GSP 04-21-08)

1-05.5(2)A GENERAL (GSP 04-21-08)

The Contractor must direct questions regarding the correct interpretation of Engineer provided survey points or data to the Engineer. Failure to correctly interpret and utilize the primary survey control or Drawings, as provided by the Engineer, does not constitute justification by the Contractor for extra work, or causation for not replacing or repairing incorrect work at the Contractor's expense.

In order to provide remedial measures the Contractor must immediately notify the Engineer, in writing, of any survey discrepancies that are discovered.

1-05.5(2)B CONTROL (GSP 04-21-08)

The Engineer will provide at minimum the following survey control:

1. Two (2) intervisible horizontal control points for each continuous street between consecutive intersections, and no less than two (2) points per 1320 linear feet measured along the centerline of street or the control line for the improvement. "T" intersection branching off a street with Work on that branching street will have similar horizontal control points. "T" intersections branching off a street with no Work on that branching street will have one control point at the intersection.
2. Two (2) vertical control points for each continuous street between intersections within the Project Site. A minimum of two (2) points per 1320 feet will be provided.

1-05.5(3) CONTRACTOR PROVIDED SURVEY (GSP 10-10-10)

1-05.5(3)A GENERAL (GSP 10-10-10)

The Contractor must provide all surveys required other than those specified in Section 1-05.5(2)B. The Contractor must assume full responsibility for detailed dimensions, elevations, and excavation slopes measured from Engineer furnished Monuments and control points. The Contractor must set reference lines from these control points for trimming subgrade, for surfacing, and for controlling the paving machines.

The Contractor must use the furnished information for all necessary calculation and survey to complete the Work.

The Contractor's surveyor must be or work under the supervision of a surveyor licensed in the State of Washington.

All survey work must meet a minimum of third order accuracy (1:5000) for conventional traverse. For GPS control network, the Federal Geographic Data Committee STD-007.2-1998 guidelines must be followed meeting 2 centimeter accuracy using the City of Seattle High Accuracy GPS Control Monumentation.

If the survey work provided by the Contractor does not meet the these accuracy standards; is inadequate in staking or frequency to control the work; or directly results in an increase in Bid item quantities, the Contractor must immediately, upon the Engineer's Written Notice, remove the individual or individuals performing the survey work. The Bid item payment for "Construction Survey" will be adjusted in accordance with Section 1-09.5. Thereafter the survey work will be completed by the Engineer at the Contractor's sole expense. Costs for completing the survey work required by the Engineer will be deducted from moneys due or to become due the Contractor. Any delay resulting from the removal of Contractor's survey or from Owner surveyors providing survey as called for in Section 1-05.5 will be considered nonexcusable and noncompensable.

All construction staking activities must be documented in standard hard cover survey field books or in an alternative field book method with prior written approval by the Engineer. The record must be adequate to allow the survey to be reproduced. The notes must be neat, orderly and clearly legible. The field books must include dates, page titles, page numbering, indexing and all pertinent data consistent with standard survey practices.

Copies of these field notes must be provided to the Engineer upon request. Upon physical completion of the Contract, the field books must be submitted to the Engineer and become the property of the Engineer.

Survey work must be within the following tolerances:

	<u>Vertical</u>	<u>Horizontal</u>
1. Slope stakes	+/- 0.10 foot	+/- 0.10 foot
2. Stationing	n/a	+/- 0.10 foot
3. Alignment	n/a	+/- 0.01 foot (between successive points)
4. Bridge/Viaduct Elevations:		
a. Superstructure $\pm$ 0.01 foot (from Drawing elevations)		
b. Substructure $\pm$ 0.05 foot (from Drawing elevations)		
5. Surfacing grade stakes	+/- 0.02 feet	+/- 0.02 feet (parallel to alignment) +/- 0.02 feet (normal to alignment)
6. Roadway paving	+/- 0.02 feet	+/- 0.02 feet

(parallel to alignment)

+/- 0.02 feet

(normal to alignment)

The Contractor must be responsible for delineation of all easements, right-of-way, and environmental areas.

The Contractor must be responsible for providing all volumes calculations. Cross-sections must be provided at a minimum of 25-foot intervals, and at all cross-sectional change points such as the beginning and end of cross-sectional transitions. The Engineer will verify the Contractor's Cross-sections and calculations and if a conflict exists between the Contractor's calculations and the Engineer's the Engineer may reject the Contractor's calculations until corrected or use an Engineer's estimate for payment.

Digital terrain modeling (DTM) will only be permitted with written approval of the Engineer and if used a hard copy of all cross-sections as required above must be provided.

If the Engineer provides at the Contractor request the original terrain DTM files other survey information, this information is provided for the convenience of the Contractor. This information is not part of the Contract and does not modify the existing Contract Documents. By using the this survey information, the Contractor accept full responsibility for verifying the accuracy and completeness of the survey information and agrees to indemnify, hold harmless and defend at its own expense the Owner from and against all judgments, fines, penalties, amounts paid in settlement and any other amounts arising from or in connection with the use of the survey information provided.

1-05.5(3)B ROADWAY AND UTILITY SURVEYS (GSP 09-18-09)

The Contractor must furnish offset staking for principal lines, grades (including finished, base and subbase), horizontal and vertical location of all drainage features, and measurements the Engineer deems necessary for physical completion of roadway and curbs at new locations as called for in the Drawings.

The Contractor must furnish principal lines, grades, and measurements the Engineer deems necessary for physical completion of utilities called for in the Drawings. Unless the Contract specifies otherwise, this information will include the following as applicable:

1. Offset points to establish line and grade for mainline underground utilities which include water, sewer, and storm drains.
2. Offset points to establish line only for utility pole locations.

The Contractor is responsible for reestablishing the line and grade of any existing curb, inlets, handholes, utility castings, monuments, and other features that are to be removed and constructed new at the original grade and location as shown on the Drawings.

If new grades or lines are not indicated on the Drawings, the Contractor must consider the work to be removed and constructed new finished grade at the original grade and location meeting the requirements of the Contract. The new finished grade must be adjusted for smoothness or other obvious defects. The finished grade of inlets, handholes, utility casting, monuments castings, and other features must be determined by the Contractor's reestablishment of the original grade of the roadway, sidewalk, or other governing feature. The Contractor must provide a copy of all reestablishing survey data to the Engineer as least five (5) Working Days prior to removal of any existing curb or other feature.

1-05.5(3)C BRIDGE AND STRUCTURE SURVEY (GSP 04-21-08)

The Contractor must provide the following primary survey control.

1. Centerline or offsets to centerline of the structure.
2. Stations of abutments and pier centerline.
3. A sufficient number of bench marks for levels to enable the Contractor to set grades at reasonably short distances.

4. Verification of Monuments and control points as shown in the Contract Documents with nearest adjacent Monuments or control points.

For all structural work such as bridges and retaining walls, the Contractor must ensure that required field measurements and locations match and fulfill the intended plan dimensions.

The Contractor must establish all secondary survey controls, both horizontal and vertical, as necessary to assure proper placement of all Project elements based on the control points and monuments provided by the Engineer.

The Contractor must provide as-built survey coordinates and elevations for the survey monuments installed on the bridge and sidewalk as shown in the Drawings.

1-05.5(3)D ENGINEER CHECK OF CONTRACTOR SURVEY (GSP 04-21-08)

The Engineer may verify survey work performed by the Contractor. If errors are found the Contractor must correct the errors, which may include removal and replacement of incorrectly installed improvements. All cost incurred in correcting the work will be at the Contractor's own expense.

1-05.5(4) MEASUREMENT (GSP 04-21-08)

Measurement for "Construction Surveying" will be by lump sum.

1-05.5(5) PAYMENT (GSP 04-21-08)

The payment for "Construction Surveying" includes all costs for the work required to provide survey as specified in Section 1-05.4 and 1-05.5, including field books.

Payment will be made in up to four payments, in accordance with the following schedule for projects less than 180 Working Days inclusive:

- Whenever work representing 20% of the total Contract price is completed, excluding the bid price for this item, a payment of 30% of the amount bid for this item will be paid.
- Whenever work representing 50% of the total Contract price is completed, excluding the bid price for this item, a second payment of 30% of the amount bid for this item will be paid.
- Whenever work representing 90% of the total Contract price is completed, excluding the bid price for this item, a third payment of 30% of the amount bid for this item will be paid.
- Upon Physical completion of the Project and the acceptable submittal of all survey field notes, a final payment of the remaining 10% of the amount bid for this item will be paid.

Payment will be prorated over the Contract Time in accordance with the following schedule for projects greater than 180 Working Days:

The Contractor must submit a lump sum breakdown, showing the anticipated amount of monthly progress payment for surveying. Anticipated monthly payments must be coordinated with activities or milestones on the Contractor's CPM schedule, and the total of the anticipated monthly payments must not exceed 90% of the amount bid for this item. Once approved by the Engineer, this will become the basis for payment for this item of work. The Engineer will make adjustments dependent on project progress. Actual progress payments will be at Engineer's sole discretion.

Upon Physical completion of the Project and the acceptable submittal of all survey field notes, a final payment of the remaining 10% of the amount bid for this item will be paid.

1-05.13 SUPERINTENDENTS, LABOR AND EQUIPMENT

1-05.13(1) GENERAL (GSP 05-20-15)

Replace the second sentence of the third paragraph with:

Incompetent, careless, or negligent employees (including supervisors) or employees who reportedly engage in abusive or harassing behavior shall be discharged by the Contractor upon written order of the Engineer.

1-05.14 COOPERATION WITH OTHER CONTRACTORS (SP 02-01-20)

Add the following:

Bidders are notified that there will be other public or private construction projects in the general vicinity of the project site. The Contractor must coordinate with other projects in or around the project limits such that the schedule is maintained. Should another project impact the schedule in any way, the Contractor is required to notify the Engineer in accordance with Section 1-04.3.

The Contractor is encouraged to access the most up to date information on construction in the City of Seattle by visiting the Planning and Coordination website:

<http://www9.seattle.gov/transportation/pactutility.htm>.

Or contact the Street Use Permit Counter at (206) 684-5253.

In the event that the Contractor's coordination efforts are unsuccessful with adjacent projects or street use permit holders, the Contractor must notify the Owner of the coordination issue 30 working days prior to the start of work in the disputed area.

In accordance with SMC 15.04.050, the Owner will provide the street use permit holder written notice to resolve issues with the contractor within right-of-way, with the least disruption to both projects.

Refer to Section 1-08.3(2) for scheduling requirements

At a minimum, the Contractor will need to coordinate its activities with contractors or suppliers performing the following work:

Waterfront Seattle – The projects listed below will be executed by the Seattle Department of Transportation as part of the Waterfront Seattle program. The point of contact for all Waterfront Seattle projects is Jessica Murphy, Construction Manager, (206) 684-0178 or Jessica.Murphy@Seattle.gov

Alaskan Way – Elliott Way (S King St to Bell St) Project- This project will construct the new Alaskan Way roadway and promenade between the east margin of Alaskan Way and the existing seawall between Yesler Way and Pine Street. Construction began in 2019 and is expected to be complete in 2024. During the work of this contract, the Alaskan Way Elliott Way (S King St to Bell St) Project will be constructing side sewer, electrical service, communication service, concrete surfaces, traffic signals, and irrigation on the east half of Alaskan Way adjoining the Union project limits (see Appendix for Project Plans).

Overlook Walk Project - This project will construct a large pedestrian bridge over Alaskan Way near Pine St, connecting Pike Place Market to the future Aquarium Ocean Pavilion and waterfront promenade. Construction is expected to begin in 2021 with a duration of approximately 2 years.

Waterfront Park Project – This project will remove and replace Pier 58 (Waterfront Park) located on the west side of Alaskan Way near Union Street. Construction is expected to begin in 2021 with a duration of 18 months.

Commuter Building (815 Western Ave: SDCI Project No 3032808-LU) – This private development project will demolish the existing buildings at 815 Western Avenue bounded by Alaskan Way, Marion Street, Western Avenue, and Columbia Street and will construct a new 18-story building in the same location. The project is scheduled to begin demolition of the building in January 2021.

Seattle Multimodal Terminal at Colman Dock Project (Colman Dock Project) – This project will be executed by Washington State Ferries and will replace the Colman Dock passenger terminal and dock. Point of Contact is Byant Bullamore, Construction Engineering Manager, (206) 515-3747 or bullamb@wsdot.wa.gov. Washington State Ferry representatives must be included

in weekly coordination meetings with the Contractor and Construction management teams during Marion Street Pedestrian Bridge Work (Additive No. 1 and Additive No. 2).

Seattle Aquarium Ocean Pavilion - This project will be executed by the Seattle Aquarium. The project will construct a building with exterior elevator near Alaskan Way and Pine Street. Construction is expected to begin in coordination with Overlook Walk Project as soon as 2021 with a duration of approximately 2-3 years. The Point of Contact is Susan Bullerdick, Project Manager, (206) 693-6248 or s.bullerdick@seattleaquarium.org.

1-06.7 MOCK-UPS (SP 03-22-16)

1-06.7(A) SUMMARY

The Work includes requirements for mock-ups of various elements of the Contract to ensure quality requirements in workmanship and material selection in accordance with the Specifications and must be approved by the Engineer. Mock-ups required are intended to provide opportunity for the Owner and Contractor/fabricator to test assembly, workmanship methodologies, and ask questions prior to production of the full contract quantity. The mock-ups will become the standard of acceptance of subsequent production work and will be used as the basis of inspection. Mock-up assemblies will be for Engineer's review and acceptance. Mock-ups may be incorporated into the final project as noted in each respective section, or as approved by the Engineer.

The Work includes requirements for mock-ups as defined in Section 1-01.3.

1-06.7(B) SUBMITTALS

Shop Drawings of Mock-Ups:

Provide large scale Shop Drawings for fabrication, installation, and erection of all parts of each mock-up as specified in the Contract Documents in accordance with Specification Section 1-05.3. Provide plans, elevations, and details of anchorage, connections, and accessory items. Separate submittals are required for the remainder of the work after the mock-up is approved by the Engineer. If there are no changes to the original mock-up submittal, it may be resubmitted for production work.

Photographs of Mock-Ups: Submit photographs of mock-ups after completion of installation and acceptance of each mock-up.

Samples: Refer to individual Divisions 2 through 8 Specification Sections for submittal requirements of mock-up components and coordinate accordingly.

1-06.7(C) QUALITY ASSURANCE

Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required in each relevant Specification Section and comply with the following requirements:

Build mockups in location and of size indicated or, if not indicated, as directed by the Engineer.

Notify Engineer at least 7 days in advance of dates and times when mockups will be constructed.

Demonstrate the proposed range of aesthetic effects and workmanship.

Obtain the Engineer's approval of mockups before starting work, fabrication, or construction.

Maintain mockups during construction as a standard for judging the completed Work.

Demolish and remove mockups when directed, unless otherwise indicated.

Provide the Owner with 10 Work Days for mock-up evaluation and acceptance or rejection. Mock-up rejections, or modifications requested by the Owner that are in accordance with the Contract requirements must not form the basis of Contractor delay.

1-06.7(D) CONSTRUCTION REQUIREMENTS – GENERAL

Refer to Construction Requirements portions of the various Specification Sections for specific requirements regarding condition of surfaces, erection, and erection tolerances.

1-06.7(E) REMOVAL AND DISPOSAL

Dismantle and remove mock-ups not intended to remain from site at the completion of the Project. Legally dispose of, salvage, recycle, or donate demolished mock-up materials.

1-07 LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

1-07.1 LAWS TO BE OBSERVED

1-07.1(2) SAFETY RULES AND STANDARDS (GSP 04-09-18)

Replace the first and second paragraphs after item 3 with the following:

These requirements apply continuously and are not limited to normal working hours. The Engineer's review of the Contractor's performance may include review or a determination of the adequacy of the Contractor's safety measures on the Work Site.

Per CWA Article II, the Contractor must provide a copy of a project specific safety plan to the Unions at the pre-job conference specified in Section 1-07.10(1) and thereafter notify and provide an updated copy if any subsequent changes are made to the safety plan. Per CWA Article II, Section 2, all Personal Protective Equipment must be furnished and paid for by the Contractor or Subcontractor.

The Contractor must establish, maintain, and supervise a safe and healthy working environment, an Acceptable Work Site, an accident prevention program, and training programs to improve the skill and competency of all employees with respect to occupational safety and health.

1-07.1(4) PROJECT GENERAL SAFETY AND HEALTH PLAN (GSP 07-07-10)

The Contractor must submit to the Engineer a Project General Safety and Health Plan (PGSHP) that is to apply to all people on the Project Site at least 10 Working Days prior to the Contractor beginning Work. The PGSHP must identify the Company Safety Officer, the On-Site Safety Officers, and any on-site alternates. The emergency contact list per section 1-05.13(4) must identify an emergency contact for safety issues. The PGSHP must include any site specific safety and health requirements identified elsewhere in the Contract.

The Contractor must not begin any work without an accepted PGSHP found to be within reasonable conformity of the Specifications.

All costs to prepare and implement the PGSHP are included in the Bid prices for the associated items of work.

1-07.3 MANAGEMENT AND DISPOSAL OF WASTE

1-07.3(2) SUBMITTALS (GSP 05-01-18)

Replace this section with the following:

At or before the preconstruction conference, the Contractor must submit a Waste Management Plan containing a list of proposed disposal and recycle sites that allow the types of waste and recyclable material that can be reasonably expected from examination of the Bid Documents and Project Site, including Materials supplied by the Contractor to perform the Work.

The submittal must:

1. Identify each disposal site and recycle site, and the estimated quantities and type of material to be disposed of or recycled at each site.

2. Identify the proposed transporter to be used for each type of waste or recyclable material and applicable licenses that may be necessary for transporting the identified or characterized waste.
3. Specifically identify any Contaminated Material(s) Not Designated as Dangerous Waste(s) or TSCA Waste(s) that the Contractor proposed to dispose or recycle.
4. Present copies of the permits held by each proposed disposal site and recycle site that allow the site to receive the types of waste and recyclable material to be taken to the site.
5. State if waste or recyclable material will be stored on the Project Site before being recycled or disposed of. If waste or recyclable material will be stored on-site before recycling or disposal, the Spill Plan and the Construction Sediment and Erosion Control Plan must identify procedures that will ensure that such material is stored in a safe, secure manner that does not allow for leakage or other releases. See Sections 1-07.15(1) and 8-01.3(2)C regarding spill prevention and control and Sections 1-07.15 and 8-01.3(2)A regarding sediment and erosion control.

For additional or alternate disposal and recycle sites and transporters needed during the Contract Time, the locations and information, including permits, for each additional site, and the qualifications and licenses for each additional transporter, must be submitted to the Engineer for approval at least 10 Working Days before their use.

The Contractor must not dispose or recycle Dangerous Waste(s) or TSCA Waste(s) without prior and specific written approval from the Engineer.

Add the following Section:

1-07.3(6) DISPOSAL OF TREATED WOOD WASTE (GSP 5-28-14)

Wood piles, utility poles, railroad ties, and other wood waste treated with specific chemical preservatives may be generated under this Contract. Arsenic-treated wood and wood treated with creosote and pentachlorophenol are exempt from the Washington State Dangerous Waste Regulations (WAC 173-303-071) based on generator knowledge of the toxicity or persistence characteristics of this waste.

The Contractor is responsible for worker protection and proper health and safety procedures during handling of treated wood waste in accordance with Section 1-07.1.

The Contractor is responsible for managing the treated wood waste in accordance with WAC 173-303-071. This includes disposing of the wood waste at an approved landfill that is permitted as a RCRA Subtitle D facility in accordance with chapter 173-350 WAC, Solid Waste Handling Standards or Chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills; or sending the wood waste to a facility that has all the regulatory authority required to treat the wood waste.

Contractor must propose how the wood timbers are to be disposed per Section 1-07.3(2). The Contractor is responsible for obtaining waste clearance forms and providing estimated waste quantities and disposal facility information to the Engineer for review prior to disposal.

1-07.4 SANITATION (GSP 04-09-18)

Supplement this Section with the following:

Per the CWA, Article IV, Section 6, on Covered Projects the Contractor must provide adequate sanitary and restroom facilities for workers, a room for drying clothes, and tables for meals.

1-07.4(1) ENCAMPMENTS (SP 02-04-20)

In accordance with FAS Encampment Rule 17-01, an Encampment Immediate Hazard may be removed promptly. The Engineer will determine the safety and risk level of the Encampment and provide direction to the Contractor. The Engineer may have the Owner's own forces, or third party specific contract, remove any Encampment.

Encampment Obstruction removal requires notice. The Owner will affix the notice to the obstruction as soon as reasonably possible. The notice will state the date the notice was posted, the obstruction must be immediately removed and is subject to removal without further notice, where any personal property removed will be stored, and how any stored personal property may be claimed by its owner.

Prior to any removal of any Encampment, the City's Encampment Cleanup Program Manager must be notified. The Contractor must contact the Engineer 10 days in advance of the work to request such notification be made by the Engineer.

1-07.5 PREVENTION OF ENVIRONMENTAL POLLUTION AND PRESERVATION OF NATURAL RESOURCES

1-07.5(4) NOISE POLLUTION

Replace this Section with the following:

1-07.5(4) NOISE CONTROL AND WORK PERFORMED AT NIGHT (GSP 02-06-19)

The Contractor must take all reasonable measures for the suppression of noise resulting from work operations. Mobile engine driven cranes, loaders and similar material handling Equipment; engine used in stationary service for standby power; air compressors for high and low pressure service and other similar equipment must be equipped with exhaust and air intake silencers designated for use in critical noise problem locations such as high density residential, hotel and hospital areas.

The Contractor must conduct performance of the Work consistent with the applicable noise control levels set forth in SMC Chapter 25.08 or, if outside the City limits and in King County, Chapters 12.86 through 12.100, King County Code, and the requirements of local jurisdictions; or, if outside King County the requirements of local jurisdictions, including all reasonable measures for the suppression of noise resulting from Work operations including the equipping of engine driven equipment with such exhaust and air intake silencers designed to achieve the reasonable degree of silencing determined by Owner to be appropriately necessary.

If the Contractor is provided and executes, or obtains a Temporary Noise Variance from the City of Seattle Department of Construction and Inspections (SDCI) Noise Abatement Program, then any activity, use, process, or equipment which the SDCI Administrator determines, in accordance with rules and regulations, does not annoy a substantial number of the people and does not endanger public health or safety may be allowed provided the measures to mitigate noise in the variance are followed.

In addition to the above requirements, as a measure to mitigate noise, any approved nighttime construction work in Seattle (between the hours of 10:00 PM to 7:00 AM Monday through Friday and 10:00 PM to 9:00 AM on Saturday, Sunday and legal holidays) must be performed under the following conditions:

1. Notify all residential use properties within 300 feet' 72 hours in advance of starting nighttime work.
2. All trucks performing export haul during the variance window (10 p.m. to 7 a.m. weekdays and 10 p.m. to 9 a.m. weekends and holidays) must have bed lining approved by the engineer such as, but not limited to, soil, gravel, or rubber.
3. All backup warning devices must be the least intrusive audible type or the Contractor may use a backup observer in lieu of backup warning devices as allowed by WAC 296-155-610(2)(e). Additionally, requirements in WAC 296-155-610(2)(f) must be followed when reversing dump trucks and/or pup trailers;
4. Radios will be used for all long-range communication on site; no yelling or honking between trucks will be permitted except in the case of an emergency.
5. Impact tools such as jackhammers, chipping hammers, pile drivers, and vacuum trucks may be used only between the hours of 7 a.m. and 10 p.m. on weekdays, 8 a.m. and 10 p.m. on Saturdays, and 9 a.m. and 5 p.m. on Sundays and legal holidays. Vibratory pile driving methods must be utilized instead of impact pile driving whenever feasible.
6. Any material or debris that spills on the pavement will be removed by hand sweeping; no scraping type equipment or activity will be used to clean pavement surfaces during nighttime hours. In addition, no street sweeping machinery will operate between the hours of 10 p.m. and 7 a.m. on weekdays and 10 p.m. and 9 a.m. on weekends and legal holidays.

7. Engine idling must be limited to 2 minutes or less when vehicle or equipment is not directly engaged in work activity, such as on-site pickup trucks and cued export haul trucks.
8. Construction activities associated with this project could generate noise impacts resulting in a noise complaint; the project will assist the Seattle Department of Construction and Inspections (SDCI) to resolve it by contacting SDCI within 24 hours of receipt of any noise-related complaints.
9. If construction activities at night under this variance generate complaints SDCI may require additional mitigation such as but not limited to fixed or handheld noise monitoring with weekly reporting or prohibiting certain activities at night or in specific areas.
10. Lighting equipment must be directed away from oncoming traffic and residences, and must be shielded as deemed necessary by the Engineer. Lighting that is encased in a balloon-like material that diffuses the light, and reduces the glare, and can be directionally controlled is encouraged;
11. Generators, air compressors, and any other similar equipment and machinery must use approved mitigation shields; and,
12. Night work must be addressed in the Project General Safety and Health Plan (PGSHP); see Section 1-07.1(4).

1-07.5(5) ARCHAEOLOGICAL AND HISTORIC PRESERVATION

Replace this Section with the following:

1-07.5(5) ARCHAEOLOGICAL AND HISTORIC PRESERVATION (SP 10-17-17)

Cultural resources (both pre-contact and historic, as defined in RCW 27.53.040) exist near the proposed work areas and could be found within the Project Site. Such cultural resources could consist of the following:

- An accumulation of shell, burned rocks, or other food related materials
- Bones or small pieces of bone
- An area of charcoal or very dark stained soil with artifacts
- Stone tools or waste flakes (e.g., an arrowhead or stone chips)
- Human skeletal remains
- Clusters of tin cans or bottles, concentrations of brick, or logging, mining or agricultural equipment that appears to be more than 50 years old
- Intact buried railroad tracks (e.g., metal rail connected to ties), decking, wood structure, or other industrial materials

The Engineer will select and retain an archaeological monitor to observe excavations as described below (see Section 1-07.5(6)). Should at any time the Contractor discover any cultural resources or human remains at the Project Site during construction activity or through other means, the Contractor must immediately stop construction activity at the discovery site. The Contractor must immediately notify the Engineer and, if one is present, the archaeological monitor of any such finds and cease all work adjacent to the discovery, in an area adequate to provide for the total security and protection of the integrity of the discovery.

If ordered by the Engineer, the Contractor must suspend construction activity that, in the opinion of the Engineer, would be in violation of State Law. Suspension of this construction activity must remain in effect until the Engineer has obtained permission to proceed from the State Historic Preservation Officer or from other authority.

The Contractor and all Subcontractors must comply with regulations regarding archaeological resources including, but not limited to:

1. Archaeological Sites and Resources (RCW 27.53)
2. Indian Graves and Records (RCW 27.44)
3. Abandoned and Historic Cemeteries and Historic Graves (RCW 68.60)
4. Archaeological Site Public Disclosure Exemption (RCW 42.56.300)
5. Discovery of Human Remains (RCW 68.50.645)
6. Archaeological Excavation and Removal Permit (WAC 25-48)
7. SEPA Environmental Protection and Historic Preservation Policies (SMC 25.05.660-.675)

1-07.5(5)A ARCHAEOLOGICAL MONITORING

Certain ground disturbing and excavation work that the Contractor will perform as part of the work shown in the Bid documents must be monitored by an archaeological monitor. Figures 3, 4, and 5 in the Archaeological Resources Monitoring Plan/Inadvertent Discovery Plan (AMRP/IDP) included in the Project Manual Appendix identify work that must be monitored by an archaeological monitor on an "intermittent" ("Check-In") or "as needed" (inadvertent discovery or "On-Call") basis. The Contractor must provide 7 days advanced notification to the Engineer for all work that the AMRP/IDP identifies as requiring an archaeological monitor. The Contractor must not perform any work that requires an archaeological monitor until the archaeological monitor is on-site and ready to begin monitoring the work.

Should the Owner or Owners representatives discover cultural resources or human remains at the Project Site during observation of the work, they will notify the Engineer who will direct the Contractor to cease all work adjacent to the discovery adequate to provide for the total security and protection of the integrity of the discovery. The Engineer may direct the Contractor's means and methods to allow investigation or salvage of cultural resources.

Any suspension of construction or modification to means and methods must remain in effect until the Engineer has obtained permission to proceed from the State Historic Preservation Officer or from other authority.

1-07.5(5)B PAYMENT

If the Engineer determines that the suspension of work in the vicinity of the discovery increases or decreases the cost or time required for performance of any part of the Work under this Contract, the Engineer will make an adjustment in payment or the time required for the performance of the Work in accordance with Section 1-04.3.

1-07.6 PERMITS

1-07.6(1) CONTRACTOR OBTAINED PERMITS (GSP 7-24-15)

Add the following:

Where Seattle Department of Construction and Inspections permits are required, permits may be obtained online at the following website: <http://www.seattle.gov/dpd/permits/> or applied for in person at the Applicant Service Center located at:

700 5th Avenue, 20th Floor
Seattle, WA

Notifications for scheduling SDCI inspections must be provided in accordance with Section 1-07.28(21).

The Contractor must obtain and pay permit fees for all permits required for the work except those listed in Section 1-07.6(2). The following required permits have been identified for the contractor's convenience:

- a. Temporary Noise Variances

1-07.6(2) OWNER OBTAINED PERMITS (SP 02-14-20)

Add the following:

The Owner has obtained the following permits for the project

1. Consent Decree
2. Seattle Department of Construction and Inspections Master Use Permit 3026658-LU
3. Seattle Department of Construction and Inspections Analysis and Decision for Shoreline Substantial Development Permit Nos. 3026658, 3030405, 3030406, and 3030407 and Shoreline Special Use Permit No. 3016850
4. Washington Department of Fish and Wildlife Hydraulic Project Approval SDOT 2018-4-291+01.
5. Right of Entry for the Public Storage Building for survey and settlement monitoring in accordance with Section 2-19.
6. Alaskan Way, Promenade and Overlook Walk, Seattle, King County, Washington (070215.22-KI) Archaeological Resources Monitoring Plan / Inadvertent Discovery Plan

1-07.9 WAGES

1-07.9(1) PREVAILING WAGE RATES

1-07.9(1)A GENERAL (GSP 04-09-18)

Insert the following as the second sentence in the first paragraph:

CWA Article III and Article IV provide supplemental requirements for wages.

Delete and replace the first sentence in the second paragraph with the following:

The Contractor is responsible for assigning the appropriate classification to all laborers, workers, or mechanics that perform any work under this Contract. Classifications must be in conformance with the scope of work descriptions established by the Industrial Statistician of the Washington State Department of Labor and Industries and subject to Jurisdictional Disputes processes provided in the CWA, Article IX, Article X, and Article VIII where applicable.

1-07.9(1)C WAGE RATES (GSP 04-09-18)

Supplement the first paragraph in this Section with the following:

Under CWA Article III, Contractors and Subcontractors must incorporate all increases in prevailing wage rates effective in September each year. Such increases must be included in the Contractor's Bid.

Add the following new Section:

1-07.9(1)C1 TRUST FUND CONTRIBUTIONS AND DUAL BENEFITS (GSP 04-09-18)

1. Under the CWA Article III, the Contractor and all Subcontractors are required to pay into a joint labor/management employee welfare benefit trust fund(s) ("Trust Fund"), regardless of participation in an employer-sponsored benefit plan. Contractor and all Subcontractors are required to complete trust documents and submit the documents to the Union for each worker and to pay into the Trust Fund as required by that Trust Fund's schedule.
2. If any Subcontractor does not pay into the Trust Fund, the Union may provide notice and documentation to the Contractor and PC in the form of a grievance or other communication.
 - a. If after 10 Business Days from notice, delinquencies remain unpaid, the Contractor must withhold an amount to cover the delinquency from any unpaid funds otherwise due to the delinquent Subcontractor, and must not release such withholding until the delinquent Subcontractor is in compliance.

- b. The delinquent Subcontractor and Contractor, by mutual agreement, may identify other agreeable solutions that assure timely payment to the Trust Fund. If the delinquent amounts are undisputed in whole or in part between the Trust Fund and the delinquent Subcontractor, the Contractor must issue a joint check to the Trust Fund with the Subcontractor named in the amount of the undisputed delinquency.
3. Open-Shop Contractors that pay Dual Benefits, are eligible for reimbursement from the Owner of the applicable portion of the employer-provided usual benefits as defined by WAC 296-127-014. Contractor and Subcontractors are required to submit a Dual Benefit Reimbursement Form, invoice, and other supplemental information to PC at LaborEquity@seattle.gov prior to Substantial Completion. Open-Shop Contractors and Subcontractors must apply for reimbursement at least once per year, but may apply as frequently as once per month. To be considered for reimbursement, Open-Shop Contractors and Subcontractors must submit all of the following:
 - a. Dual Benefit Reimbursement Form
 - b. Invoice specifying amount for which reimbursement is being requested
 - c. Copy of employer-provided benefit plans which provide proof of coverage for usual benefits
 - d. Receipts or other proof of payments to the employer-provided plans for each worker showing that they received employer-provided benefits within the last 90 days prior to starting work on the project
 - e. Receipts or other proof of payments to the employer-provided plans for each worker issued during the time reimbursement is being requested
 - f. Receipts or other proof of payment to the Joint Health and Pension Trust Fund issued during the time reimbursement is being requested
 - g. Up to date certified payroll records in LCPTracker during the time reimbursement is being requested

1-07.9(1)D OVERTIME (GSP 04-09-18)

Replace this Section with the following:

The CWA requires additional payment for overtime above and beyond the requirements of RCW 49.28 and WAC 296-127-022, including overtime payments for missed meals and 2nd and 3rd shift overtime above specified shift hours. Overtime for hours worked outside of the regular shift must be determined by the Labor and Industry overtime code for the applicable trade. Work performed on Covered Projects wherein the employee will work up to 10 hours per Day in a 4-Day week to accomplish 40 hours of work is permissible without the requirement of overtime rates if the applicable craft's Collective Bargaining Agreement allows for 4-Day at 10 hours per Day shifts, with no additional written agreement required. Contractor must reference the applicable craft's Collective Bargaining Agreement to determine if 4-Day at 10 hours per Day shifts are permissible. For Covered Projects, see CWA Article IV. The Contractor must include all costs for overtime specified in the CWA within the Bid. Working more than 10 hours in any Calendar Day on a public works project is prohibited except in cases of extraordinary emergency, such as danger to life or property. Notwithstanding the above provisions, overtime rates must be paid for all hours worked more than 40 hours per week. This Section provides a minimum public works overtime standard, and does not supersede prevailing overtime wage rates established under RCW 39.12.

1-07.9(1)D1 WRITTEN OVERTIME AGREEMENT (GSP 04-09-18)

Delete Item 6:

~~6. Be entered into voluntarily by the employer and employee.~~

Supplement this Section with the following:

If an overtime or 4-Day at 10 hours per Day shift agreement is established through a Collective Bargaining Agreement provision, the Contractor must submit a copy of the Collective Bargaining Agreement provision via the online reporting portal: <http://www.LCPTracker.net>

1-07.9(5) PREVAILING WAGES FOR APPRENTICES (GSP 04-09-18)

Supplement this Section with the Following:

Apprenticeship prevailing wages are subject to CWA Articles III and IV.

1-07.9(6) PREVAILING WAGE DISPUTES (GSP 04-09-18)

Replace the first sentence of the first paragraph with the following:

Prevailing wage disputes are not subject to the dispute resolution process under Section 1-04.4. Prevailing wage disputes are subject to the provisions of the CWA, Article VII or Article IX.

1-07.10 RESERVED

Delete this Section and Title and replace with the new Section and Title:

1-07.10 COMMUNITY WORKFORCE AGREEMENT AND PRIORITY HIRE WORKERS (GSP 04-09-18)

The requirements of the Community Workforce agreement and Priority Hire apply. The City adopted a Priority Hire requirement (SMC Ch. 20.37) and entered into a Community Workforce Agreement to prioritize workers living in Economically-Distressed ZIP Codes, women, people of color and preferred entry candidates for hire on City Covered Projects. PC administers and enforces Priority Hire and the Community Workforce Agreement and assists Contractors during Bid and after Award to comply with Priority Hire and CWA provisions. Additional Contractor responsibilities and forms can be found in the labor manual. The labor manual includes the CWA, forms and guidelines and is in the Appendix.

Contractors interested in obtaining assistance or information may contact PC at 206-684-0444.

For Covered Projects, the following workforce diversity requirements and aspirational goals to meet the intent of SMC Ch. 20.37 apply. For additional details on Preferred Entry see Section 1-07.12 and the CWA.

APPRENTICE AND PRIORITY HIRE REQUIREMENTS AND ASPIRATIONAL GOALS	
Requirements	
Apprentice Utilization	19%
Apprentice – Preferred Entry	1:5
Priority Workers – Apprentice Level	10%
Priority Workers – Journey Level	21%
Aspirational Goals	
Journey Level	
People of Color	27%
Women	9%
Apprentices	
People of Color	49%
Women	24%

1-07.10(1) PRE-JOB PACKAGE AND PRE-JOB CONFERENCE

The Contractor must submit the Pre-Job Package for self-performed work along with the project specific safety plan to PC prior to attending a pre-job conference and must attend a pre-job conference with Unions and PC, per CWA Article IX, 2 weeks prior to starting Work, but not more than 90 days prior to starting Work. The Contractor's Pre-Job Package must include a signed copy of the Owner-provided Letter of Assent to the Owner before Contract Execution.

Each Subcontractor must submit the Pre-Job Package prior to attending a pre-job conference to the Contractor. The Contractor must submit all Pre-Job Packages to PC. The Subcontractor must attend a pre-job conference with Unions and PC 2 weeks prior to starting Work, but not more than 90 days prior to starting Work. The Contractor may attend with the Subcontractor but is not required.

The Pre-Job Package includes the Letter of Assent, Pre-Job Form, and if applicable the Core Worker list and supporting documentation. See CWA Article IX and Article XI.

1-07.10(2) CORE WORKERS

Open-Shop Contractors may bring as many as 3 Core Workers onto the Covered Project and up to 2 Open-Shop Apprentices enrolled in a WSATC program who meet the qualifications specified in Article XI, Section 2 of the CWA for each contract, provided that the ratio of apprentices to journey level workers is in compliance with the applicable apprenticeship program standards. All subsequent Open-Shop Contractor workforce needs will be fulfilled through the respective Union hiring hall or by agreement between the Open-Shop Contractor and the respective union.

1-07.10(3) REPRESENTATION FEES

Contractors are responsible for honoring Union dues and representation fees check-off (for union members and Core Workers) and remitting dues and fees to the appropriate Union.

1-07.10(4) WORKFORCE PROJECTIONS

Within 3 Business Days of the issuance of the Notice of Intent to Award, the Contractor must submit to PC a plan, as part of the Social Equity Plan Form, outlining how the Priority Hire requirements and aspirational goals will be met on the total Contract labor hours. The plan must be submitted on a form provided by the Owner and updated by the Contractor on a quarterly basis.

1-07.10(5) WORKER DISPATCH

The Contractor and all Subcontractors must request new hires from Union hiring halls using a Craft Request Form and must copy PC on all Craft Request Forms submitted to the Union hiring halls. Core Workers of Open-shop Contractors are also required to be Dispatched from Union hiring halls. Contractors must seek to first hire Priority Workers who are Residents of Seattle Economically Distressed ZIP Codes, and then Priority Workers from ZIP codes in King County. See CWA Article XII and Article VI. If the signatory Unions are unable to fill a request for employees within 2 Business Days, the Contractor or Subcontractor must request a referral from the Jobs Coordinator. If the Jobs Coordinator is unable to refer a worker that can satisfy the request, the Contractor must make any other reasonable efforts to comply with Priority Hire requirements and aspirational goals as practicable given the needs of the work to be performed.

1-07.10(6) JOINT ADMINISTRATIVE COMMITTEE (JAC)

The Joint Administrative Committee is made up of labor and city representatives and is tasked with addressing safety, referral of Priority Workers, Apprenticeship utilization, preferred entry, job progress and other relevant issues that will affect the project. The Contractor must attend the monthly Joint Administrative Committee meetings, track Priority Worker utilization and maintain copies of Craft Request Forms for the duration of the project.

1-07.10(7) MONITORING

PC will monitor the Priority Worker and Apprentice utilization data provided by the Contractor. The Owner will make routine visits to the Project Site for Contract compliance and CWA compliance. Contractor must cooperate with PC and allow PC unfettered access to the Project Site and records. The City may request

more than one form of physical address verification from Residents living in Economically Distressed ZIP Codes.

1-07.10(8) NON-MANUAL POSITIONS

The Director may authorize a credit of up to 10% of the hours performed by Priority Workers, if the Contractor or Subcontractor hires workers from Economically Distressed ZIP Codes who perform non-manual work and continues to employ said workers in Non-Manual Positions for the duration of the Contractor or Subcontractor's work on the Covered Project. Such credit must be approved by the Director.

1-07.10(9) PARKING

Unless provided for in the Project Manual, dedicated parking within a 3-block radius is not available. As required under the CWA Article II, the Contractor must provide for employee parking through project-dedicated parking, transportation from a designated Contractor-provided parking location, reimbursement of employee public transit use, or pay a negotiated amount for parking compensation. The cost of Contractor-provided employee parking must be included with the various items of the Contractor's Bid

1-07.11 SOCIAL EQUITY IN CONTRACTING (SP 1-28-20)

Replace the first paragraph with the following:

The City provides assistance to Contractors that desire to bid on, or have been awarded a City Contract, to comply with equal opportunity, non-discrimination, Affirmative Efforts, Priority Hire, and Apprenticeship provisions. Should a Contractor desire assistance or information in recruiting, tutoring, and training or otherwise preparing potential employees and Subcontractors, a Contractor may contact CP at (206) 684-0444. For projects with an Engineer's Estimate of \$2 Million or more, the Contractor must name a person or firm that has been qualified by the City to act as the Bidder's WMBE expert for Affirmative Efforts. Direct all questions, reports, or other submittals regarding the requirements of this Section to CPCS. Telephone: (206) 684-0444.

1-07.11(2) LABOR STANDARDS (SP 2-14-20)

Supplement this paragraph with the following:

For the Contractors who conduct business outside the City limits, including attending meetings must comply with RCW 49.46, minimum wage requirements and labor standards, and paid sick and safe time.

1-07.11(3) WOMEN AND MINORITY BUSINESSES AND NON-DISCRIMINATION REQUIREMENTS (GSP 08-15-18)

Delete the first paragraph in this Section and replace with the following:

The Owner will not enter into contracts with Contractors who do not agree to use Affirmative Efforts Priority Hire to employ or contract with women and minority group members as required under SMC 20.42, who do not agree to ensure an Acceptable Work Site, or who violate any provisions of SMC 20.42, or those requirements set forth below.

1-07.11(3)A AFFIRMATIVE EFFORTS (GSP 08-15-18)

Delete item 2.b. in this Section and replace it with the following:

b. If applicable, the Contractor must submit a Social Equity Plan as specified in Section 1-03.3(4).

1-07.11(4) EMPLOYMENT NON-DISCRIMINATION REQUIREMENTS (GSP 08-15-18)

Delete the first paragraph in this Section and replace it with the following:

The Contractor must not inquire, collect, or otherwise condition employment based on immigration status. Unless otherwise provided in the Contract, no background checks will be performed as part of the employment process. The City has strict policies regarding the use of background checks, criminal checks, and immigrant status for contract workers. The policies are incorporated into the Contract and are available for viewing on-line at

<http://www.seattle.gov/city-purchasing-and-contracting/social-equity/background-checks>

Delete the third paragraph in this Section and replace it with the following:

The Owner may monitor or audit the Contractor's non-discrimination policies and practices, including Affirmative Efforts to employ women or minority employees and Acceptable Work Sites. Monitoring may include proactive observations at the Work Site, interviews of individuals familiar with the Work Site, data that may evidence disparities, investigation of complaints by an individual familiar with the Work Site, or other evidence. The Owner may find unacceptable behavior and may pursue all appropriate contractual remedies.

Delete the final paragraph in this Section and replace it with the following:

The Contractor must ensure that all employees, particularly supervisors, are aware of, and comply with their obligation to maintain a working environment free from discriminatory conduct, including, but not limited to, harassment and intimidation of minorities and women, or WMBE businesses. The Contractor must display at each Work Site location, including the Project Site office, the appropriate materials supplied by the Owner regarding Acceptable Work Sites.

Insert the following new Section:

1-07.11(4)A ACCEPTABLE WORK SITE (GSP 04-09-18)

The Contractor must ensure an Acceptable Work Site and must include this Section in all subcontracts.

The intent of the person that appears to violate the Acceptable Work Site is not a measure of whether such behaviors are appropriate; rather the standard is whether a reasonable person should have known that such behavior would cause a worker to be humiliated, intimidated, or otherwise treated in an inappropriate, discriminatory, or differential manner.

Behaviors that violate an Acceptable Work Site include but are not limited to:

1. Persistent conduct that to the reasonable person would be perceived as offensive and unwelcome;
2. Conduct that a reasonable person would perceive to be harassing or bullying in nature;
3. Conduct that a reasonable person would perceive to be hazing;
4. Verbal references that a reasonable person would perceive to be offensive stereotypes or racial/gender slurs;
5. Jokes about race, gender, or sexuality that a reasonable person would perceive to be offensive;
6. Task assignments that stratify, or give a perception of stratification, based on race, gender, or other defining characteristics;
7. Language that a reasonable person would perceive to be offensive based on race, gender, or oriented towards sexuality;
8. Name-calling, cursing or unnecessary yelling, including from a supervisor, foreman, or other more senior person that a reasonable person would perceive as offensive;
9. Repeating rumors about individuals in the Work Site that a reasonable person would perceive as harassing or harmful to the individual's reputation;
10. Refusal to hire someone based on race, gender, sexuality, or any other protected class; and
11. Reference to or requests for immigration status other than those required by law, religious affiliation, gender affiliation, criminal background, or other related aspects of a worker unless mandated by federal law.

To maintain an Acceptable Work Site, all Work must be assigned in a manner that respects training objectives for apprentices and ensures an equitable distribution of meaningful work, training, and assignments among all workers.

While maintaining and managing an Acceptable Work Site is the Contractor's responsibility, each subcontractor must also have accountability for performance in sustaining and managing their Work Sites. PC will monitor Work Sites and determine whether a risk or circumstance exists that may merit a remedy. Monitoring may include proactive observations of the Work Site, interviews of individuals familiar with the Work Site, collection of data that may evidence disparities, investigation of complaints by an individual familiar with the Work Site, or other evidence. If risks or circumstances that may merit a remedy are discovered, PC will notify and collaborate with the prime Contractor to discuss appropriate remedies and may likewise notify subcontractors and appropriate unions when necessary for the resolution of the situation, except when unusual circumstances require confidentiality. PC may also require other remedies such as those found in Section 1-08.1(3), if PC regards the situation as urgent, of potential harm, or without timely resolution.

This Section is for the benefit of the Owner and its interest in the Project. It does not create any third-party beneficiaries or form the basis of any action against the Owner by a third party.

1-07.11(5) RECORDS

Insert the following new Section:

1-07.11(5)A NOTIFICATION REQUIREMENTS FOR FEDERAL IMMIGRATION ENFORCEMENT ACTIVITIES (GSP 04-09-18)

Prior to responding to any requests from an employee or agent of any federal immigration agency including the Immigration and Customs Enforcement, the U.S. Department of Homeland Security, Homeland Security Investigations, Enforcement Removal Operations, Customs and Border Protection, and U.S. Citizenship and Information Services regarding this Contract, Contractor must notify the Engineer immediately. Such requests include, but are not limited to:

1. Requests for access to non-public areas in City buildings and venues (i.e., areas not open to the public such as staff work areas that require card key access and other areas designated as "private" or "employee only"); or
2. Requests for data or information (written or oral) about workers engaged in the work of this Contract or Owner employees.

No access or information shall be provided without prior review and consent of the Owner. The Contractor must request the federal immigration agency to wait until the Engineer is able to verify the credentials and authority of the federal immigration agent and directs the Contractor on how to proceed.

1-07.11(6) APPRENTICE UTILIZATION

1-07.11(6)B APPRENTICE UTILIZATION REQUIREMENTS AND GOALS (GSP 05-20-15)

Delete and replace the first paragraph in this Section with the following:

The Contractor must ensure that no less than 15% and no more than 20% of the total Contract labor hours utilized on the Project are performed by Apprentices registered with the Washington State Apprenticeship and Training Council (WSATC). The Apprentice utilization requirement will be set at 15% unless determined otherwise by PC, see Section 1-07.10. Additional preferred entry hiring is required under Section 1-07.12.

Delete and replace item b) in the fourth paragraph in this Section and replace it with the following:

b) Recruit and hire minority and women Apprentices for the Project. The Owner has established aspirational goals provided in Section 1-07.10 for women and minority Apprentices based on the total Apprentice utilization requirement percentage. The Contractor may substitute other efforts to meet the intent as approved by PC.

1-07.11(6)C APPRENTICE UTILIZATION PLAN (GSP 08-15-18)

Delete the contents of this Section and replace it with the following:

As specified in Section 1-03.3(4), the Contractor must submit to PC, as part of the Social Equity Plan, a comprehensive plan outlining how the apprentice utilization requirements will be met on the total Contract labor hours. The plan must be submitted on a form provided by the Owner or by accessing <http://www.seattle.gov/city-purchasing-and-contracting/social-equity/apprenticeships>. An approved plan is required prior to the Execution Date.

PC may provide assistance in directing the Contractor to available resources for hiring apprentices. The Contractor, the Engineer, and PC must meet to discuss and change the plan as appropriate.

1-07.11(7) VIOLATIONS (GSP 04-09-18)

Supplement this Section with the following:

The Contractor must immediately report to PC any violation of the requirements of this Section.

1-07.12 RESERVED

Delete this Section and Title and replace with the new Section and Title:

1-07.12 PREFERRED ENTRY TO APPRENTICESHIP (GSP 04-09-18))

The Contractor must ensure compliance with the preferred entry requirement that 1 of every 5 Apprentices who have worked at least 700 hours on the project is from a recognized Pre-apprentice Training Program and receive preferred entry into apprenticeship and on to Covered Projects per the processes in the CWA Article XV. The Director may reduce the number of required hours to a minimum of 350 hours on smaller projects. Preferred entry candidates must meet all the following qualifications to be counted toward the preferred entry requirement:

1. Graduate of a recognized Pre-apprentice Training Program defined in the Community Workforce Agreement or Helmets to Hardhats referral;
2. Be employed at least 700 hours on the project; and
3. Either be within their first two steps and/or years of apprenticeship or be prepared to register for an Apprenticeship Training Program.

1-07.16 PROTECTION AND RESTORATION OF PRIVATE PROPERTY

1-07.16(1) PRIVATE AND PUBLIC PROPERTY (SP 2-3-20)

Add the following paragraph at the end of the Section:

Contractor must not place equipment or materials with a total weight in excess of 4,000 lbs within 10-feet of the retaining wall on Western Avenue at Union Street. In addition, the Contractor must not place any material or equipment on top of existing areaways identified on the Drawings.

Contractor must protect the existing art mural on the Western Avenue Wall throughout construction from damage or debris.

1-07.18 INSURANCE

1-07.18(1) MINIMUM INSURANCE COVERAGE, LIMITS AND OTHER REQUIREMENTS

1-07.18(1)D RESERVED

Replace this Section with the following:

1-07.18(1)D IN-TRANSIT POLLUTION LIABILITY INSURED (GSP 01-31-11)

CA 99 48 and MCS 90 endorsements are required on the Automobile Liability insurance policy unless in-transit pollution risk is covered under a Pollution Liability insurance policy

1-07.18(1)E RESERVED

Replace this Section with the following:

1-07.18(1)E XCU AND SUBSIDENCE PERILS NOT EXCLUDED (GSP 01-31-11).

The Contractor's CGL insurance must not exclude perils generally known as XCU (Explosion, Collapse and Underground Property Damage), Subsidence, Absolute Earth Movement (except as respects earthquake peril only) or any equivalent peril.

1-07.18(1)F RESERVED

Replace this Section with the following:

1-07.18(1)F PRODUCTS AND COMPLETED OPERATIONS ADDITIONAL INSURED (GSP 01-31-11)

The Contractor's CGL insurance must include the Owner as an additional insured for Products and Completed Operations by providing additional insured status on the ISO CG 20 10 11 85 or CG 20 37 endorsement, or by an equivalent policy or endorsement provision. The Products and Completed Operations additional insured status for the Owner must remain in effect for not less than three (3) years following the Physical Completion Date or Final Acceptance of the Work (as applicable) by the Owner.

1-07.18(1)G RESERVED

Replace this Section with the following:

1-07.18(1)G CONTRACTOR'S POLLUTION LIABILITY INSURANCE (GSP 03-09-12)

The Contractor must provide a Pollution Liability policy for pollutants being remediated on or off site covering claims, including investigation, defense, or settlement costs and expenses that involve bodily injury and property damage (including natural resources damages and loss of use of tangible property that has not been physically injured) covering:

1. Pollution conditions caused or made worse by the Contractor, including clean-up costs for a newly caused condition or a historical condition that is made worse.
2. The vicarious liability of subcontractors of any tier.

Such Pollution Liability insurance must provide a minimum limit of liability of \$1,000,000 each claim with a minimum aggregate limit of 200% of the each claim limit. There will be no requirement for a dedicated project aggregate limit provided that the Contractor must (1) cause to be submitted to the City prior to the Notice to Proceed date with its insurance certification a written statement from its authorized insurance representative that the full minimum aggregate limit is available and has not been impaired by any claims reserved on another project, and (2) thereafter, until the completion of the Work, the Contractor must provide notice in writing to the City within ten (10) Days of Contractor's constructive knowledge of any pending or actual impairment of the aggregate limit.

1-07.18(1)H RESERVED

Replace this Section with the following:

1-07.18(1)H UMBRELLA OR EXCESS LIABILITY INSURANCE (GSP 01-31-18)

The Contractor must provide minimum Excess or Umbrella Liability coverage limits of \$7,000,000 each occurrence in excess of the primary CGL and Automobile liability insurance limits specified in section 1-07.18(1)A or 1-07.18(1)B. The minimum total limits requirement of \$8,000,000 may also be satisfied with primary CGL liability insurance limits or any combination of primary and excess/umbrella limits

1-07.18(1)L RESERVED

Replace this Section with the following:

1-07.18(1)L ARCHITECTS AND ENGINEERS PROFESSIONAL LIABILITY (GSP 01-31-11)

The Contractor and/or its Subcontractor and/or its design consultant must provide evidence of Professional Liability insurance covering design-related professional errors and omissions. Such

insurance must provide a minimum limit of liability of \$1,000,000 each claim. If insurance is on a claims made form, its retroactive date, and that of all subsequent renewals, must be no later than the Notice to Proceed Date.

1-07.18(1)N RESERVED

Replace this Section with the following:

1-07.18(1)N CONTRACTOR-PROVIDED BUILDER'S RISK PROPERTY INSURANCE

The Contractor must obtain and maintain Builder's Risk Property insurance ("Builder's Risk") covering interests in the Work of the Owner by the Contractor and any subcontractor of any tier ("Subcontractor"). Builder's Risk will insure against all risks of physical loss or damage, including earthquake and flood, except as excluded. The Builder's Risk will:

1. Commence at the Notice to Proceed Date. Builder's Risk may be terminated upon notification of the Physical Completion Date, or earlier if the Owner, Contractor and the insurer agree that an earlier date is appropriate under the circumstances of the project.
2. Be written with an amount of insurance \$6,000,000 covering hard cost and soft cost (including design costs, licensing fees, architect fees and engineer fees).
3. Include coverage for temporary buildings, debris removal, and building materials in transit or stored on or off-site, but is not required for Contractor's or Subcontractor's owned, hired, or leased property or tools, equipment, or supplies used for construction and not intended to form a permanent part of the Work.
4. Payment of deductibles are the responsibility of the Contractor except for (i) earthquake or flood claims, or (ii) all risks claims to the extent damage is not caused by the negligent acts of the Contractor or any Subcontractor.
5. Include the Owner as loss payee as its interest may appear.
6. Name "The City of Seattle and its officers, officials, employees, agents and volunteers" as Additional Insured.

Within 5 Business Days of binding Builder's Risk coverage, the Contractor will provide to the Owner a certificate of Builder's Risk Property insurance that includes coverage information, amounts of insurance, deductibles and provisions for 30 Calendar Day notice of cancellation and loss payee status; evidence of renewal of the insurance will thereafter be delivered until the earliest of the Physical Completion Date or occupancy of the Work by the Owner. Contractor shall provide certificate of Builder's Risk Property insurance by email to Judy.keefe@seattle.gov prior to the Execution Date.

In the event of any claim or potential claim against the Contractor-provided Builder's Risk, the Contractor must, as soon as practicable, provide electronic written notice by email to Travis.Steichen@seattle.gov or by fax to (206) 470-1275.

Builder's Risk will cover all materials, supplies, and equipment that are intended for specific installation in the project while the materials, supplies and equipment are located at the project site, in transit or while temporarily located away from the project site. However, Builder's Risk insurance does not cover Contractor's or Subcontractor's owned, hired, or leased property or tools, equipment, or supplies used for construction and not intended to form a permanent part of the Work, for which Contractor and Subcontractor must be responsible and at their sole option may insure.

The Contractor and the Owner mutually waive all rights of subrogation against the other and any of their Subcontractors, and their respective agents and employees, each of the other, for damage caused by insured perils to the extent covered by Builder's Risk or other property insurance applicable to the

work. The applicable property insurance policies must provide automatic blanket provisions for the waivers.

1-07.23 PUBLIC CONVENIENCE AND SAFETY

1-07.23(2) PEDESTRIAN CONTROL AND PROTECTION (GSP 08-23-16)

Replace the third and fourth paragraph in this section with the following:

Where sidewalks are required to be closed by construction, an alternate walkway must be provided and the walkway must be ADA compliant including curb ramps and detectable warnings

Where it is necessary to divert pedestrians into the roadway, barriers must be provided to separate the pedestrian walkway from the adjacent vehicular traffic lane. Pedestrians must not, at any time, be diverted into a portion of a street used concurrently by moving vehicular traffic.

1-07.28 NOTIFICATIONS RELATIVE TO CONTRACTOR'S ACTIVITIES (GSP 08-23-16)

Add the following at the end of the third paragraph

All written communications performed by the Contractor must be submitted to the Engineer in advance of the planned notification. The Contractor must also include the Engineer in all written notifications in order to provide confirmation that proper notifications have been made.

2. For Work That Partially or Completely Restricts Any Seattle Arterial, Street, Sidewalk, or Alley:

Replace the first paragraph with the following:

After receiving approval of the traffic control plan (see Section 1-10.2(5)), the Contractor must provide notice to the Engineer and SDOT (at 206-684-7623 Monday to Friday 8:00 AM to 5:00 PM) before the start of Work within the street Right of Way. The Contractor must also provide SDOT notification upon completion of Work within the street Right of Way by no later than 9:00 AM the first Working Day following completion. This notification requirement includes partial or full lane closures, parking restrictions, sidewalk closures, detours, complete or partial street closures, shoulder work, and pedestrian rerouting, as well as the placing of building Materials or equipment on city streets, sidewalks, or alleys.

Replace items 2b, and 2c with the following

b. Complete closure of any arterial within the Seattle City Limits: Provide 5 Working Days advance notice to SDOT (206-684-7623) Monday to Friday 8:00 AM to 5:00 PM.

c. Complete closure of any local access street within the Seattle City Limits: Provide notice to SDOT (at 206-684-7623 Monday to Friday 8:00 AM to 5:00 PM) by 2:00 PM at least 3 Working Days in advance.

Replace item 2d with the following

d. To restrict parking on any street within the Seattle City Limits: Provide 3 Working Days advance notification to SDOT (206-684 7623 Monday to Friday 8:00 AM to 5:00 PM). To arrange for inspection of "No Parking" easels and other parking related signs by a parking enforcement officer or uniformed peace officer, contact 206-386-9012 after placing the easels and 24 hours in advance of the effective date of enforcement on the easels (see Section 1 10.2(5)C, item 4.).

Add the following::

f. Complete closure of any alley or sidewalk within the Seattle City Limits: Provide notice to SDOT (at 206-684-7623 Monday to Friday 8:00 AM to 5:00 PM) by 2:00 PM at least 1 Working Day in advance.

4. Disruptions to, or service modification requests for METROKC Transit, Streetcar service and facilities, or Sound Transit Link Light Rail service and facilities:

Replace item 4a2) with the following:

2) For work resulting in Metro removing any transit facility structure including, but not limited to shelters, boards/kiosks and bus stop signs, fifteen (15) Business Days advance notification is required.

Replace item 4b with the following:

b. Contact METROKC at 206-477-1150 for overhead power wire requests as follows:

1) Overhead power line modification or outage requests for an electric bus require ten (10) Business Days advance notification (by COB Monday two weeks prior). Request forms must be submitted to the Trolley Impacts Office at trolley.impacts@kingcounty.gov. Trolley bus overhead deactivation is limited to weekends only (4:30 AM Saturday morning until 2:00 AM Monday morning).

2) Overhead power line modification or outage requests for a streetcar require ten (10) Business Days advance notification (by COB ten days prior). Request forms must be submitted to the Trolley Impacts Office at trolley.impacts@kingcounty.gov. Streetcar deactivations are limited to non-operational hours during periods when Streetcar staff are not testing cars or training new operators.

3) When working within ten (10) feet of any electric bus or streetcar overhead power, ten (10) Business Days advance notification is required. It is the responsibility of the Contractor to adhere to Washington Administrative Code guidelines in regards to working within the vicinity of high voltage lines. See Section 1-07.1(2)A "Working Near Overhead Energized Trolley Lines".

4) Requests for overhead power line modification or outage may have an associated cost payable by the Contractor. In addition, outage requests for non-SDOT projects may be subject to a recently-legislated King County Trolley Ordinance Fee. The Contractor must consult with MetroKC to determine costs and include such costs within the Bid. Requests may require additional information. Approval is dependent on METROKC Transit Power Distribution's ability to perform requests (some overhead power line modification requests may require more than ten (10) Business Days advance notification).

Replace item 6 with the following:

6. Property access restrictions:

The Contractor must provide abutting property owners and tenants of impending access restrictions. Advanced notification must be at least 2 Business Days for residential property and 3 Business days for commercial property.

9. Electrical Safety and Service within SCL Service Area:

Replace Items a through d in item 9 with the following: (GSP-08-09-17)

a. **Electrical Safety Observer:** To schedule an Electrical Safety Observer, notify SCL at least seven (7) Working Days in advance of the need to enter a SCL vault, or to work on or within any other SCL electrical Structure or facility, or to work on or near any SCL electrical transmission or distribution system (206-684-4911). See Section 1-05.2(2).

b. **SCL Electrical Service Inspections:** SCL will provide inspection and review services for Contractor-installed equipment and material between the customer's service cabinet and the SCL distribution system service point to assure contractor compliance with SCL specifications, standards, and requirements for service. Contact the project SCL Electrical Service Representative and reference the service request number to schedule an SCL inspection. The SCL Electrical Service Representative must be notified a minimum of ten (10) Working Days prior to when inspection is needed.

c. **SCL Electrical Service Connections:** After Seattle Department of Construction and Inspections (SDCI) and/or SDOT inspectors have inspected and accepted all Work on the customer side of the service cabinet, and SCL has inspected and accepted the Work on the service side, contact the project SCL Electrical Service Representative and reference the service request number to schedule the electrical service connection. The SCL Service Electrical Representative must be contacted a minimum of ten (10) Working Days prior to when service is needed.

d. **Excavation at or near Underground Electrical Distribution and Transmission System:** When proposed excavation is within the vicinity of underground electrical distribution and transmission facilities per Section 1-07.17(2)C, the Contractor must notify SCL at least ten (10) Working Days in advance of the excavation as follows:

At and North of Denny Way: (206) 615-0600.

South of Denny Way: (206) 386-4200.

e. **Streetlight System Inspections:** To schedule an inspection for streetlight systems, contact SCL at least ten (10) Days in advance.

1-07.29 DISCOVERIES OF CONTAMINATED MATERIAL(S), DANGEROUS WASTE(S) AND TSCA WASTE(S)

1-07.29(1) GENERAL (SP 1-28-20)

Replace the paragraph with the following:

Section 1-07.29 addresses Work related to responding to potential pre-existing Contaminated Materials, potential Dangerous Wastes, and potential TSCA Wastes encountered during construction or in connection with the Contract or Project Site but not otherwise identified in Contract-related documents.

1-07.29(5) PAYMENT (SP 1-28-20)

Add the following to the end of the paragraph:

Costs for the work to prevent, contain, remove, and dispose of contaminated materials generated by the Contractor's means and methods of construction must be included in the various Bid Items in the Bid Form, and no separate payment will be made under this Section. See Section 8-01.3(2)C.

Add the following Title and Section:

1-07.30 KNOWN CONTAMINATED MATERIAL ON PROJECT SITE (SP 09-21-17)

Soil and groundwater within the Project Site have been sampled and found to be contaminated with total petroleum hydrocarbons (TPH), metals, volatile organic compounds (VOCs), and carcinogenic polynuclear aromatic hydrocarbons (cPAHs). In some cases, the concentrations exceed Department of Ecology's Model Toxics Control Act (MTCA) Method A Cleanup levels. Based on the analytical sampling results, soil and groundwater generated by the project will not designate as Dangerous or Toxics Substance Control Act waste. Laboratory analytical data for samples within the areas of planned excavation are available in the geotechnical data provided in the Project Manual Appendix.

Because of this contamination, all soil excavated for the project will require handling as Contaminated Material. Contaminated Material, exceeds a regulatory criterion, and requires disposal at a RCRA Subtitle D Facility (a Type A Waste).

Wood waste including piles and timbers have been identified in the project area and must be handled in accordance with Sections 1-07.3(6) and 2-02.3(12).

Disposal of untreated wood waste not described in 2-02.3(12) must be disposed of in accordance with applicable regulations outlined in Section 1-07.3 and included in other items of work subject to the provisions of Section 2-04.3(1)J.

The Contractor is responsible for permitting, transporting, and disposing of Type A Waste generated during the project in accordance with federal, state, and local requirements. Sampling of project soil, as presented in the Appendix, was completed in accordance with Department of Ecology guidelines and conforms to typical soil disposal facility waste characterization requirements. Type A Waste must be

delivered by the Contractor to the Owner-contracted RCRA Subtitle D Facility and will not require additional testing.

The Owner has determined that existing paint on the Marion Street Pedestrian Bridge steel bridge elements, including pedestrian railings, may contain lead. The Contractor must abide by all laws and regulations pertaining to lead paint removal if the paint is found to contain lead. The requirements specified in Sections 1-07.31 and 1-07.33 must be met.

1-07.30(1)A HANDLING OF PROJECT SITE SOILS

If conditions observed are different than those identified in these Specifications, the Contractor must immediately notify the Engineer of a potential change in condition. Procedures for addressing new discoveries are defined in Section 1-07.29.

The Contractor must handle, transport, and dispose of all Type A Waste in accordance with applicable federal, state, and local requirements, and these Specifications. On-site storage of soils must be performed in a manner that prevents contact with stormwater and prevents run-on or run-off of free liquids. Storage areas must be returned to preconstruction conditions, or better, as determined by the Engineer.

1-07.30(1)B REMOVAL AND DISPOSAL OF PROJECT SITE SOIL

Add 1-G

~~The Owner has contracted directly with Waste Management Alaska Street Reload Facility at 70 S. Alaska Street in Seattle, Washington for the disposal of Type A Waste. The Contractor must dispose of Type A Waste through Waste Management during its normal operating hours, 7:30 AM to 5:00 PM Monday through Friday.~~

Delete and replace with the following:

The Owner has contracted directly with Waste Management for disposal of Type A Waste. Type A Waste containing soils and water must be delivered to Waste Management Reload Facility at 7400 8th Avenue S, Seattle, Washington and Type A Waste soils without water must be delivered to the Alaska Street Reload Facility at 70 S. Alaska Street in Seattle, Washington. The Contractor must dispose of Type A Waste through Waste Management during its normal operating hours, 7:30 AM to 5:00 PM Monday through Friday.

1-07.30(4) MEASUREMENT

Measurement for "Offsite Disposal of Contaminated Materials Designated as Type A Waste" will be per ton.

The tonnage of the excavated material for utility Work will be defined by the measurements of the excavation within the neat line of the proposed trenches calculated using a conversion factor of 1.712 TN/CY.

1-07.30(5) PAYMENT

Compensation for the cost necessary to complete the work described in Section 1-07.30 will be made at the Bid Item prices for the Bid Items listed below:

1. "Offsite Disposal of Contaminated Materials Designated as Type A Waste", per ton.

The Bid Item price for "Offsite Disposal of Contaminated Materials Designated as Type A Waste" must include all costs associated with handling, loading, hauling, and providing required documentation for disposal of Contaminated Material designated as Type A Waste at the Owner's selected disposal facility. The Owner will directly pay the disposal fees to Waste Management not including extra costs for off hour delivery. Payment for disposal of material excavated outside of the excavation limits defined in Section 1-07.30 and shown in the Drawings must be at the Contractor's expense. Payment for disposal will not be made to the Contractor without submittal of the documentation required in Section 1-07.3(3).

Add the following title and section:

1-07.31 HEALTH, SAFETY AND ENVIRONMENTAL PROVISIONS (SP 02-22-17)

1-07.31(1) HEALTH AND SAFETY

The Contractor must comply with the requirements of Section 1-07.1(4) and develop and implement an appropriate Health and Safety Plan that will identify hazards involving contaminated materials for all activities in accordance with WAC 296-843. This required information will be incorporated into the Project General Health and Safety Plan as required to be prepared for the project in Section 1-07.1(4).

Definitions of terms used in this Specification are found in WAC 296-843-300. Refer also to 29 CFR 1910.

Contractor must comply with all safety and health provisions of the Washington Industrial Safety and Health Act of 1973 (WISHA), as amended, including DOSH Safety and Health Core Rules (Washington Administrative Code [WAC] 296-800) and Hazardous Waste Operations ((WAC 296-843), as applicable); all other applicable federal, state, county, and local laws, ordinances, and codes; the requirements set forth herein, and regulations that may be specified in other parts of this Contract. In case of conflict or overlap, the provisions more protective of employee safety and health must apply. Failure to become thoroughly familiarized with these safety and health provisions will not relieve the Contractor of responsibility for compliance with the obligations and requirements set forth therein.

The Contractor must have instituted a corporate health and safety program. Contractor and Subcontractor workers must be (when required based on Project Site conditions) trained in hazardous waste site health and safety issues in accordance with 29 CFR 1910.120 and WAC Chapter 296-843 (including HAZWOPER Training) and must have personal protective equipment as needed.

Submit proof of training and updated annual refresher course prior to starting any Work, which requires hazardous waste training (i.e., work in areas of contaminated soil or groundwater). These materials must be submitted to the Engineer with the Health and Safety Plan.

The Contractor must inspect the Project Site to identify potential hazards for workers. The Contractor must have a designated a health and safety officer, and the officer must be present on site during soil excavation, dewatering, and loading of soils and water for offsite disposal.

The Engineer will review the Health and Safety Plan and reserves the right to comment on it, but the Engineer will not be responsible for approval of the Contractor's Health and Safety Plan. The Health and Safety Plan must be submitted to the Engineer no later than 10 working days prior to the start of Project Site Work. Health and safety is considered incidental to project work outlined.

1-07.31(2) ENVIRONMENTAL CONTAMINATION OF PROJECT SITE

The Contractor must consider soil/debris excavated from the Project Site as Contaminated Material. Contaminated Material encountered or generated during construction or in connection with the Contract or Project Site but not otherwise identified in Contract-related documents are handled in Section 1-07.30. Laboratory analytical data for samples within the areas of planned excavation are available in the Waterfront Seattle Program Geotechnical and Environmental Data Report - Dated March 2018, available at <http://www.ebidexchange.com/seattle>.

The Contractor must review this report for more specific details regarding the type and level of contaminants in the soil and groundwater.

The samples were collected in a manner consistent with Ecology guidelines and tested to meet typical disposal facility waste characterization requirements.

1-07.31(3) SUBMITTALS LIST

The Contractor must submit to the Engineer for review all the following documents:

Health & Safety Plan; See Section 1-07.1(2)

Proof of HAZWOPER training 5 Working Days prior to start of Work. No onsite work must be performed until documentation is provided.

Add the following title and section:

1-07.32 SAFETY AND HEALTH REQUIREMENTS FOR HAZARDOUS WASTE OPERATIONS (SP 02-07-20)

This section specifies the Contractor's responsibility for safety and health requirements for hazardous waste operations associated with the project. All references to "site" "Project Site" or "on-site" in this

specification refer to all locations where the Contractor or sub-contractors and their employees are handling or abating lead based paint associated with the project.

1-07.32(1) DESCRIPTION

The Contractor must be fully responsible for the safety and health of all on-site workers and compliant with Washington Administrative Code (WAC 296-155-176). Information, interpretation, or representation of laws, regulations, or ordinances referenced in the Contract Documents must not take precedence over the law, regulation, or ordinance itself, nor relieve the Contractor of responsibility for determining the true current construction and content of such laws, regulations, and ordinances.

The Contractor must appoint a Competent Person as required by WAC 296-155-17625.

The Contractor must ensure that all necessary monitoring equipment, protective clothing, and other supplies and equipment, up to the appropriate level of protection as defined by WISHA, are available to implement the Program.

The Contractor must not permit employees to work under conditions that would jeopardize health and safety. Should the Engineer or any authorized representative of a regulatory agency report a violation of the safety and health regulations to the Competent Person the Contractor must take immediate and decisive corrective action.

If the Contractor fails or refuses to promptly accede to a compliance directive, the Engineer may issue an order to suspend all or part of the work. Failure of the Engineer to order discontinuance of any or all of the Contractor's operations must not relieve the Contractor of responsibility for safety.

The Contractor must notify the Engineer and the Seattle-King Co. Dept. of Public Health of any emergencies as soon as possible following an incident.

The Contractor must maintain records of exposure, medical surveillance, medical removals [employees removed from Project Site due to exposure to lead] in accordance with WAC 296-155-17629. Records must be made available to the Engineer upon request.

1-07.32(2) SITE-SPECIFIC SAFETY AND HEALTH PLAN

1-07.32(2)A GENERAL

For any operation within the scope of WAC 296-155-176, the Contractor must develop and implement a written site-specific safety and health plan for employees involved in lead paint operations. This site-specific safety and health plan, for lead paint operations must be included in the Project General Safety and Health Plan (PGSHP) (see Section 1-07.1(2)). The Plan must be designed to identify, evaluate and control safety and health hazards and provide for emergency response for lead paint operations. It must include all applicable requirements of WAC 296-155-176, respiratory protection program as required by WAC 296-842 and the following:

- (a) General: The site-specific safety and health plan, which must be kept on-site, must address the safety and health hazards of each phase of site operations, and include the requirements and procedures of employee protection.
- (b) Elements: The site-specific safety and health plan must include as a minimum:
 - (1) Names of key personnel and alternates responsible for site safety and health, including the on-site safety officer.
 - (2) A safety and health risk or hazard analysis for each site task and operation found in the work plan.
 - (3) Employee training assignments to assure compliance with WAC 296-155-17625.
 - (4) Personal protective equipment to be used by employees for each of the site tasks and operations being conducted as required by the personal protective equipment program in WAC 296-843-19005 and WAC 296-155-17613 & 17615.
 - (5) Medical surveillance requirements in accordance with WAC 296-155-17621.

- (6) Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment to be used. Type(s) of ventilation equipment utilized, the cfm's, filter type and maintenance, volume of fully contained work area including the air exchanges per hour in the applicable work area.
- (7) Work practices controls in accordance with the compliance program required in WAC 296-155-17611.
- (8) Hygiene facilities and practices in accordance with WAC 296-155-17619.
- (9) An emergency response plan meeting the requirements of WAC 296-843-16005 for safe and effective responses to emergencies, including the necessary PPE and other equipment.
- (c) Pre-entry briefing: The site specific safety and health plan must provide for pre-entry briefings to be held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety and health plan and that this plan is being followed.
- (d) Effectiveness of site safety and health plan: Inspections must be conducted by the on-site safety officer or, in the absence of that individual, another individual who is knowledgeable in occupational safety and health acting on behalf of the Contractor as necessary to determine the effectiveness of the site safety and health plan. Any deficiencies in the effectiveness of the site safety and health plan must be corrected by the Contractor.

1-07.32(2)B ENGINEERING CONTROLS: WORK PRACTICES AND PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) is intended for use whenever work practice precautions and carefully applied engineering controls fail to reduce and maintain employee exposure to or below permissible exposure limits or dose limits for substances regulated by WAC 296-843 and WAC 296-255-27607.

For guidance in the selection of PPE for protection against various published exposure levels refer to WAC 296-843-19005, Table 2.

The Contractor's safety and health program must contain a written personal protective equipment (PPE) program.

When elements, such as donning and doffing procedures, are provided by the manufacturer of a piece of equipment and are attached to the program, they need not be rewritten into the plan as long as they adequately address the procedure or element.

The PPE program must include the following elements:

- (a) PPE selection based on site hazards,
- (b) PPE use and limitations of the equipment,
- (c) Work mission duration,
- (d) PPE maintenance and storage,
- (e) PPE decontamination and disposal,
- (f) PPE training and proper fitting,
- (g) PPE donning and doffing procedures,
- (h) PPE inspection procedures prior to, during, and after use,
- (i) Evaluation of the effectiveness of the PPE program, and
- (j) Limitations during temperature extremes, heat stress, and other appropriate medical considerations.

1-07.32(2)C NOTIFICATION, SUSPENSION AND CORRECTIVE ACTION

If the Contractor's Monitoring Program detects the presence of a hazardous substance in concentrations at or above established Permissible Exposure Limits, the Contractor must immediately suspend work activities in the vicinity of the material discovery and immediately notify the Engineer. The Contractor must determine actual procedures to be used in resuming the work. The Engineer may suspend all or any part of the work pending submission of test results or revised plans and procedures by the Contractor. If a suspension of work is ordered by the Engineer, work must not resume until an order to resume work has been issued by the Engineer.

Although the actual procedures used in resuming the work will depend upon the nature and quantity of the potentially hazardous substance, the following operating alternatives are possible:

1. Contractor must resume work as before the suspension.
2. Contractor must move work operations to another portion of the site until the hazardous conditions have been eliminated.

If contaminated air, soil and/or water is identified by the monitoring program, and construction activity is suspended at the affected location by the Owner, but the Contractor cannot move its operation to another portion of the site, the Contractor must be compensated for idle time of all equipment in actual use at the time of the potentially hazardous substance identification at that location in accordance with Section 1-09.4.

1-07.32(3) MONITORING PROGRAM

1-07.32(3)A GENERAL

As part of the Site-Specific Safety and Health Plan, the Contractor must put in place monitoring functions designed to protect employees against exposure levels which exceed established Permissible Exposure Limits for hazardous substances.

The Contractor's Environmental Monitoring Program must be performed in accordance with this section to assure proper selection of engineering controls, work practices, and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits or published exposure levels for hazardous substances.

Air monitoring must be used to identify and quantify levels of airborne hazardous substances and safety and health hazards in order to determine the appropriate amount of employee protection needed on site.

1-07.32(3)B PERIODIC MONITORING

Periodic monitoring must be conducted when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring.

The Contractor must develop and submit to the Engineer a written Environmental Monitoring Program within 14 days after receiving the Notice to Proceed with submittals, such Monitoring Program to provide the needed capability for detecting potentially hazardous substances. The Monitoring Program must include, at a minimum, the following elements:

Instruction of workers in the detection and the method of reporting potentially hazardous substances; identification of contaminants by odor, color and by surface appearances of water, soils and refuse.

Development of action levels for worker safety when potential contamination is detected by monitoring equipment.

Development of an emergency medical care and treatment plan.

Monitoring records must be made available to the Engineer upon request.

1-07.32(4) EMERGENCY RESPONSE BY EMPLOYEES AT UNCONTROLLED HAZARDOUS WASTE SITES

1-07.32(4)A EMERGENCY RESPONSE PLAN

An Emergency Response Plan must be developed and implemented by all employers within the scope of this section to handle anticipated emergencies prior to the commencement of hazardous waste operations. The plan must be in writing and available for inspection and copying by employees, their representatives, WISHA personnel, and other governmental agencies with relevant responsibilities.

Employers who will evacuate their employees from the workplace when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, respond to assist in handling the emergency are exempt from the requirements of this section if they provide an emergency action plan complying with WAC 296-843-16005.

1-07.32(4)B ELEMENTS OF EMERGENCY RESPONSE PLAN

The Contractor must develop an emergency response plan for emergencies which must address as a minimum, the following:

- (a) Pre-emergency planning.
- (b) Personnel roles, lines of authority, and communication.
- (c) Emergency recognition and prevention.
- (d) Safe distances and places of refuge.
- (e) Site security and control.
- (f) Evacuation routes and procedures.
- (g) Decontamination procedures which are not covered by the site safety and health plan.
- (h) Emergency medical treatment and first aid.
- (i) Emergency alerting and response procedures.
- (j) Critique of response and follow-up.
- (k) PPE and emergency equipment.
- (l) Site topography, layout, and prevailing weather conditions.
- (m) Procedures for reporting incidents to local, state, and federal governmental agencies.
- (n) The emergency response plan must be a separate section of the site safety and health plan.
- (o) The emergency response plan must be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.
- (p) The emergency response plan must be rehearsed regularly as part of the overall training program for site operations.
- (q) The site emergency response plan must be reviewed periodically and, as necessary, be amended to keep it current with a new or changing site conditions or information.

1-07.32(4)C PROCEDURES FOR HANDLING EMERGENCY INCIDENTS

An employee alarm system must be installed in accordance with WAC 296-843-16005 to notify employees of an on-site emergency situation, to stop work activities if necessary, to lower background noise in order to speed communication, and to begin emergency procedures.

Based upon the information available at the time of the emergency, the Contractor must evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the on-site emergency response plan.

Refer to WAC 296-843-160 and 200 for requirements pertaining to training and emergency response programs.

1-07.32(4)D EMERGENCY RESPONSE TO HAZARDOUS SUBSTANCE RELEASE

This section covers employers whose employees are engaged in emergency response no matter where it occurs.

Those emergency response organizations who have developed and implemented programs equivalent to this section for handling releases of hazardous substances pursuant to Section 303 of SARA Title III must be deemed to have met the requirements of this section.

Emergency response organizations may use the local emergency response plan or the state emergency response plan or both, as part of their emergency response plan to avoid duplication. Those items of the emergency response plan that are being properly addressed by the SARA Title III plans may be substituted into their emergency plan or otherwise kept together for the employer and employee's use.

1-07.32(5) MEASUREMENT

Measurement for "Safety and Health Program" will be by lump sum.

1-07.32(6) PAYMENT

Compensation for the expenses incurred to complete the Work described in Section 1-07.32 will be made at the Contract unit bid prices only for the pay items listed or referenced below:

1. **"Safety and Health Program"**, per lump sum.

The lump sum Contract Price for "Safety and Health Program" must include all costs for labor, equipment, materials, and any other costs required to prepare, and implement the Site-Specific Safety and Health Plan (SSSHP), the PGSHP, the Emergency Response Plan and all other Plans, Programs and Work specified by Section 1-07.32, including costs for use of Personal Protective Equipment (PPE) when determined necessary and required by the Site Safety and Health Supervisor and WAC regulations for safe work performance. PPE must meet the requirements of WAC 296-843 - Hazardous Waste Operations. Payments for "Safety and Health Program" will be pro-rated in equal monthly payments beginning in the month or pay period in which the Contractor's Safety and Health Program is submitted and ending in the month or pay period in which the projected last Working Day occurs, not allowing for Work suspensions. The lump sum Contract Price for "Safety and Health Program" must include all costs for the Safety and Health Program provisions required by Section 1-07.32 including costs for decrease in productivity resulting from the use of PPE.

2. **Other payment information.**

Any Work necessary to comply with the requirements of Section 1-07.31, Section 1-07.32, and Section 1-07.33 but not specifically mentioned or paid otherwise must be included in the Bid item "Safety and Health Program".

Add the following title and section:

1-07.33 LEAD ABATEMENT AND COATING REMOVAL (SP 02-13-20)

1-07.33(1) DESCRIPTION

This Section specifies requirements for management, containment, and abatement of lead based paint and coatings that may exist on the Marion Street Pedestrian Bridge and are regulated as Contaminated Material, Dangerous Waste and/or recyclable substitute material. All references to "site" "Project Site" or "on-site" in this specification refer to all locations where the Contractor or sub-contractors and their employees are handling or abating lead based paint associated with the project.

Contractor must remove lead-based paint and coatings prior to performing site activities that would disturb and/or potentially release the lead-based paint and coatings except as agreed in writing by the Engineer.

Contractor may perform demolition operations prior to abatement with an approved containment plan, including containment during transport to a disposal or abatement facility. Waste which contains lead based paint or coatings must be analyzed by a toxicity characteristic leaching procedure (TCLP) analysis to determine if the waste is a designated Dangerous Waste.

Sampling of lead based paint or coatings has not been conducted, and the extent and scope of lead based paint and coating removal is not known. Lead based paint and coating removal which may be necessary includes, but is not limited to, removing lead based paint on steel members prior to cutting through the member to allow for demolition. Full abatement of all discovered lead based paint and coatings is not required by the project. The Contractor is to abate lead based paint and coatings only to the extent required to adhere to pertinent local, state, and federal regulations.

1-07.33(1)A PRESENT SITE CHARACTERIZATION

The Owner has determined that paint and coatings on components including, but not limited to, the steel members of the existing Marion Street Pedestrian Bridge may be lead-based. The Contractor must test for lead based paint prior to impacting the painted components to determine if the paint or coating contains lead. The Contractor must be responsible for full compliance with all applicable Federal, State and Local laws and regulations. The Contractor must be responsible for undertaking the proper methods and procedures to characterize, remove, and dispose of lead based paint and coatings, and associated debris.

1-07.33(1)B REFERENCES

Work required in this section must conform to the latest edition of the Society for Protective Coating (SSPC) Specifications and guidelines. In case of conflict or overlap, the provisions more protective of employee's health and safety and the environment must apply.

- Surface Preparation Specification No. 11 (SSPC-SP-11) - Power Tool Cleaning to Bare Metal, November 1, 1987, Editorial Revisions, November 1, 2004.
- Joint Surface Preparation Standard Specification No. 6 (SSPC-SP-6)-Commercial Blast Cleaning, January 1, 2007.
- Lead Paint Removal Guides: SSPC Technology Guide No. 6 for Containing Debris Generated During Paint Removal Operations, October 1, 2004.
- Lead Paint Removal Guides: SSPC Technology Guide No. 7 Guide, Editorial Revisions November 1, 2004.
- Guide to The Disposal of Lead - Contaminated Surface Preparation Debris: SSPC Technology Guide No. 7 Guide, Editorial Revisions November 1, 2004.
- SSPC-VIS 3: Guide and Reference Photographs for Steel Surfaces Prepared by Power and Hand Tool Cleaning.

1-07.33(1)C REGULATIONS

Work in this section must be in strict accordance with all Federal, State, or local laws, statutes, regulations, permits and common law regarding human/worker health and the environment including but not limited to the following:

- Title 40 Code of Federal Regulations Parts 260-271 Hazardous Waste Regulations.
- Washington Administrative Code (WAC) 173-303 Dangerous Waste Regulations.
- WAC 296-155-176 Lead.

- E.P.A. National Ambient Air Quality Standards.
- Puget Sound Clean Air Agency (PSCAA) Regulation 1.
- City of Seattle Municipal Code Chapter 25.08 Noise Control Requirements.

1-07.33(1)D DEFINITIONS REGARDING LEAD ABATEMENT

The terms Hazardous Waste and Dangerous Waste must be considered synonymous for this project, and must be as defined for Dangerous Waste in WAC 173-303.

Bulk Container: A DOT-approved container, designed for storage, and transport of Contaminated Material, Dangerous Waste, and recyclable wastes. Container must meet the requirements of the designated recycler for acceptance. Drums are not acceptable.

Lead-based coating Blast Debris: all debris generated through abrasive blasting of lead-based coatings.

Competent Person: Defined, by WAC 296-155-17605 Lead, as one who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt and corrective measures to eliminate them.

Dangerous Waste Contaminated Construction Debris: includes PPE, ground membrane, containment system materials, or any other construction generated material that must be disposed of as a Dangerous Waste or Contaminated Material because of contamination and contact with lead-based coating debris.

Decontamination System: an engineered system to prevent the movement of Contaminated Material off site on clothes, personnel, and equipment. System must provide for the controlled cleaning of contamination from personnel, personal protective equipment, and other contaminated equipment prior to leaving the exclusion zone. System must include a method of collection for contaminated wash water and debris.

Engineering Control System: An engineered system for preventing uncontrolled emission of dust or particulates during removal, transfer, storage and coating activities.

Hazardous Substances: Any liquid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the physical, chemical, or biological properties described in WAC 173-303-090 or WAC 173-303-100.

Lead Abatement: The controlled removal of lead-containing coatings from a surface prior to any activity with the potential to release lead-containing dust or debris. Also referred to as Lead Removal.

Lead-Based Coating Debris: All debris generated through removal of coatings on the Project Site using power tools.

Lead-Based Coating / Chemical Remover Debris: All debris generated through removal of lead-based coatings on the Project Site using chemical remover.

Recyclable Substitute Material: Lead-based coating blast debris meeting the recycling criteria of both WAC 173-303-017(2) and Owner-specified recycler, which is exempt from Dangerous Waste designation. However all on site activities, including but not limited to debris generation, handling, personal protective equipment, and employee training, must be handled as if the lead-based coating blast debris is a Dangerous Waste.

Secondary Containment Unit: A locked, watertight structure(s) of sufficient size to contain all coating debris in approved storage containers. The secondary containment must be designed to retain 110% of the volume of the largest single container if any waste is liquid in nature.

New Coating Blast Debris: All debris generated through abrasive blasting of vinyl coating on the Project Site if that method is used by Contractor.

New Coating Debris: All debris generated through the removal of coating at Project Site. Includes chemical remover residue if that method of removal is used by Contractor.

1-07.33(1)E ON SITE PERSONNEL

The Contractor must submit qualifications for Competent Person, Lead Abatement Workers, and On-Site Foreman for Lead Based Paint Removal at the preconstruction meeting.

All workers who may impact lead based paint or coatings and the Competent Person must demonstrate a blood lead level below 40 ug/dL prior to start of coating removal activities. Persons with a blood lead level exceeding 40 ug/dL must not be allowed to conduct any coating removal.

Submit within 5 working days after Notice to Proceed (NTP) date, evidence of blood lead level below 40 ug/dL for each lead based paint and coating removal worker and Competent Person.

Test blood lead level for each worker and Competent Person on the project within 5 working days of completion of coating removal and submit results to the Engineer within 10 working days of analysis. The Completion Date will not be granted until all such information has been submitted to the Engineer.

1-07.33(1)E1 COMPETENT PERSON

The Contractor must provide the name of the properly trained (WAC 296-62-3040 and WAC 296-155-17625) and experienced Competent Person to be assigned to this Contract. During lead abatement activity, the Competent Person must be full time at the on-site location where lead abatement activity occurs. This individual must meet the following requirements:

1. Worked as Competent Person within the last three years on at least three lead abatement projects.
2. Documentation must include the following:
 - a. Name of person assigned to this position;
 - b. Proof of holding a valid, current certificate of training for Industrial First Aid;
 - c. Titles and dates of three lead abatement projects regulations within the last three years, for which the individual acted as Competent Person.
 - d. Contracting agencies with names and phone numbers of contact persons for each project listed above;
 - e. Brief technical summary of work for each project, including any pertinent details that are similar to this project.

If at any time during the project, a new Competent Person is required, that new Competent Person prior to assuming these responsibilities must meet these same requirements listed above.

1-07.33(1)E2 LEAD ABATEMENT WORKER

The Contractor must provide the names of the properly trained (WAC 296-843 and WAC 296-155-17625) and experienced lead based paint removal workers to be assigned to this contract, each of whom must meet the following requirements:

1. Be a part time or full time employee of the Contractor.
2. Completed respirator training as per Part E of WAC 296-62;
3. Documentation of employment on at least five lead abatement projects, at least two of which must have used the methodology proposed for this contract.

Note: No more than one trainee meeting requirements (1), (2), and (3) must be permitted to train on-the-job, for every worker who is experienced in lead abatement, and who meets each of the requirements (1), (2), (3), and (4) of this section:

Documentation must include the following: Note: (2) does not apply to trainees:

1. Names, dates, job title and proof (certificates) of training;
2. List of projects including name, address, and phone number of the owner and the owner's project manager, type of facility, quantity of lead abatement performed, specific method of lead abatement; name of the "Health and Safety Supervisor" for each project, and name and phone number of the employer if other than the Contractor;
3. Documentation of participation in ongoing respiratory protection program by present or recent employer, including results of fit-testing conducted within past 6 months;
4. Documentation of completion of initial medical surveillance, and participation in a medical surveillance program in compliance with WAC 296-62-3050.

For each employee, including trainees, provide a statement that the above information of the documentation is correct for the same employee complete with employee signature to demonstrate that the information is correct. Any new Lead Abatement Worker must also meet these same requirements listed above prior to performing any work covered by this section.

1-07.33(1)F SUBMITTALS

Submit the following information for acceptance review in accordance with Section 1-05.3, within 10 Working Days after Notice to Proceed. Resubmit if materials or material sources change after Engineer's acceptance of original submittal.

- MSDS and manufacturer's product data sheets of product to be used for lead based paint or coating removal, such as chemicals or abrasive media.
- Work plan describing the lead based paint or coating scope of work, removal procedures to be used, and safety precautions which must be taken.
- Plans for product and waste containment and monitoring to assure no releases to the environment or public occur during application, removal, waste collection, and storage operations.

Submit the plan for worker safety, including personal protective equipment, as part of the Safety and Health Program including supplemental section for Lead Construction work.

- An 8oz sample of the abrasive material must be provided to the Engineer within 24 hours of request.

The Engineer reserves the right to have the material analyzed to confirm manufacturer's test data.

No abrasive blasting is permitted until Engineer accepts abrasive.

2. Submit the following information for approval within 15 working days after Notice to Proceed with submittals date if chemical paint removal products are to be used:

- MSDS and manufacturer's product data sheets
- Work plan describing the method for application and removal of the chemical product. The Work plan must address the number of applications of chemical product to be used with a specified time allocation to yield acceptable coating removal. The Contractor will be allowed to perform one limited test of chemical coating removal in order to demonstrate the effectiveness of this technique.
- Plans for product and waste containment and monitoring to assure no releases to the environment or public occur during application, removal, waste collection, and storage operations
- Submit the Safety and Health Program, including personal protective equipment, as part of the PGSHP. Specific information must detail protection against the specific paint stripping chemicals and lead containing mixture exposures.

3. Submit the information specified above within 3 working days after Notice to Proceed if a substitute "equal" product is to be used instead of the approved chemical paint removal products.

4. Name and certifications for Independent Laboratory to perform testing and analysis of Lead Based Coating Debris.

1-07.33(1)G QUALITY ASSURANCE

Surface Cleaning: The Engineer must be allowed sufficient time prior to covering the cleaned surface to inspect and test all surface cleaning areas to verify that these specifications are being met.

Engineering Control Systems: The Engineer must be allowed sufficient time prior to starting lead paint or coating abatement to inspect all engineering control systems to verify that the specifications are being met.

1-07.33(2) RESERVED

1-07.33(3) CONSTRUCTION REQUIREMENTS

1-07.33(3)A PRELIMINARY REQUIREMENTS

No coating removal activities must be allowed until:

1. All submittals required in this section have been reviewed and accepted by the Engineer.
2. All requirements listed in this section have been met.
3. Methods of containing, collecting, storing, disposing, and preventing the spread of Dangerous Wastes and hazardous substances are reviewed by the Engineer and in place.
4. All chemical paint removers submitted as an "equal" product, have been both accepted by the Engineer and successfully demonstrated by the Contractor.

1-07.33(3)B GENERAL REMOVAL OF COATINGS

All coating debris (lead-based blast debris, lead-based coating debris, chemical remover debris), and any other construction debris, wash water, or soil that is contaminated by the coating debris, must be collected, stored, and managed as dangerous waste and hazardous substances as required under WAC 173-303. Stockpiling of coating debris directly on ground at the Project Site, or other releases to the environment are prohibited. See also Section 1-07.33(3)E.

The Contractor must remove lead based paint, sample and provide laboratory analytical results, collect and store all coating debris and generated waste per regulatory compliance. The Contractor must facilitate all aspects of sampling, removal, storage, manifesting, transport, and disposal.

The different types waste and/or recyclable waste that may be generated are defined Section 1-07.33(1)D. Each waste must be collected and stored separately, and labeled accordingly at all times.

The Contractor must ensure that no debris or dust escapes from Project Site during lead based coating removal, handling, storage, or any other site activity. The Contractor must determine the required Engineering Control System, subject to the Engineer's review and approval.

The Contractor must provide for inspections conducted and documented by the Engineer and/or site health and safety supervisor as necessary to determine the effectiveness of the safety and health program.

1-07.33(3)C LEAD BASED PAINT REMOVAL

Prior to washing and rust mitigation, the Contractor must submit for approval by the Engineer a written procedure for collection and removal of all debris, cleaning materials, and cleaning residues.

Pressure washing must precede all other methods of cleaning the metal surfaces except as may be indicated in the field by the Engineer.

All pressure washing is to be accomplished within a containment system capable of collecting all solid and liquid wash debris. The Contractor must contain 100% of the pressure washing water, unless otherwise permitted in advance by the Engineer, and must abide by all laws and regulations pertaining to hazardous materials, and water pollution control.

All wash water and debris from pressure washing must be filtered through a filter fabric capable of collecting all loose debris and particles if completed on-site. A polypropylene, non-woven, needle-punched geotextile or equivalent must be used as the filter fabric. The fabric must have the following properties:

Grab tensile (ASTM D4632)	100 Lbs.
Min Apparent opening size (ASTM D4751)	#40 US Sieve
Permittivity (ASTM D4491)	0.7 sec - or better

The Fabric must be supported underneath the structure to hold the contained material and must be cleaned at intervals frequent enough to prevent clogging, overflow, or collapse. The debris obtained from the pressure water flushing operation must be collected accordance with Section 1-07.33(3)E.

Where used, abrasive blasting must employ a blast admixture such as Blastox, or approved equal, is required and must be premixed by the supplier to assure correct proportions. The supplier of the blast admixture must provide the Engineer with a certified letter stating that the proper proportioning has been

accomplished. Abrasive media samples must be submitted to the Engineer and use of abrasive material must be in accordance with Section 1-06.1.

No mixing will be allowed on site. The Contractor will provide the Engineer with TCLP analytical results of blasting operation waste. Prior to the sample collection, the Contractor will notify the Engineer. If the TCLP test results indicate lead levels greater than 5 ppm (parts per million), the Contractor must stop the blasting operation and correct the admixture deficiency. The Contractor will immediately notify the Engineer of the findings and provide the applicable data.

The Contractor must be knowledgeable of current or recently revised laws and regulations that apply to construction work where an employee may be occupationally exposed to lead.

1-07.33(3)D ABRASIVE BLAST COATING REMOVAL

Contractor must not initiate any abrasive blasting operations prior to completion of the following items, nor prior to authorization by the Engineer.

A sample of the blast media must be collected from a sample blast area, not to exceed 25 square feet, removed to SSPC SP-6 levels. The Engineer will approve the location and size. Submit samples of the lead-based coating blast debris to the Engineer for testing by the Owner's Laboratory Services Consultant. Blasting activities must not continue until results are received and reviewed by Engineer, and approval to proceed is granted. Allow 5 working days for the Engineer's review.

1-07.33(3)E STORAGE AND MANAGEMENT OF LEAD CONTAINING PAINT DEBRIS

Primary Containment: Collect lead containing paint coating debris in DOT 17-C or DOT 17-H metal drums, or other approved containers, in accordance with WAC 173-303. Contaminated PPE, used plastic sheeting, or any other waste other than coating debris, must be collected and stored in separate containers. Store debris collected from different cleaning processes in separate drums. Debris from pressure washing must be kept separate from debris from abrasive blast coating removal, and debris from abrasive blast coating removal must be kept separate from debris generated from any other removal process.

The Contractor must store drums containing debris from paint removal in a fenced and locked area designated by the Engineer.

Sample Collection, Analysis, and Profiling: The Contractor must inform the Engineer when accumulation of each waste stream begins and before any material sampling. The Contractor will submit the sample to the approved lab for analysis. Upon receipt of the analytical data from the lab, the Contractor will promptly submit the data to the Engineer. The Owner may collect additional samples for verification purposes. The Contractor will characterize the Waste. The Contractor must manage the waste per regulatory requirements. The Contractor must notify the Engineer when accumulation of each waste stream begins and before any material sampling. The Owner reserves the right to collect duplicate samples of waste materials.

1-07.33(3)F HANDLING DRUMS AND CONTAINERS (WAC 296-843-180)

Hazardous substances, hazardous wastes, liquids, and other residues must be handled, transported, labeled, and disposed of in accordance with this section.

Drums and containers used during the project must meet the appropriate DOT, OSHA, WISHA, and EPA regulations for the wastes that they contain.

When practical, drums and containers must be inspected, and their integrity must be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (i.e., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile, etc.) must be moved to an accessible location and inspected prior to further handling.

Unlabeled drums and containers must be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

Site operations must be organized to minimize the amount of drum or container movement.

Prior to movement of drums or containers, all personnel exposed to the transfer operation must be warned of the potential hazards associated with the contents of the drums or containers.

United States Department of Transportation specified salvage drums or containers and suitable quantities of proper absorbent must be kept available and used in areas where spills, leaks, or ruptures may occur.

Where major spills may occur, a spill containment program, which is part of the employer's safety and health program required in WAC 296-843-180, must be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

Drums and containers that cannot be moved without rupture, leakage, or spillage must be emptied into a sound container using a device classified for the material being transferred.

1-07.33(3)G TRANSPORTATION AND RECYCLING

The Contractor must transport and dispose of waste generated from the work site specifically from the lead based paint or coating removal processes. The waste may be characterized as Dangerous Waste, dependent upon sampling results.

1-07.33(3)H SCHEDULING DANGEROUS WASTE TRANSPORT, DISPOSAL AND/OR RECYCLING

The Contractor must ensure that all of the Dangerous Waste coating debris and Dangerous Waste contaminated construction debris accumulated at the site is prepared for shipment in approved D.O.T containers, labeled, stored, transported, and disposed of per regulations.

1-07.33(3)I PROVISION OF PERSONAL SAFETY EQUIPMENT FOR CITY INSPECTORS

The Contractor must provide workers protective measures "Personal Protective Equipment" described in Section 1-07.32(2)B and facilities for a crew of two inspectors representing the Owner.

1-07.33(3)J NOTIFICATION, SUSPENSION AND CORRECTIVE ACTION

If the Contractor's Air Monitoring Program detects the presence of hazardous air pollutants, including lead, in concentrations at or above established Permissible Exposure Limits, the Contractor must immediately notify the Engineer and alert the Contractor's and subcontractor's personnel. The Contractor must promptly obey orders by the Engineer to suspend the work in the vicinity of the material discovery.

Following completion of any further testing necessary to determine the nature of the material, the Contractor must propose the manner in which the substance will be handled and disposed of and the actual procedures to be used in resuming the work. If the Contractor's measures are determined by the Engineer or a regulatory agency with jurisdiction to be inadequate, the Engineer may suspend all or any part of the work pending submission of revised procedures by the Contractor and their approval by the

Engineer. If the Engineer orders a suspension of work, work must not resume until an order to resume work has been issued by the Engineer.

Although the actual procedures used in resuming the work will depend upon the nature and quantity of the potentially hazardous substance, the following operating alternatives are possible.

1. Contractor must resume work as before the suspension.
2. Contractor must move work operations to another portion of the site until the hazardous conditions have been eliminated.

1-07.33(4) MEASUREMENT

No separate measurement will be made for the Work required to manage, contain or abate lead based coating debris as described in this Section.

1-07.33(5) PAYMENT

Payment for the Work required to manage, contain, and abate lead based coating debris as described in this Section is included in the applicable Bid item prices in Sections 2-03.

The costs associated with preparing and implementing the Safety and Health Program, including costs for PPE must be paid per Section 1-07.32.

1-07.34 REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS (SP 02-13-20)

1-07.34(1) DESCRIPTION

The Contractor must remove, handle, transport, and dispose of asbestos containing materials (ACM) from the Marion Street Pedestrian Bridge structure scheduled for demolition. Sampling for ACM has not been conducted and is to be provided by the Owner prior to beginning work which may impact ACM. Any material not proven to be non-ACM through analytical testing must be assumed to contain asbestos. Abate ACM required for removal of the structure in accordance with this Section. A good faith survey will be conducted by the Owner and will be provided prior to Notice to Proceed.

1-07.34(1)A PRESENT SITE CHARACTERIZATION

The Owner has determined that materials present on the Marion Street Pedestrian Bridge structure may be ACM. The Contractor must be responsible for full compliance with all applicable Federal, State and Local laws and regulations pertaining to removal and disposal of asbestos containing materials prior to removal or demolition activities.

1-07.34(1)B REGULATIONS

Regulations which govern asbestos abatement work include, but is not limited to, the following:

Federal requirements: Which govern asbestos abatement work or hauling and disposal of asbestos waste materials including but not limited to the following:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
 - a Occupational Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite; Final Rules Title 29, Part 1910, Section 1001 and Part 1926, Section 58 of the Code of Federal Regulations.
 - b Respiratory Protection Title 29, Part 1910, Section 134 of the Code of Federal Regulations.

- c Construction Industry Title 29, Part 1926, of the Code of Federal Regulations.
- d Access to Employee Exposure and Medical Records Title 29, Part 1910, Section 2 of the Code of Federal Regulations.
- e Hazard Communication Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.
- f Specifications for Accident Prevention Signs and Tags Title 29, Part 1910, Section 145 of the Code of Federal Regulations.
- 2. U.S. Environmental Protection Agency (EPA), including but not limited to:
 - a Regulation for 40 A of the Code of Federal Regulations 763.
 - b National Emission Standard for Hazardous Air Pollutants; Asbestos, NESHAP Revision; Final Rule, 40 CFR, Part 61, of the Federal Register.
 - c Office of Solid Waste publication Asbestos: Waste Management Guidance (EPA/530-SW-85-007).
- 3. Department of Transportation (DOT) including, but not limited to the following:
 - a Hazard Material Regulations (HMR) 49 CFR parts 171-180.
 - b 49 CFR part 107, et. seq., Performance-Oriented Packaging Standards; Changes of Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule.

Washington State Requirements: WISHA rules which govern asbestos abatement work or hauling and disposal of asbestos waste material including but are not limited to the following:

- 4. General Occupational Health Standards Chapter WAC 296-62.
- 5. Asbestos Removal and Encapsulation Chapter WAC 296-65.
- 6. Safety Standards for Construction Work Chapter WAC 296-155.
- 7. Parts – Demolition WAC 296-155-975.
- 8. Respirators Standard Chapter WAC 296-842.
- 9. WISHA Regional Directives 79-23 (Amended) regarding minimum airborne fiber concentration for initiation and continuing asbestos medical examinations, 80-16 (amended) regarding respirable air supplied by oil-lubricated compressors, 83-10 (Amended) regarding respirator requirements for removal, demolition, and spraying of asbestos, 87-2 Respiratory Protection Requirements for negative pressure enclosures, 23-10 Occupational Exposure to Asbestos.
- 10. Safety Standards Chapter WAC 296-24.

Local Requirements: Local regulations which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

- 11. Puget Sound Clean Air Agency (PSCAA) Regulation III, Section 4 – Asbestos Control Standards.

1-07.34(1)C DEFINITIONS REGARDING ASBESTOS ABATEMENT

Abatement: Procedures to control fiber release from asbestos containing building materials. Includes encapsulation, enclosure, and removal.

Adequately Wetted: Sufficiently mixed or coated with water or an aqueous solution to prevent dust emissions.

Asbestos Abatement Project: Any demolition, renovation, repair, construction, or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling, or disposal of any material with potential for releasing asbestos fibers from asbestos containing material into the air.

ACM: Asbestos Containing Material. Asbestos or material containing asbestos in excess of one percent by weight.

Air Cell: Insulation usually used on pipes and duct work comprised of corrugated cardboard containing asbestos.

Airlock: A system for permitting restricted ingress or egress while allowing air movement from an uncontaminated area to a contaminated area during negative air pressure conditions in the work area, typically including two curtained doorways at least 6 feet apart.

Amended Water: Water containing a wetting agent or surfactant.

Area Monitoring: Sampling of asbestos fiber concentrations within the asbestos removal area which is representative of the airborne concentrations of asbestos fibers which may reach the breathing zone.

Asbestos: The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

Asbestos Containing Material (ACM) Waste: Asbestos containing or contaminated materials or objects requiring disposal.

Asbestos Fibers: This expression refers to asbestos fibers having an aspect ratio of three to one and longer than 5 micrometers.

Asbestos Removal Contractor: The asbestos abatement firm contracted to perform the asbestos abatement services addressed in these Special Provisions.

Authorized Visitor: City of Seattle personnel, Engineer, or a representative of any of the regulatory agencies having jurisdiction over the project.

Bridging Encapsulant: A liquid material that can be applied to ACM that controls the possible release of asbestos fibers from the material by creating a membrane over the surface. Also referred to as a sealant when used to seal residual fibers left on a surface from which asbestos has been removed.

Breathing Zone: An area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

Certified Asbestos Workers: Workers who have received training through an accredited training center in accordance with regulations as set forth in 40 CFR Part 763 and as required by WAC 296 62 in accordance with the requirement of WAC 296-65.

Clean Room: An uncontaminated area or room, which is part of the decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

Clearance Air Sample: The air monitoring sample taken after all abatement is completed and prior to deregulation of work areas. Provide clearance air samples equal to or better than the outside ambient air at the (less than 0.01 fiber/cubic centimeter).

Containment: An enclosure with restricted access where the air is filtered.

Control Device Asbestos Waste: Any ACM Waste that is collected in a pollution control device.

Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing three overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one side of the doorway, and securing the vertical edge of the other sheets along the opposite vertical side of the doorway.

Decontamination Enclosure System: A decontamination enclosure system for workers, materials and equipment, including a designated area of the work area adjacent and connected to the regulated area including an equipment room, shower room, and clean room formed by connecting a series of rooms with curtained doorways forming airlocks between any two adjacent rooms.

Demolition: The wrecking or removing of any load-supporting structural member and any related removing or stripping of friable asbestos materials.

Encapsulant: A material which is applied to ACM to minimize or eliminate potential release of asbestos fibers, either by creating a membrane over the surface (bridging encapsulant) or by penetrating the material and binding the components together (penetrating encapsulant).

Engineer: The Engineer is the Owner's on-site representative directly involved with project oversight, abatement inspections, and recordkeeping.

Equipment Room: A contaminated area or room, which is part of the decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.

Excursion Limit: The maximum personal exposure concentration of asbestos fibers for any 30-minute period (1.0 fiber per cubic centimeter of air (f/cc)).

Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to power by hand pressure when dry.

Glovebag: A customized bag for covering friable ACM with gloves to allow work inside the bag.

Hazardous Air Contaminant: Any air contaminant considered by regulatory agencies to cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness and for which no ambient air standard exists.

HEPA Filtered Equipment: High efficiency particulate air filtered equipment with a filter capable of collecting and retaining asbestos fibers.

Industry Standards: Applicable standards of construction industry have the same force and effect on performance of the Work as if copied directly into Contract Documents or bound and published therewith. If overlapping or conflicting requirements are found between standards referenced in these Specifications and non-referenced standards, implement the more stringent requirements.

Mini Enclosure Method: An abatement method that establishes an isolation zone as a sub-area of the total area. Air exchanges requirements are a minimum of four per hour. Decontamination facilities include two air chamber airlock, double suiting and HEPA vacuuming.

Mini Isolation Method: A method of isolation area preparation where only the portion or portions of the total room area containing ACM are isolated. Decontamination facilities and air exchanges are identical to those under standard isolation.

Modified Glove Bag: An abatement method utilizing a standard glove bag within an isolation area under negative pressure of at least four air exchanges per hour.

Mudded Pipe Insulation Section: A section of pipe insulation covering plumbing fittings, usually 12-inch diameter or less.

Negative Air System: A localized and HEPA filtered exhaust system capable of maintaining a constant, low velocity air flow into the Decontamination Enclosure Systems and Work Area from adjacent uncontaminated and unsealed areas.

Non-Friable Asbestos Material: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not release fibers more than the asbestos control limit during any appropriate use, handling, demolition, storage, transportation, processing, or disposal.

Outside Air: The air outside buildings and structures.

Particulate Asbestos Material: Finely divided particles of asbestos material.

PCM: Phase Contrast Microscopy

PLM: Polarized Light Microscopy

Personal Monitoring: Sampling of asbestos fiber concentrations within the breathing zone of an employee.

Regulated Area: An area established by the Contractor to demarcate areas where airborne concentrations of asbestos exceed or can reasonably be expected to exceed the permissible exposure limits. The regulated area may take the form of (a) a temporary enclosure, as required by WAC-296-62-07711, or (b) an area demarcated in any manner that minimizes the number of employees exposed to asbestos.

Removal: All herein specified procedures necessary to strip all ACMs from the designated areas and to dispose of these materials in a permitted facility.

Renovation: The removing or stripping of friable asbestos materials used on any pipe, duct, boiler, tank, turbine, furnace or structural member. Operations in which load supporting structural members are wrecked or taken out are included.

Sealing Agent: A liquid product similar to a Bridging Encapsulant that is applied to surfaces from which asbestos has been removed to prevent release of any residual asbestos fibers into the environment.

Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.

Standard Isolation: An asbestos removal process, which includes enclosing the entire area prior to and during the removal.

Stripping: Removing friable asbestos materials from any pipe, duct, boiler, tank, turbine, furnace, or structural member from any building, structure, facility, or installation.

Structural Member: Any load-supporting member, such as beams and load-supporting walls, or any non-load-supporting member, such as ceilings and non-load-supporting walls.

Supervisor for Full-Scale Asbestos Abatement: A person who has been trained and certified in accordance with a state-approved EPA Asbestos Training Center. Such persons are required for any negative containment abatement.

Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Suspect ACM: Material encountered during removal work that is suspected of being ACM, based on proximity to other ACM, or other indicators.

TEM: Transmission Electron Microscopy.

Time Weighted Average: The TWA is an eight-hour time weighted average airborne concentration of fibers longer than 5 micrometers per cubic centimeter of air.

Visible Emissions: Emissions containing particulate asbestos material that are visually detectable without the aid of instruments. These do not include condensed uncombined water vapor.

Waste Manifest: A record of shipment and disposal of ACM waste.

Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with amended water, and by afterwards disposing of these cleaning tools as asbestos-contaminated waste. Use of HEPA filtered vacuums are recommended during wet cleaning.

Work Area: The area where asbestos-related work or removal operations are performed that is defined or isolated to prevent the spread of asbestos dust, fibers, or debris, and entry by unauthorized personnel.

1-07.34(1)D MATERIALS

Provide disposal drums that are metal or fiberboard with locking ring tops; labeled in accordance with EPA regulation 40 CFR 61.150 (a) (I) (iv) (v).

Warning signs as required by WISHA Chapter 296-62-07721.

If necessary, construct walls separating abatement work area from other areas of fire retardant wood or metal framing to support products barriers in all openings larger than 4 feet by 8 feet. For wood framing, adhere to Uniform Building Code 23-4 and 23-5. Cover the framing with 5/8-inch, type "X" gypsum wall board.

Tape:

Capable of sealing joints of adjacent sheets of plastic sheet and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials

Capable of adhering under dry or wet conditions, including use of amended water

Minimum 2-inch wide

For surfactant (Wetting Agent) use ENVIRO-WET, ASBESTO-WET, NANCOL or equivalent approved by the Engineer including 50 percent polyoxyethylene ether and 50 percent polyoxyethylene or polyglycol ether and mix with water in accordance with manufacturer's directions.

Use encapsulation materials that are non-flammable, non-hazardous (non-solvent or petroleum based) penetrating type.

Use non-hazardous solvent mastic remover capable of effectively removing mastic or other adhesive.

Encapsulation materials must be applied to asbestos containing material to control the release of asbestos fibers. Both "Bridging" and "Penetrating" encapsulation products may be used.

Danger Signs and Labels: Provide danger signs and labeled barricades at all approaches to asbestos work areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide and affix labels to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.

Danger Sign: Vertical format conforming to 29 CFR 1910.145(d)(4) and WAC 296-24-14007(4).

Warning Labels: Provide labels of sufficient size to be clearly legible, displaying the following warning:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

Warning Signs: Provide signs of sufficient size to be clearly legible, displaying the following warning:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

Provide full body disposable protective clothing, including head, body and foot coverings including material impenetrable by asbestos fibers (Tyvek® or equivalent) for workers and authorized visitors in sizes adequate to accommodate movement without tearing.

Provide additional safety and fall protection as necessary to workers and authorized visitors.

Provide non-skid footwear to abatement workers. Ensure disposable clothing is adequately sealed to the footwear to prevent body contamination.

Provide goggles to personnel engaged in asbestos operations when the use of a full-face respirator is not required.

1-07.34(1)E EQUIPMENT

Select respirators from those approved by the Mine Safety and Health Administration (MSHA) or by the National Institute for Occupational Safety and Health (NIOSH). Provide personnel engaged in the removal and demolition of asbestos from negative pressure enclosures and visitors with Type C supplied air respirators, pressure demand, operated with either an auxiliary positive pressure self-contained apparatus or HEPA filters for emergencies.

Equip negative air machines with HEPA filters. Utilize pressure differential equipment continuously from first disturbance of ACM until completion of successful final inspection and final air clearance. Do not discharge unfiltered air outside the work area via air movement system or air filtering equipment. Maintain the exchange rate at no less than four air changes per hour. Continuously monitor and record the pressure differential across isolated barriers using a pressure differential monitoring device. Maintain the pressure differential at a minimum of 0.02 inch water.

A continuous-read strip chart manometer.

Design air compressor to provide air volumes and pressure in accordance with respirator requirements. Compressors must meet the requirements of 29 CFR 1910.134(d), and be equipped with an in-line carbon monoxide monitor. Provide the compressed air system with a receiver of adequate capacity to allow escape of the personnel in case of compressor failure.

Provide miscellaneous equipment, such as scaffolds, in accordance with task requirements.

HEPA filter vacuums:

- With disposable collection bags for the project

- Filters that are 99.97 percent efficient for retaining fibers of 0.3 micron or larger

Respirator Protection

Provide the necessary respiratory protection for the work to be performed. Don respiratory protection equipment and level of protection in accordance with applicable regulations and standards.

Type C respiratory protection is required for abatement activities inside a negative air enclosure. This includes pressure demand, supplied air system with HEPA filter escape respirator.

Half-face respirators may be used for abatement of non-friable ACM and glovebag procedure. The air monitoring results may be used to justify upgrades or downgrades of the respiratory protection. The Site Safety and Health Officer (SSHO) may propose changes to the Engineer for evaluation. Downgrades of respiratory protection will only be allowed after approval by the Engineer. Disposable half-face respirators may not be used.

Properly maintain, clean, and store the respirators.

Provide respiratory protection for authorized visitors wishing to enter a regulated area, including a negative air enclosure, as needed. These include, but are not limited to, inspectors from regulatory agencies and City of Seattle monitors.

1-07.34(1)F CONSTRUCTION REQUIREMENTS

Submittals:

- Asbestos Work Plan

Documentation of air monitoring results:

- Copies of air monitoring sample chains-of-custody

- Analysis reports

Record of abatement activities including disposition of ACM Waste removed from the Site, one copy of every completed waste manifest to verify proper disposal, all Contract changes clearly indicated, project photographs, supervisor's daily field reports, and similar final record documentation within 30 days of completion of the project. Project photographs must show conditions before and after asbestos removal.

Copies of waste profiles, transportation, disposal certification, and signed manifests from the landfill within 30 days of completion. Documentation must include:

- Name and address of landfill

- Name of landfill employee authorized to accept asbestos waste

- Quantity removed from work site

- Quantity disposed of at landfill

Medical surveillance for all personnel working within the control area in accordance with the regulations, as well as workers' post-Contract medical surveillance results

Copies of all applicable permits and notifications required for work, including those for the Puget Sound Clean Air Agency (PSCAA) and Washington Department of Labor and Industries (L&I).

Qualifications

Certifications

1-07.34(1)G QUALITY ASSURANCE

Qualifications:

- Work must be completed by a licensed asbestos removal contractor with the following minimum experience:

 - Satisfactory completion of at least three asbestos abatement projects of similar scope

 - Licensed in the State of Washington

- Contractor personnel performing the work must have the following experience:

 - One-year experience in the task they are to perform

 - Three years or more experience in asbestos abatement

 - Supervisor: Certified asbestos supervisor

1-07.34(1)F CERTIFICATIONS

- Personnel working within the control areas must be certified asbestos workers in accordance with WAC 296-65-005 and WAC 296-65-010.

- The asbestos supervisor must be certified for Full-Scale Asbestos Abatement in accordance with WAC 296-65-007 and WAC 296-65-012.

- Personnel must have respirator fit test certification (qualitative/quantitative) for the respirators they use.

The Engineer may conduct perimeter and clearance air monitoring for quality assurance/quality control (QA/QC) purposes.

The independent qualified testing laboratory for air samples must be a satisfactory participant in the NIOSH Proficiency Analytical Testing (PAT) program and American Industrial Hygiene Association (AIHA) registry.

1-07.34(1)G ASBESTOS WORK PLAN

Present the methods to be used for removal and disposal of ACM. Include a detailed plan of the work procedures to be used in the removal of materials containing asbestos in compliance with all

applicable Federal, State, and local regulations. As a minimum, include the following components in the plan:

- Subcontractor qualifications, experience, and license number
- Work procedures and sequences
- Required Permits and Notifications
- Exposure monitoring plan, include person responsible for air monitoring program and monitoring locations
- Respiratory Protection Program
- Personal Protective Equipment
- Personnel Decontamination Procedures
- Administrative Controls
- Emergency Plan
- Housekeeping Practices
- Engineering Controls/Equipment
- Medical Surveillance Program
- Heat and Cold Stress Monitoring and Management
- Employee Training Certificates and Medical Surveillance
- Certifications and qualifications of the asbestos supervisor/competent person
- Signage
- Laboratory qualification information
- Plans for disposing of ACMs
- Decontamination of Equipment and Areas
- Manufacturers literature on equipment and materials
- Material safety data sheets for all chemicals
- Record Keeping
- Disposal facility information
- Respirator fit test records

Job Hazard Analysis and Hazard Communication (HCSHSP Addendum see 6-mil polyethylene, pre-printed with labels as required by EPA regulation 40 CFR 61.150 (a) (I) (iv) (v), WISHA Chapter 296-62-007721, and OSHA regulation 29 CFR, 1926.1101.

1-07.34(1)H PERFORMANCE REQUIREMENTS

Provide necessary labor, equipment, and material to remove, transport and dispose of ACM in accordance with all Federal, State, and local regulations and standards. Work includes obtaining required permits, notifying appropriate agencies, and performing required air monitoring.

In accordance with State of Washington Administrative Code (WAC) 296- 62- 07721 (1)(c)(iii), a good faith survey of the structure that is to be demolished will be performed by the Owner. A summary of findings shown in the good faith survey report for the structure to be demolished will be provided prior to Notice to Proceed.

1-07.34(1)I EXAMINATION AND PROTECTION

Suspect ACM: If suspect ACM is discovered during demolition activities that is not identified in the asbestos survey, notify the Engineer immediately and stop work in the immediate area. Cordon off area to prevent contamination of clean areas. Allow access for the Engineer to collect a representative sample of the material and submit for testing using PLM, as well as TEM if necessary. Estimate quantity of additional suspect ACM to Engineer for appropriate documentation.

1-07.34(1)J AIR MONITORING

Collect air samples required by regulations for the abatement activity on the project. These may include pre-abatement, area and perimeter, personal, short-term excursion limit, and clearance samples. The Engineer may elect to conduct air sampling for quality assurance/quality control (QA/QC) purposes.

Collect air samples in accordance with established procedures and protocols (i.e. NIOSH Method 7400, as revised). Take air samples at an approximate height of 60 inches from the work floor. Be responsible for regular calibration of the sample pumps.

Submit the air samples to an independent qualified testing laboratory.

Analyze the samples by PCM method. Fiber concentrations detected above the allowable limit may have to be tested by TEM method. Make test results available for review prior to the start of work the next day.

Take pre-abatement samples prior to start of abatement activities. Obtain the sample during a period where there are no dust-creating activities. If the fiber count exceeds 0.01 f/cc, then re-sample the area prior to completion of enclosure.

Ensure the area samples inside a negative air enclosure do not exceed 1.0 f/cc. If such concentration is detected, stop work immediately to evaluate the work procedures. Clean the work with HEPA vacuuming and wet cleaning. Take another sample to demonstrate that the fiber count is below 0.01 f/cc. The work may start up after the cleaning has been completed and in accordance with procedural revisions that may be agreed upon with the Engineer.

Take the perimeter air samples upwind and downwind of the regulated work area. Obtain the perimeter samples for a negative air enclosure at the personnel decontamination station, waste loadout, and HEPA/negative air machine exhaust(s). If the fiber count exceeds 0.01 f/cc, the Engineer may request analysis of the sample by TEM procedure; the Engineer may request to clean the perimeter area prior to start of a shift.

Take personal and short-term exposure limit (STEL) samples as required by the activities and the regulations. Post the personal air sample test results within 24 hours from collection.

Take the clearance air sample at the completion of abatement activities inside of the regulated area prior to inspection, encapsulation, and tear-down. Take additional clearance samples if the area fails inspection, requiring additional abatement. For acceptable fiber count, use the pre-abatement result or less than 0.01 f/cc, whichever is less.

If there is a conflict between the Contractor sample test results and the Engineer's QA/QC sample test results, re-take the sample. Repeat if necessary, until the test results are in the same range, as determined by the Engineer.

Limit the maximum flow rate of collecting air samples to 2.5 liters/minute for personal samples and 10.5 liters/minute for inside and outside regulated work area air samples.

1-07.34(1)K PREPARATION

Notifications: Prepare for Owner submission all necessary permits and notifications, amendments, and request for alternate means of compliance to the regulatory agencies including, but not limited to, Puget Sound Clean Air Agency (PSCAA) and Washington Department of Labor and Industries (L&I). Provide timely notification of asbestos removal, abatement, hauling and disposition as may be required by such agencies. Have a copy of all said permits and notifications at the Site.

Utilities:

Provide temporary power and lighting in the area where abatement is taking place and ensure safe installation of temporary power sources and equipment in accordance with applicable electrical code requirements. Use ground fault interrupters to service any temporary and existing power sources utilized during project performance. Refer to OSHA requirements for temporary lighting under the construction standard, 29 CFR 1926.56 and WAC 296-62-3120 (Illumination), 1926.400 (Electrical Standards), and 1926.401 (Temporary Lights).

Provide necessary water for the work. This includes potable water for consumption and shower, if necessary, and for abatement activities. If a source of water is available on Project Site, use the source with approval from the Resident Engineer.

Properly dispose of wastewater generated during the project. Water that comes in contact with asbestos must be containerized and disposed of offsite at an approved disposal facility. Water used during asbestos abatement must not flow off of the site. Stormwater must be treated in accordance with requirements of Section 1-07.3, Management and Disposal of Waste.

Be responsible for utility connections and subsequent disconnects. This includes repairs that may be necessary to restore the connection.

All conduit joints, junction boxes, control panels, and associated equipment in the work areas must be protected from amended water. The Contractor is responsible for all electrical safety.

Preparation of The Work Area

Post barrier tape and caution signs meeting the specifications of WISHA chapter 296-62-07711 at the locations and approaches to the locations where airborne concentrations of asbestos may be expected to exceed the pre-abatement concentrations. Signs must be posted at a distance sufficiently far enough away from the work area to permit an employee to read the sign and take the necessary protective measures to avoid exposure.

Pre-clean, remove furnishings and install drop cloths using HEPA filtered vacuums or wet cleaning methods as appropriate. Do not use methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during the pre-cleaning phase.

1-07.34(1)L ENCLOSURE SYSTEMS

Build suitable framing and line with 6-mil polyethylene sheeting sealed with tape at lap joints in the plastic for enclosures and decontamination enclosure system rooms.

For access between contaminated and uncontaminated rooms or areas, use an airlock. Use a curtained doorway for access between any two rooms within the decontamination enclosure systems. Provide a minimum distance between two curtained doorways of 6 feet.

Decontamination Enclosure System: Construct a decontamination enclosure contiguous to each isolation area including three totally enclosed chambers as follows:

An equipment/waste loadout decontamination station including a wash-down room, holding room, and clean room for removal of equipment and materials from work area. Do not allow personnel to enter or exit isolation area through this unit.

A shower room with two curtained doorways, one to the equipment room and one to the clean room. Supply the shower with at least one shower with hot and cold or warm water. Provide hot and cold water for showering. Pay careful attention to the shower enclosure to ensure against leaking of any kind. Ensure a supply of soap at all times in the shower room. Filter shower water through a 5-micrometer-filter system prior to disposal.

A clean room with one curtained doorway into the shower and one entrance or exit to non-contaminated areas of the building. Provide sufficient space in the clean room for storage of the workers' street clothes, towels, and other non-contaminated items.

Provide and post in the Equipment Room and the Clean Room the decontamination and work procedures to be followed by workers, as describes in this Special Provision.

Ensure workers and authorized visitors, upon entering the job site, remove street clothes in the clean change room and put on the required PPE.

Ensure workers and authorized visitors, each time they leave the work area, remove gross contamination from clothing before leaving the work area, proceed to the equipment room and remove all clothing except respirators. Still wearing the respirator, proceed naked to the showers, clean the outside of the respirator with soap and water while showering, remove the respirator, and thoroughly shampoo and wash themselves. Remove filters and wet them and dispose of filters in the container provided for the purpose, and wash and rinse the inside of the respirator. Ensure that following showering and drying off, each worker and authorized visitor proceed directly to the clean change room and dress in clean clothes at the end of each day's work, or before eating, smoking, or drinking. Store contaminated work footwear in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from equipment and access area. Dispose contaminated protective clothing in receptacles for disposal with other asbestos contaminated material.

Work in a mini-enclosure area may be conducted wearing a double suit of protective clothing over street clothes. Decontaminate by HEPA-vacuuming out suit completely and removing outer suit in the inner airlock chamber and proceeding to outer airlock to remove inner suit. Completely HEPA-vacuum and wet wipe clean waste containers before removing from the inner airlock. Then double bag waste containers in the outer airlock and again HEPA-vacuum and wet clean before removing from the outer airlock.

Ensure workers removing waste containers from the decontamination enclosure enter the shower room wearing a respirator and dressed in clean coveralls.

Do not allow workers to eat, drink, smoke, or chew gum or tobacco at the work site except in the established clean room.

Ensure workers are fully protected with appropriate respirators and protective clothing from the time of first disturbance of ACMs prior to commencing actual asbestos abatement and until final clean-up is completed.

Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.

Visually inspect enclosures at the beginning of each work period. Dispersive smoke methods will be used to test effectiveness of barriers. Repair all damage immediately.

Clean external surfaces of contaminated containers and equipment thoroughly by wet cleaning before moving such items into the decontamination enclosure system for final cleaning and removal to uncontaminated areas.

1-07.34(1)M REMOVAL OF ASBESTOS

Spray asbestos material with amended water, using spray equipment capable of providing a "mist" application to reduce the release of fibers. Saturate the material sufficiently to wet it thoroughly. Spray the asbestos material repeatedly during work process to maintain wet condition and to minimize asbestos fiber dispersion.

Saturated asbestos-containing material must be removed in manageable sections. Containerize removed material immediately and prior to moving it to a new location for continuance of work.

Large components removed intact may be wrapped in 2 layers of reinforced 6-mil polyethylene sheeting secured with tape for transport to the landfill.

For friable and non-friable material, remove visible accumulations of asbestos material and debris. Wet-clean all surfaces within the work area.

For friable and non-friable materials, ensure the windows, doors, and HVAC vents remain sealed and all HEPA filtration negative air pressure systems, air filtration, and decontamination enclosure systems remain in service during cleaning operations.

For friable materials, clean all surfaces in the work area and other contaminated areas with water or with HEPA vacuum equipment. After cleaning the work area, allow surfaces to dry completely (6 hours minimum) and again wet-clean or clean with HEPA vacuum equipment surfaces in the work area. After completion of the second cleaning operation and after the surface has dried, a complete visual inspection will be performed of the work area to ensure that the work area is dust free. If the inspection indicates that removal and clean-up performance is satisfactory as determined by the Engineer, the work area will be sampled for final clearance.

Where encapsulant is used following a period sufficient to allow the encapsulant to dry completely, remove plastic sheeting covering walls and floors and dispose of as ACM waste. Surfaces exposed by the removal of plastic sheeting on walls and floors must be thoroughly cleaned using acceptable methods. If underlying surface cleaning is not satisfactory as determined by the Engineer, reclean all surfaces. Leave critical barriers including plastic sheets covering doors, vents, windows, air plenum grilles, and the decontamination barriers in place during final air testing. If project performance is not satisfactory as determined by the Engineer, reclean all surfaces.

After completion of stripping work, wire brush and wet sponge or clean surfaces from which asbestos has been removed, or clean by an equivalent method to remove visible material. Keep surfaces being abated wet during this work.

Place removed ACM in labeled disposal bags of 6-mil thickness immediately upon removal. Thoroughly clean the external surfaces of bags by wet sponging in the designated area of the work area. Place the waste bags in a second, clean 6-mil bag at the waste loadout for disposal. Ensure the bags do not have tears and are properly sealed to minimize the release of fibers. Do not drop or drag the waste bags. Ensure that containers are removed from the regulated area by workers who have entered from uncontaminated areas dressed in clean coveralls. Ensure that workers do not enter from contaminated areas into the clean area during any phase of project performance.

Bag and secure ACM in a locked and properly labeled container at the end of each workday. Do not leave any debris, unsecured equipment, or tools on the work site past the end of each workday. Each bag of asbestos waste must be pre-labeled in accordance with OSHA and DOT regulations.

Conduct work in a manner that prevents spread of ACM. Be responsible for the cost associated with cleanup of ACM spread outside the work areas.

For mini-enclosures and glovebag of ACM, other than thermal system insulation, use a HEPA vacuum to maintain a negative pressure.

The waste bags generated during a roofing abatement project may be slid through an enclosed chute directly into a lined waste bin. Otherwise, lower waste bags to the ground. Under no circumstances allow waste bags to be dropped.

Asbestos-containing wallboard systems, which contain less than one percent ACM as a composite of the drywall and associated joint compound, must be removed by mechanical means, where practicable. If removal is accomplished by hand, then wet, non-aggressive methods and HEPA filtered vacuums must be used followed by a prompt cleanup. For removal by hand, asbestos awareness and hands-on training as prescribed in WAC 296-62-07722(5) is required for workers. Supervision is required by a competent person as defined in WAC 296-62-07703.

Include sealed drums and equipment used in the work area in the clean-up and removal from work areas, via the decontamination enclosure system, at an appropriate time in the cleaning sequence.

Final inspections will be conducted by the Engineer on each work area. When a final inspection and air monitoring determines that the area is free of visible accumulation of dust and ambient air is within control limits for "clean air" – (less than 0.01 f/cc) – remove all decontamination enclosure systems for the cleaned area and thoroughly wet clean. Dispose of materials from the equipment room and shower as contaminated waste. Ensure the Contractor and Engineer carry out a final check to ensure that no dust or debris remains on surfaces, as a result of dismantling operations.

1-07.34(1)N DISPOSAL OF ACM WASTE

Double-bag gross asbestos debris by the end of each workday. Dispose of ACM Waste as the work progresses to prevent exceeding available storage capacity on site. Provide caution signs as specified herein. Remove sealed and labeled containers as asbestos waste and dispose of containers at an authorized disposal site in accordance with the requirements of the Puget Sound Clean Air Agency. Transport in a vehicle compartment completely double-lined with 6-mil polyethylene sheeting and dispose of at the permitted disposal site. Submit documentation including name and address of landfill, name of landfill employee authorized to accept asbestos waste, quantity removed from work site, and quantity disposed of at the landfill.

For hauling and disposal, comply with 40 CFR 61, Subpart M, and state, regional, and local standards. Ensure workers unloading material wear appropriate PPE when handling asbestos materials at the disposal site.

Only undamaged and sealed plastic bags will be disposed of in the landfill. If the bags have been broken or damaged, place the damaged bags in a sealed drum and dispose.

1-07.34(1)O MEASUREMENT

Measurement for "Remove and Dispose of Asbestos Containing Materials" is by force account.

1-07.34(1)P PAYMENT

The Bid Item price for "Remove and Dispose of Asbestos Containing Materials" must include all costs for the work required to complete the testing, removal, handling, transportation, and disposal of asbestos containing materials from structures scheduled for demolition. Payment will be made on force account. Payment is dependent upon what ACM is determined to be present in the structure to be demolished.

1-08 PROSECUTION AND PROGRESS

1-08.1 PRELIMINARY AND ON-GOING MATTERS (GSP 8-23-16)

1 08.1(2)A PRECONSTRUCTION CONFERENCE

Insert the following new item 10. into this Section:

10. To review the requirements of the CWA (Sections 1-07.10, 1-07.11, and 1-07.12).

1-08.1(3) SUBCONTRACTING (GSP 04-09-18)

Insert the following paragraph after the fourth paragraph in this Section:

Before any Subcontractor of any tier may start Work, the Subcontractor must submit the Pre-Job Package, per Section 1-07.10, to the Contractor and attend a pre-job conference 2 weeks prior to starting Work, but not more than 90 days prior to starting Work. The Contractor must provide the Community Workforce Agreement and Priority Hire requirements and aspirational goals to potential bidders before bidding and include these requirements in all Subcontracts.

1-08.1(4) HOURS OF WORK (GSP 05-20-15)

Delete and replace the first sentence of the first paragraph with the following:

The normal hours of Work must be between 7:00 AM and 7:00 PM on any Working Day and must consist of 8 hours, exclusive of a lunch period of one-half hour.

Supplement the end of the second paragraph of this Section with the following:

In accordance with the requirements of the CWA, the Contractor must provide adequate notice to Unions of any change in working hours.

1-08.3 CRITICAL PATH SCHEDULE AND SCHEDULE CONSTRAINTS

Replace Section 1-08.3(1) with the following:

1-08.3(1) CRITICAL PATH SCHEDULE (SP 02-04-20)

1-08.3(1)A GENERAL REQUIREMENTS

The scheduling of the Work is the responsibility of the Contractor. The Engineer's review and acceptance of any Critical Path Schedule does not transfer any of the Contractor's responsibilities to the Owner or to the Engineer. Acceptance implies only that the Engineer has determined that the Critical Path Schedule submittal with any noted exceptions is within reasonable conformity to these specifications. Acceptance of any schedule does not relieve the Contractor of his responsibilities to adjust labor and equipment forces or work schedules and provide sufficient materials to complete the work within the Contract Time.

Except for 3-week look-ahead schedules, all schedules must meet these General Requirements.

The construction of this project will be planned and recorded with a conventional Critical Path Method (CPM) schedule. The Critical Path is the series of activities in a project schedule that will take the longest total amount of time to complete. Therefore, at any point in time, the critical path will be the path with the least amount of total float. The critical path does not have to follow the same logic path from start to finish and does not have to have zero total float.

Total Float is the total number of Days that a scheduled activity can be delayed without affecting the intermediate or Physical Completion Date.

The baseline Critical Path Schedule and each Critical Path Schedule update must:

1. Show all activities necessary to complete the Work.
2. Define activities in small enough durations that the Work is described in recognizable detail. Excluding the Preliminary CPM Schedule, the maximum duration for any one activity must be 20 Working Days or otherwise accepted by the Engineer.
3. Show all preceding and succeeding activities for each activity.
4. Show the Critical Path.
5. Comply with all order of Work requirements included in the Contract.
6. Show durations in Working Days.
7. Show Contract milestones including the following:
 - a. Notice to Proceed Date,
 - b. Substantial Completion Date,
 - c. Physical Completion Date,
 - d. Other milestones defined in the Special Provisions of this Contract.
8. Show Contractor work activities conforming to and allow time for notifications and reviews.
9. Include a written narrative describing the project schedule, the critical path activities, and resources for major work activities.
10. Show procurement, manufacture and delivery activities for significant material items of Work that affect the schedule.
11. Show significant Owner activities or supplied materials.
12. Show required submittals for significant activities and specified review time.
13. Show significant elements of the Stormwater Pollution Prevention Plan. These elements may include but are not limited to the installation and removal of erosion, sedimentation controls, and stormwater control.
14. Show subsurface obstruction verification in advance of underground Work for foundations and utility improvements and prior to the submission of Shop Drawings specified in Section 8-32.1(3).
15. Show significant activities for projects listed in Section 1-05.4 that require coordination.

16. All activities must have at least one predecessor and one successor, except Contract start and finish milestones.
17. Maintain a majority of Finish to Start relationships.
18. No use of constraints other than those defined in the Contract Documents without prior acceptance by the Resident Engineer.
19. Leads or lags must not be used.
20. Calendars must be maintained at a Contract level.
21. Activity codes must be maintained at a Contract level.
22. Each activity must be identified with activity codes. At a minimum the following activity codes must be used and maintained: party responsible for performing the work, phasing/stage of the work, and area or location of the work.

Unless otherwise specified in the Contract, the Contractor must allow the Engineer a reasonable amount of time to perform his activities. Reasonable will be defined as “customary or normal” for the type of work involved.

Float available in the Critical Path Schedule, at any time, is not be considered for the exclusive use of either the Contractor or the Engineer. However, any float used by the Owner that is later needed by the Contractor and results in delay to the critical path will be considered an excusable non-compensable delay.

If the Engineer deems that the Critical Path Schedule is not within reasonable conformity to these specifications, it will be returned to the Contractor for correction and resubmittal. The Engineer's review and acceptance of any Critical Path Schedule does not transfer any of the Contractor's responsibilities to the Owner.

The Contractor, or its Subcontractor(s), must not deviate from the projected start and completion times for major phase(s) of the Work shown in the Engineer's accepted Critical Path Schedule without providing at least 14 Days advance notice to the Engineer. Failure to notify the Engineer of a deviation from projected start and completion times for major phases of the Work may impact costs to the Owner, and most likely will result in cost of additional community outreach done to communicate change in schedule to the public. Resulting costs due to this “failure to notify” are the responsibility of the Contractor. The Engineer is authorized to deduct these costs from any money due or to become due to the Contractor.

1-08.3(1)B SCHEDULE TYPES

1-08.3(1)B1 PRELIMINARY CPM SCHEDULE

The Contractor must prepare and submit a preliminary critical path schedule at the preconstruction conference. The preliminary schedule must show the first 30 Days of Work in reasonable conformity to these Specifications. The remaining schedule must show the critical path schedule using broad Work activities, and major milestones and durations for the purpose of review and discussion at the preconstruction conference.

1-08.3(1)B2 BASELINE CPM SCHEDULE

The Contractor must submit for Engineer's review and acceptance a baseline Critical Path Schedule no later than 30 Days after receipt of the Notice to Proceed. The baseline schedule will not be accepted unless it satisfies Section 1-08.3(1)A General Requirements.

Following the Engineer's review of the baseline CPM schedule and within 7 Days of the Engineer receiving the submittal or some other mutually agreed upon time, the Engineer and the Contractor must meet for joint review, correction and adjustment of the initial baseline CPM schedule. After this meeting, but within 7 Days or some other mutually agreed upon time, the baseline schedule must be resubmitted to the Engineer showing the agreed upon adjustments. Adjusted baseline CPM schedules submitted by the Contractor will be reviewed by the Engineer and returned to the Contractor within 7 Days of the Engineer's receiving the submittal. If necessary, the joint review and adjusted schedule submittal process must be repeated. However, the schedule must be finalized within 30 Days after Notice to Proceed.

1-08.3(1)B3 CPM SCHEDULE UPDATE

At the discretion of the Engineer, progress meetings may be held monthly for the purpose of updating the Critical Path Schedule. Progress will be reviewed to verify actual start and finish dates, remaining duration and percent complete of uncompleted activities, and any proposed revisions to the schedule. It is the Contractor's responsibility to provide the Engineer with the status of activities at this progress meeting and prepare schedule updates based on this information once it has been verified and agreed upon. The updated Critical Path Schedule must be resubmitted should it not contain the agreed upon information.

The Contractor must submit Critical Path Schedule updates monthly, and upon Physical Completion, the final as-built schedule. A written narrative describing the project schedule status, the critical path and any revisions to the schedule must be included with the updates.

The Contractor must submit a supplemental Critical Path Schedule update within 7 Days of Substantial Completion.

The Contractor must submit a supplemental Critical Path Schedule update within 7 Days of a request by the Engineer.

Critical Path Schedule updates must show:

1. Update datum (current or update date), actual start and finish dates of all activities completed prior to the update datum, actual start dates and percent complete of all current activities, and projected start and finish dates of all activities required to complete the project.
2. For each activity, any changes to the preceding or succeeding activities logic.
3. Any new activity or additional activity as a result of the splitting of an existing activity.
4. Actual or projected milestone dates.

Critical Path Schedule updates must be clearly labeled and must include the update datum.

Unresolved issues or disputes with asserted time effects may be reflected in a schedule update by assuming no time extension and showing the effects to follow-on activities that will be necessary to complete the project within the currently allotted Contract Time. If Work cannot be completed within the current Contract Time, the schedule must reflect the earliest completion date practicable and address the reason that the Work cannot be completed within in the current allotted time in a narrative. Acceptance of late completion schedules is at the discretion of the Engineer and will not relieve the Contractor from Liquidated Damages.

1-08.3(1)B4 LOOK-AHEAD SCHEDULE

For each week that Work will be performed, the Contractor must submit a look-ahead schedule showing the Contractor's, and all subcontractors' proposed Work activities and any Owner activities or supplied Materials for the next 4 weeks. Include the description, duration and sequence of Work, the planned hours of Work, changes to street, driveway or sidewalk access and potential utility interruptions. Also describe subsurface obstruction verification in advance of Work for foundations and utility improvements. For the first schedule, Week 1 should begin with Notice to Proceed. The 4-week look-ahead may be reduced to a 3-week look-ahead with the approval of the Engineer. Submit the look-ahead schedule to the Engineer by the midpoint of the week preceding the scheduled Work or some other mutually agreed upon submittal time. Unless otherwise specified in the Contract, the Contractor must notify the Engineer at least 2 Working Days in advance of changing Work and any Work affecting any street, driveway or sidewalk access or utility service as shown in the look-ahead schedule; an updated look-ahead schedule must be submitted with the notification.

1-08.3(1)C SUBMITTALS

The Contractor must submit one (1) copy of the Critical Path Schedule logic diagram (Gantt chart), Schedule Report (data printouts), and any narrative; and one (1) full electronic copy in selected CPM software format. The Critical Path Schedule logic diagram (Gantt chart - 22 in. x 34 in minimum), Schedule Report (data printouts), and narrative must also be submitted in PDF format.

1. The logic diagram must be plotted on sheets with a horizontal time scale that is the project calendar. The plotted length of each activity must correspond to its duration and dates on the horizontal time scale. Logic diagrams that are not plotted according to a horizontal time scale will not be acceptable. The diagram must be furnished on full size 22 in. x 34 in. sheets or as accepted by the Engineer. Activity information must include activity numbers, activity descriptions, durations, total float, and projected or actual start and finish dates. The diagram must clearly show the sequence and interdependence of all activities required for complete performance of all items of Work under the Contract and must indicate the critical path
2. The schedule report must provide the following information for each activity: activity number, activity description, activity calendar, original duration, remaining duration, percent complete, projected or actual start and finish dates, and total float. The schedule report sorted by activity number
3. The electronic copy of the Critical Path Schedule must be compatible with P6, Suretrack or Microsoft Project. The Contractor must submit a functional and complete CPM schedule electronically via email, on compact disk (CD), or other medium accepted by the Engineer.

The Contractor must allow 14 Days for the Engineer's review. If rejected by the Engineer, the Contractor must resubmit the document, allowing an additional 14 Days for each review required until accepted by the Engineer.

The Owner will not issue the Certificate of Completion unless the final as-built Critical Path Schedule is received and accepted.

1-08.3(1)D EARLY COMPLETION

The Engineer allocates resources to a Contract based on the Contract Time. The Engineer will review and accept a Critical Path Schedule indicating an early Physical Completion Date but cannot guarantee Owner resources will be available to meet the accelerated schedule. No additional compensation or time will be allowed if the Contractor is not able to meet its accelerated schedule due to the unavailability of Owner resources or for other reasons beyond the Engineer's control.

1-08.3(1)E MEASUREMENT AND PAYMENT (GSP 03-09-11)

Compensation for the cost necessary to complete the Work described in this section will be made at the Bid item price for "**Critical Path Schedule Update, Min Bid =\$1500**", per each.

The Bid item price for "Critical Path Schedule Update, Min Bid =\$1500", includes all costs for the Work specified in Section 1-08.3(1). Payment will be made based on the following measurement criteria:

If the "base Critical Path Schedule" is accepted by the Engineer within 30 Days of Notice to Proceed, the schedule will be measured and paid as 3 Critical Path Schedule updates (3 each). If not acceptable to the Engineer within 30 Days of Notice to Proceed the Contractor is not relieved of the requirement to provide a base CPM; but once accepted it would be measured and paid as a single Critical Path Schedule update (1 each). Note: no adjustment of Contract Time will be considered prior to the acceptance of the base CPM.

Each updated Critical Path Schedule or supplemental Critical Path Schedule accepted by the Engineer within specified time will be measured and paid as a single Critical Path Schedule update (1 each).

If the monthly Critical Path Schedule update is not accepted by the Engineer prior to the next scheduled monthly update, no measurement or payment will be made for that Critical Path Schedule update. The As-built CPM will be considered a Critical Path Schedule update for measurement and payment.

Should there be an extension to Contract Time by the Owner and additional Critical Path Schedule updates are required, the Critical Path Schedule updates will be measured and paid as indicated above.

No measurement or payment will be made for Critical Path Schedule updates resulting from Contractor caused delays or Contractor changes to the scheduling of Work; if these required updates are not submitted and approved before the next monthly update, than a deduction of a single Critical Path Schedule update (1 each) will be made.

No measurement or payment will be made for preliminary or look-ahead schedules.

No measurement or payment will be made for monthly Critical Path Schedule updates not required.

A minimum Bid as indicated on the Bid Form has been established for the item "Critical Path Schedule Update". For minimum Bid see Section 1-03.1(1).

1-08.3(2) SCHEDULE CONSTRAINTS

Replace this Section with the following:

1-08.3(2) SCHEDULE CONSTRAINTS (SP 12-19-19)

The Contractor's CPM schedule must reflect constraints imposed by applicable laws and regulations, and those specified in the Contract. Constraints including but not limited to the following:

1. Submittal requirements and review durations (see Specification Section 1-05.3)
2. Traffic Control restrictions (see Specification Section 1-10.2(5))
3. Environmental restrictions (see Specification Section 1-07.5, 1-07.15 and permits)
4. Safety restrictions (see regulations and permits)
5. Phasing requirements (see Specification Section 1-08.3(3)).
6. Property Access requirements (see Specification Section 1-10.2(5)D)
7. Work Area restrictions (see Specification Section 1-05.14)

1-08.3(3) RESERVED

Replace this Section with the following:

1-08.3(3) PHASING REQUIREMENT (SP 12-19-19)

Add 2-F The Contractor's preliminary CPM schedule must reflect the following construction activities with specific dependencies and interrelations.

Replace Item 1 with the following:

1. Access to the site boundaries shown on the Alaskan Way Elliott Way (S King St to Bell St) Drawing SG02 (see Appendix) will be provided by September 8, 2020.

- ~~1. Access to the site boundaries shown on the Alaskan Way Elliott Way (S. King St. to Bell St) Drawing SG02 (see Appendix) will be provided by June 1, 2020.~~
2. The Contractor may restrict access to the Public Storage building north side loading docks subject to the following:
 - Access to Public Storage building north side loading docks must be opened on, or before 175 Working Days after NTP.
 - The maximum duration of restricted access is 150 Working Days.
 - Written notification must be provided to the Engineer 20 Working Days before access is restricted.
3. Additive 1: The Marion Street Pedestrian Bridge shafts must be completed by December 18, 2020.
4. Additive 2: The demolition of portions of the existing Marion Street Pedestrian Bridge must occur prior to construction of the Marion Pedestrian Bridge shafts.

1-08.4 NOTICE TO PROCEED AND PROSECUTION OF THE WORK

Union Street Pedestrian Bridge
Division 1: General Requirements

Replace the first sentence of the second paragraph with the following:

Replace this Section with the following:

The Contractor must commence construction activities on the Project Site within 10 Calendar Days of the Notice to Proceed Date, unless otherwise approved in writing.

1-08.4 NOTICE TO PROCEED AND PROSECUTION OF THE WORK (GSP 10-28-09)

After the Execution Date of the Contract is established, notice is given to proceed on work for submittals, and for procurement of material critical to Project completion within Contract Time. The Contractor must not commence with any other work until the Notice to Proceed has been given by the Engineer. ~~For this Project, Notice to Proceed will be given no later than August 17, 2020 unless otherwise agreed.~~ The Contractor must bear all risks for any portion of the Work begun outside such areas other than work on submittals and procurement after execution of the Contract.

~~The Contractor must commence construction activities on the Project Site within **10** Calendar Days of the Notice to Proceed Date, unless otherwise approved in writing. Contract time begins on the Notice to Proceed Date~~

The Contractor must diligently pursue the work to the Physical Completion Date within the time specified in the Contract. Voluntary shutdown or slowing of operations by the Contractor does not relieve the Contractor of the responsibility to complete the work within the time(s) specified in the Contract

1-08.8 TIME EXTENSIONS AND DELAYS ENTITLEMENT AND COMPENSATION

1-08.8(2) NON-EXCUSABLE DELAYS (GSP 04-09-18)

Supplement this Section with the following:

The Contractor's failure to allow adequate time to comply with the requirements and processes of the CWA and Priority Hire are non-excusable delays.

1-08.9 LIQUIDATED DAMAGES

Replace this Section with the following:

1-08.9 LIQUIDATED DAMAGES (SP 02-25-20)

Time is of the essence of the Contract. Delays inconvenience the traveling public, obstruct traffic, interfere with and delay commerce, and increase risk to Highway users. Delays also cost tax payers undue sums of money, adding time needed for administration, Engineering, inspection, and supervision.

Because the Owner finds it impractical to calculate the actual cost of delays, it has adopted the following formula to calculate liquidated damages for failure to complete the physical Work of a Contract or Milestone on time.

Accordingly, the Contractor agrees:

1. To pay (according to the following formula) liquidated damages for each working day beyond the number of Working Days established for each Milestone and Physical Completion, and
2. To authorize the Engineer to deduct these liquidated damages from any money due or coming due to the Contractor.

LIQUIDATED DAMAGES FORMULA:
$$LD = \frac{0.15 * C}{T}$$

where: LD = liquidated damages per Working Day (rounded to the nearest dollar)

C = original Contract amount (Award amount for Completion) and the combined sum total of Additive 1 and 2 for Milestone 1.

T = original time for each Milestone or Physical Completion (Working Days)

When the Contract work has progressed to the extent that the Owner has full use and benefit of the facilities, both from the operational and safety standpoint, and only minor incidental work, replacement of temporary substitute facilities, or correction or repair remains to physically complete the total Contract, the

Engineer may determine the Contract work or work of the Milestone is substantially complete. The Engineer will notify the Contractor in writing of the Substantial Completion Date. For overruns in Contract Time occurring after the date so established, the formula for liquidated damages shown above will not apply. For overruns in Contract Time occurring after the Substantial Completion Date, liquidated damages will be assessed on the basis of direct engineering and related costs assignable to the project until the actual Physical Completion Date of all the Contract work. The Contractor must complete the remaining work as promptly as possible. Upon request by the Engineer, the Contractor must furnish a written schedule for completing the physical work on the Contract.

Liquidated damages will not be assessed for any Days for which an extension of time is granted. No deduction or payment of liquidated damages will, in any degree, release the Contractor from further obligations and liabilities to complete the entire Contract.

1-09 MEASUREMENT AND PAYMENT

1-09.6 FORCE ACCOUNT

Add the following Section:

1-09.6(8) FORCE ACCOUNT INCLUDED IN THE BID FORM (GSP 10-10-08)

The Owner has estimated and included in the Bid Form, dollar amounts for all items to be paid per force account, only to provide a common proposal for Bidders. All such dollar amounts are to become a part of the Contractor's total Bid. However, the Owner does not warrant expressly or by implication that the actual amount of work will correspond with those estimates. Payments will be made on the basis of the amount of work actually authorized by the Engineer.

1-09.7 PAYMENT FOR MOBILIZATION (GSP 08-15-18)

Delete items 1-3 and replace with the following:

1. When 5 percent of the Contract Price (with exclusions applied) is earned from the original Contract Bid Items, the lower of either 50 percent of the amount Bid for mobilization or 5 percent of the Contract Price (with exclusions applied) will be paid.
2. When 10 percent of the Contract Price (with exclusions applied) is earned from the original Contract Bid Items, the lower of either 100 percent of the amount Bid for mobilization or 10 percent of the Contract Price (with exclusions applied) will be paid.
3. Any remaining costs for the mobilization Bid Item will be paid following the project's Physical Completion Date.

1-09.9 PAYMENTS

1-09.9(3) OWNER'S RIGHT TO WITHHOLD AND DISBURSE CERTAIN AMOUNTS (GSP 12-11-17)

Supplement item 7. of this Section with a new item m:

- m. Failure of the Contractor to comply with the requirements of the CWA or Priority Hire. See Sections 1-07.10, 1-07.11, and 1-07.12.

1-09.11 PROMPT PAYMENT TO SUBCONTRACTORS AND PERSONS SUPPLYING LABOR, MATERIALS AND SUPPLIES

1-09.11(7) SUBCONTRACTOR CLAIMS AGAINST BONDS (GSP 08-15-18)

Delete the last paragraph in this Section and replace it with the following:

To obtain a copy of a bond or notify the Owner of a lien or claim against the Contractor's Payment and Performance Bond or the Retainage Bond, send the request or notification to the PC Director at the PC mailing address, see Section 1-02.9(1).

1-10 TEMPORARY TRAFFIC CONTROL

1-10.1 GENERAL

1-10.1(2) MATERIALS (GSP 02-28-19)

Delete the row for "Barrier Drums" from the table.

1-10.2 TRAFFIC CONTROL MANAGEMENT

1-10.2(2) TRAFFIC CONTROL MANAGER (SP 02-06-20)

Supplement the list of responsibilities with the following:

9. Attending monthly downtown HUB coordination meetings.
10. Coordinating implementation of approved Traffic Control Plans, Contractor Haul Routes, use of Contractor Staging Areas, with City of Seattle and other contractors listed in Section 1-05.14.
11. Ensure that milestone activities for each traffic control setup are included in the Master Schedule and weekly look ahead schedules and that the Master Schedule shows the availability of Contractor Haul Routes, and availability of Contractor Staging Areas as shown in the Staging Plans. The schedule must show how each of these milestone activities interfaces with other Contract Work and with other projects as specified in Section 1-05.14. The schedule must be updated monthly or more often if changes in the Work affect the schedule.
12. Provide a designee to coordinate with adjacent business owners and their lessees and project representatives. Designee must serve as the Contractor's point of contact to provide egress, access, and delivery assistance as described in Section 1-10.2(5)D is provided. Designee must serve as the Contractor's point of contact to coordinate outreach communications with the City Communications lead. Meet with all adjacent business owners on a weekly basis to communicate the contractor's 3-week look ahead activities.

1-10.2(5)B CONFORMANCE TO ESTABLISHED STANDARDS (GSP 08-23-16)

Replace first paragraph with the following:

Flagging, signs, and all other traffic control devices and procedures furnished or provided must conform to the standards established in the current version (in effect on the Day the Work was advertised for Bid) of the "Manual on Uniform Traffic Control Devices for Streets and Highways as modified and adopted by WSDOT (hereinafter referred to as the "MUTCD"), as supplemented by the current edition of The City of Seattle "Traffic Control Manual for In-Street Work" (hereinafter referred to as the "Seattle Traffic Control Manual" (STCM)), the most current approved edition of the Public Rights-of Way Accessibility Guidelines (PROWAG), and such additional requirements as may be included in the Contract. The Revised Code of Washington (RCW) 47.36, Traffic Control Devices, requires traffic control devices along city streets to conform to the WSDOT adopted standards to the extent possible.

Add the following after the third paragraph:

The most current edition of the Public Rights-of-Way Accessibility Guidelines (PROWAG) may be accessed at the United States Access Board website at:

<https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/background/revised-draft-guidelines>

1-10.2(5)C GENERAL TRAFFIC CONTROL RESTRICTIONS (GSP 05-20-15)

4. Parking

Supplement the end of the last paragraph under 4. Parking with the following:

Unless provided for in the Project Manual, dedicated parking within a three block radius is not available. As required under the CWA Article II (Project Conditions), the Contractor shall provide for employee parking through project-dedicated parking, transportation from a designated Contractor-provided parking location, or pay a negotiated amount for parking compensation. The cost of Contractor-provided employee parking shall be included with the various items of the Contractor's Bid.

1-10.2(5)D RESERVED

Replace this title and section with the following:

1-10.2(5)D PROJECT SPECIFIC TRAFFIC CONTROL RESTRICTIONS (SP 07-24-2019)

The traffic control plans must be submitted and implemented in accordance with the following street and lane closure restrictions:

Western Avenue - Lane Requirements

Street	Limits	Direction	Days	AM Peak	PM Peak	Daytime Hours	Daytime Lanes Required	Nighttime Hours	Nighttime Lanes Required
Western Avenue	At Union Street	Northbound	M-F	7-9	3-6	7am-6pm	1	6pm-7am	0*
			Sat-Sun	none	none	9am-6pm	0*	6pm-9am	0*
		Southbound	M-F	7-9	3-6	7am-6pm	1	6pm-7am	0*
			Sat-Sun	none	none	9am-6pm	0*	6pm-9am	0*

*Concurrent closure of northbound and southbound lanes will not be permitted. Flagged two-way traffic in a single lane is permitted in lieu of a signed detour.

No traffic shall be held on any of the above listed streets during the peak periods specified for any movement of vehicles, equipment, materials or supplies in or out of the work zone.

Marion Street – If Additive 1 is awarded, Marion Street between the east ROW line of Alaskan Way and the west ROW line of Western Avenue may be fully closed to vehicle traffic for 4 continuous weeks. If both Additives 1 and 2 are awarded, Marion Street between the east ROW line of Alaskan Way and the west ROW line of Western Avenue may be fully closed to vehicle traffic for 5 continuous weeks. Outside of the continuous closure, Marion may be reduced to one lane except during peak periods Monday – Friday 7AM to 9 PM and 3 PM to 6 PM. Contractor must coordinate closures with other contractors. The sidewalk on the north side of Marion Street must remain open during construction and serve as the pedestrian detour route. Contractor must maintain emergency egress from all abutting properties throughout the duration of construction.

Union Street – Union Street between Alaskan Way and Western Avenue is a dead-end street providing access to and from businesses on the north and south sides of Union Street. Vehicle access to the adjacent property loading docks may be restricted in accordance with Section 1-08.3(3).

When vehicle access to the loading docks on the north side of Union Street (Seattle Design Works) is not provided, Contractor must accommodate large load deliveries to the loading docks an average of 3 times per week between 7 AM and 5 PM via direct truck access, hoisting, off-loading, intermediate transport or other support to facilitate material delivery in and out of the facility. Delivery materials may include but are not limited to large concrete slabs, large timbers, large tables, counter tops, and benches.

Outside of the restricted access period described in Section 1-08.3(3), vehicle access to and from at least two (2) Public Storage loading docks on the south side of Union Street and at least one (1) Seattle Design Works loading dock on the north side of Union must be maintained during their respective business hours. Access must be provided to allow SU-30 trucks to back into the loading docks (see Appendix for turn templates). Provide a minimum of 3 parking spaces on Union Street between Alaskan Way and Western Avenue for patrons of the adjacent businesses.

Vehicle access to the western loading dock of the Antique's Warehouse building must be maintained at all times from the Union Street right of way unless coordinated otherwise with the Alaskan Way Elliott Way (S King St to Bell St) Project.

The Contractor must coordinate with the Alaskan Way Elliott Way (S King St to Bell St) Project such that the construction activities and traffic control of both contractors are scheduled and conducted in a manner that maintains reasonable access to the adjacent private properties.

Night Work

Lane closures during night work will be allowed with approved traffic control plan.

Fire/Emergency Egress

Pedestrian ingress/egress must be maintained for all businesses. Changes in fire/emergency egress must be approved by SDCI and the Fire Marshalls Office in accordance with applicable local laws and regulations.

Pedestrian Access

Pedestrian routes to all points of entry must be maintained at all times unless stated otherwise, See Section 1-07.23(2) for details. When pedestrian routes are altered, the Contractor's traffic control plans, in accordance with Section 1-10.2(5)A must show the following:

- Alternate routes and signage
- Protective measures (including spotters)
- Duration and/or hours that alternate routes will be in place

Pedestrian access on Union Street may be restricted when necessary for Construction of the Work; however, local access for small deliveries and employees of Seattle Design Works must be maintained at all times by providing a 6-foot wide pedestrian path to the access door identified on Drawing AL01. Notify the Engineer 15 Working Days in advance of closing the stair from Western Avenue.

The Public Storage exterior stair and exits will be modified by the property owner prior to Construction. An existing exit path way will be revise from exiting to Western to exiting to Union Street. Refer to the Public Storage design plans in the Appendix.

Bike Access

Bicycle lanes must be maintained Monday through Friday during the AM & PM peak hours. Bike Lane may be closed at other times with approved signage (traffic control plan). No closures, and no steel plating within bike lanes, will be permitted during the month of May (Bike to Work Month). Closures will require 10 working days advanced notice via signage. Approved signage for closing a bike route must be in place a minimum of 5 working days prior to the closure.

Special Events: Throughout project construction, large events and Holidays will require special accommodations within the project area, including the limitation of construction activities, additional access for pedestrians, and/or changes to traffic control plans. These events and holidays can be divided into two tiers, including the following:

Tier 1. Waterfront-specific events or holidays with greater than 5,000 people in attendance; and

Tier 2. Events at Century Link and Safeco Field stadiums and downtown Seattle with greater than 10,000 in attendance.

The requirements of the first-tier and second-tier events are listed below. Generally, the first-tier events and holidays are all-day events and second-tier events are confined to a few hours within the day.

Provision:

Tier 1 & 2 requirements: In addition to the detailed requirements in the table below, the following additional requirements apply.

- Two (2) hours before the scheduled start time and 2 hours following the end time of the event must be considered Peak Hours and follow the restrictions listed for Peak Hours.
- No traffic must be held for any movement of vehicles, equipment, materials, or supplies in or out of the work zone for longer than 30 seconds at any one time, and no more than 5 times in any 1 hour period on any arterial street in the Project area in the 2 hours before the scheduled start time and 2 hours following the end time of the event.

Tier 1 and Tier 2 Events:

Event Name	Date	Location	Requirements
<i>Tier 1 – Events near the project area requiring additional traffic provisions</i>			
Out to Lunch	Early September	Waterfront Park	<i>Traffic requirements as noted above</i>
Salmon Homecoming	Mid-September	Waterfront Park	
Waterfront Trick-or-Treat	Late October	Waterfront	
Chilly Hilly	Late February	Colman Dock	
Easter	Late March/Early April	Waterfront	
Maritime Festival	Early May	Bell Harbor	
Mother's Day	Mid-May	Waterfront	
Love in the Market	Late February	Pike Place Market	
Magic in the Market	November & December	Pike Place Market	
Flower Festival	Mother's Day Weekend	Pike Place Market	
Daffodil Day	April	Pike Place Market	
Halloween Events	Late October	Pike Place Market	
Valentine's Day at the Aquarium	February 14	Aquarium	
Octopus Week	February	Aquarium	
Ocean Superheros	March	Aquarium	
Father's Day	June	Aquarium	
Orca Awareness Celebration	June	Aquarium	

Event Name	Date	Location	Requirements
Octopus Survey	October	Aquarium	
Sea Otter Awareness Weekend	September		
Tier 2 – Events outside of the project area but requiring additional traffic provisions			
Seahawk Football Games	Fall/Winter	CenturyLink Field	Traffic requirements as noted above
Sounders Soccer Games	Spring/Summer/Fall	CenturyLink Field	
Professional Playoff Games	Variable	Stadium District	
Mariner's Games	April - September	T-Mobile Park	
Macy's Holiday Parade and Star Lighting	Late November	Downtown	
Seafair Fleet Week	Early August	Citywide	
Hempfest	Mid August	Myrtle Edwards Park	
Rock n' Roll Marathon	Mid June	Citywide	
Pride Parade	Mid-June	Downtown	
Torchlight Parade	Late July	Downtown	

1-10.3 TRAFFIC CONTROL LABOR, PROCEDURES AND DEVICES

1-10.3(3)F BARRIER DRUMS (GSP 02-28-19)

Replace this title and section with the following:

1-10.3(3)F RESERVED

1-10.3(3)N SPEED AND PARKING CONTROL (GSP 1-28-14)

Replace the last paragraph in this Section with the following:

If alteration of the legal (or posted) speed limit or parking control is necessary for the completion of the Work, as determined by the Engineer, there will be no cost to the Contractor. All costs for covering of parking meter(s) and placing no parking markers on "numbered" base plates where parking pay stations exist for Contractor's convenience will be at the Contractor's own expense.

DIVISION 2: EARTHWORK

2-02 REMOVE, ABANDON OR RELOCATE STRUCTURES AND OBSTRUCTIONS

2-02.3 CONSTRUCTION REQUIREMENTS

2-02.3(3) REMOVAL OF EXISTING STREET IMPROVEMENTS

2-02.3(3)A REMOVE NON RIGID PAVEMENT AND UNTREATED ROADWAY SURFACES (SP 2-20-19)

Supplement this Section with the following:

Pavement removal must include removal and salvage of approximately 35 existing large boulders located under the existing metal stairway. Boulders must be palletized and secured. Provide all necessary labor and equipment to remove and transport the boulders to the SDOT Glass Yard located at 7299 2nd Ave SW Seattle, WA 98116. Contractor must contact Paul Pablo at (206) 423-7280 to arrange for receipt of delivery.

Pavement removal must also include removal of existing well casings and existing concrete mock-ups and associated metal inlays where shown in drawings. Salvage maintenance hole castings.

2-02.3(10) REMOVE MISC. ITEMS AT TOP OF WESTERN AVENUE WALL (SP 07-22-19)

Remove the following items located at the top of the existing Western Avenue retaining wall as shown in the Drawings:

1. Steel railing
2. "To the Market/To the Waterfront" sign and sign support structure
3. Chain link fence and gate
4. Asphalt curb on top of wall
5. Remnants of timber posts embedded in the top of the wall. Remove timber to bottom of embedded posts.

Refer to Section 1-07.23(2) for protection requirements.

2-02.3(11) REMOVE METAL STAIRWAY (SP 07-22-19)

Remove metal stairway, including stringers, stairs, railing, foundations, and wall brackets. At stairway connections to wall, cut anchor bolts a minimum of 1 inch behind the wall surface. Fill the void left by removal of the bolts with mortar conforming to Section 9-04.3(2). Protect existing art mural on the Western Wall from dirt or damage. Refer to Section 1-07.23(2) for protection requirements.

2-02.3(12) REMOVE TIMBER PILING (SP 01-13-20)

Vertical timber piles must be anticipated in utility and foundation excavations within the project area. The Contractor must remove timber piling to a depth of 1 foot below the bottom of the excavation. Voids left by removals must be backfilled with Mineral Aggregate Type 17, in accordance with Section 9-03 and compacted in accordance with Section 2-11.

Add 1-H 2-02.3(13) REMOVE VAULT CASTINGS (SP 01-13-20)

~~Remove existing vault castings where shown on the Drawings. Coordinate with Seattle City Light for installation of false ceiling within the vault. After false ceiling is installed, backfill vault openings with approximately 3 cubic yards of CDF to the underside of the proposed paving section. CDF mix to meet the requirements of Section 2-10.2(3)A3 CDF for Structural Backfill.~~

Delete and replace with the following:

Coordinate with Seattle City Light for installation of a false ceiling within the vault at least 10 Working Days in advance of the Work. After the false ceiling is installed, remove existing vault castings and risers where shown on the Drawings and excavate to the top of the vault. Construct a reinforced concrete slab and backfill with Type 2 Mineral Aggregate as shown on the Drawings.

2-02.3(14) ABANDON EXISTING UNDERGROUND ELECTRICAL CONDUIT (SP 02-07-20)

At each end of conduit designated on the Drawings as "abandon", cut and cap the conduit. Do not enter Seattle City Light vaults or handholes to achieve the abandonment. Coordinate with SCL to achieve abandonment inside vaults or handholes.

2-02.3(15) REMOVE LIGHT POLE AND RECTANGULAR RAPID FLASHING BEACONS (SP 02-21-20)

Contractor must remove the following items at the locations shown on the Drawings:

- a. Light pole
- b. 2 bracket arms
- c. 2 luminaires
- d. Light pole foundation
- e. Rapid Rectangular Flashing Beacon (RRFB) equipment mounted on the light pole.
- f. RRFB equipment mounted on a pedestal post
- g. RRFB post and base
- h. RRFB post foundation.
- i. Street signs

Contractor must salvage items listed above in accordance with Section 2-02.3(7)C. Refer to RRFB plan in the Appendix for more information. Any items that do not require salvage must be disposed of by the Contractor.

2-02.4 MEASUREMENT (SP 07-15-19)

Replace the second through fifth paragraphs with the following:

No measurement will be made for any sawcutting of the pavement and/or sidewalk. All sawcutting for removal will be incidental to the related items of removal work. No measurement will be taken for line drilling.

Replace the sixth paragraph with the following:

No measurement will be made for sawcutting of curb. All sawcutting for curb removal will be incidental to either the curb removal bid item or the pavement removal bid item.

Supplement this Section with the following:

Measurement for "Remove Misc. Items at Top of Western Ave Wall" will be per lump sum.

Measurement for "Remove Metal Stairway" will be per lump sum.

Measurement for "Remove Timber Piling" will be per each.

Measurement for "Remove Vault Castings" will be per lump sum.

Measurement for "Abandon Existing Underground Electrical Conduit" will be per each conduit duct bank to be abandoned.

Measurement for "Remove Light Pole and Rectangular Rapid Flashing Beacon" will be per lump sum.

2-02.5 PAYMENT (SP 07-15-19)

Revise items 5,6 and 7 as follows:

5. "Sawcut Rigid Pavement, Full Depth", will not be paid separately.

6. "Sawcut Cement Concrete Sidewalk, Full Depth", will not be paid separately

7. "Sawcut Asphalt Concrete, Full Depth", will not be paid separately

Delete the three paragraphs after item 7 and add the following:

All costs for sawcutting must be included in the related bid items of removal work.

Supplement this Section with the following:

12. **"Remove Misc. Items at Top of Western Ave Wall"**, per lump sum.

The lump sum Contract Price for "Remove Misc. Items at Top of Western Avenue Wall" includes all costs for the work required to completely remove and dispose of the miscellaneous items at the top of the wall as shown in the Drawings and as specified.

13. **“Remove Metal Stairway”**, per lump sum.

The lump sum Contract Price for “Remove Metal Stairway” includes all costs for the work required to completely remove and dispose of the metal stairway as shown in the Drawings and as specified.

14. **“Remove Timber Piling”**, per each.

The Bid Item price for “Remove Timber Piling” must include all costs for removing, backfilling with Mineral Aggregate Type 2, compacting the backfill, handling, hauling, and disposing of piling. If the piling is treated, it must be measured and paid in accordance with section 1-07.3(6). No duplicate payment under this item will be made.

15. **“Remove Vault Castings”**, lump sum.

The lump sum price for “Remove Vault Castings” must include all costs for removing the castings and backfilling the vault openings with CDF.

16. **“Abandon Existing Underground Electrical Conduit”**, per each

The per each Contract Price for “Abandon Existing Underground Electrical Conduit” includes all costs for the work required to abandon the conduit as shown in the Drawings and as specified.

17. **“Remove Light Pole and Rectangular Rapid Flashing Beacon”**

The lump sum price for “Remove Light Pole and Rectangular Rapid Flashing Beacon” includes all costs for the work required to remove and salvage the items specified.

2-03 STRUCTURAL DEMOLITION

2-03.3 CONSTRUCTION REQUIREMENTS (SP 12-12-19)

Supplement this Section with the following:

Removing Portions of Existing Western Avenue Retaining Wall

Saw cut to remove portions of concrete wall within limits shown in the Drawings. Cut full depth of wall and do not over cut at corners.

Care must be taken in removing concrete to prevent over breakage or damage to portions of the existing structure which are to remain.

The Contractor must roughen, clean, and saturate existing concrete surfaces, against which fresh concrete will be placed, in accordance with Section 6-02.3(12)B.

The Contractor must submit a demolition plan to the Engineer for approval showing the method of removing portions of the existing wall. The demolition plan must show lifting devices, lifting attachments, the sequence of demolition and removal, and the type of equipment to be used in all demolition and removal operations. The plan must detail the containment, collection, and disposal of all debris. The Contractor must not begin removal operations until receiving the Engineer’s approval of the demolition plan.

Removing Portions of the Existing Marion Street Pedestrian Bridge

Removing portions of the Existing Marion Street Pedestrian Bridge be as shown in the drawings and in accordance with these special provisions including Section 1-07.33 and 1-07.34.

The Contractor must submit a bridge demolition plan, including a support system plan, with working drawings and calculations to the Engineer for approval in accordance with Section 2-03.3 and Section 6-01.8 (Working Drawings), showing the method of removing portions of the existing bridge. The bridge demolition plan must be prepared and sealed by a licensed Professional Engineer in the State of Washington.

The Contractor must not begin demolition operations until receiving the Engineer’s approval of the bridge demolition plan and support system plan. Approval of the bridge demolition plan must indicate

conformance only with scheduling and operational characteristics of the demolition plan. The Contractor must remain solely responsible for all aspects of safety, structural capacity, structural stability, applicable regulations, and permits associated with the demolition work.

The Contractor must preserve and protect all portions of the structure that are to remain. Damage to the existing structure must be repaired at the cost of the Contractor.

The Contractor must protect the area in and around the demolition site from falling concrete and debris, in accordance with the debris collection and containment provisions of the bridge demolition plan as approved by the Engineer.

Drawings for the existing structure (see Appendix) are named:

Great Northern Railway – Marion St. Footbridge at Seattle, WA – Vault Plan No. 157-16, 418-60, 782-192 and 803-21

Marion Street Pedestrian Bridge Replacement / Rehabilitation – City Engineer's DWG No. 777-266

Marion St. Foot Bridge –196-2221

2-03.4 MEASUREMENT (SP 12-12-19)

Supplement this Section with the following:

Measurement for "Removing Portions of Existing Western Avenue Retaining Wall" will be lump sum.

Measurement for "Removing Portions of the Existing Marion Street Pedestrian Bridge" will be lump sum

2-03.5 PAYMENT (SP 12-12-19)

Supplement this Section with the following:

1. **"Removing Portions of Existing Western Avenue Retaining Wall"**, per lump sum.

The Bid Item price for "Removing Portions of Existing Western Ave Retaining Wall" must include all costs for the work required to remove and dispose of the portions of the wall within the limits shown in the Drawings and as described in this Section.

Replace with the following:

- Add 1-I**
2. ~~"Removing Portions of Portion of the Existing Marion Street Pedestrian Bridge", per lump sum.~~ "Removing Portions of the Existing Marion Street Pedestrian Bridge", per lump sum

The Bid Item price for "Removing Portions of the Existing Marion Street Pedestrian Bridge" must include all costs for the work required to remove portions of the bridge within the limits shown in the Drawings and as described in this Section including traffic control.

Furnishing and placing rail on concrete pedestal is included in for "Removing Portions of the Existing Marion Street Pedestrian Bridge."

2-04 EXCAVATIONS

2-04.1 DESCRIPTION

2-04.1(2) CLASSIFICATION (GSP 08-15-18)

Delete the last sentence in this Section and replace it with the following:

Where widening of roadway cuts and ditches and excavations of 3 feet or less below the designated subgrade are directed by the Engineer, they will be considered common excavation.

2-04.3 GENERAL REQUIREMENTS (SP 1-30-20)

2-04.3(1)J OBJECTS ENCOUNTERED (SP 08-03-17)

Replace this Section with the following:

Objects, such as stumps, railroad ties, woody debris, buried pavement, controlled density fill (CDF), abandoned pipe, abandoned duct banks, abandoned transmission cable pipe, and abandoned conduit and wire, encountered in the excavation must be removed and disposed of by the Contractor. With the exception of the items listed below, all costs for the excavation, removal, and disposal of these objects will be considered incidental to other items of work unless the excavation width or depth must be increased such as to cause extra work. Extra work will be paid in accordance with Section 1-09.4.

Removal of timber piles will be paid in accordance with the bid item "Remove Timber Piling".

Disposal of railroad ties and timber piles will be paid in accordance with "Offsite Disposal of Contaminated Materials Designated as Type A Waste".

Add the following Section

2-07 PROTECTIVE SYSTEMS

2-07.3 CONSTRUCTION REQUIREMENTS

2-07.3(2) SAFETY SYSTEMS (GSP 08-15-18)

Delete the second paragraph in this Section and replace it with the following:

The safety system must provide safe working conditions in the excavation. The Contractor may use a shield system for trenches. All Work outside of the neat line limits required to restore conditions that were disturbed by the Contractor's operations, including: handling and disposal of excavated material; additional backfill beyond neat line limits; or additional surface restoration beyond limits specified in the Contract; as well as repair of damage to adjacent structure, improvement, or underground installation, will be at the Contractor's sole expense and at no additional or separate cost to the Owner. Neat line limits for trenches are shown on Standard Plans 284 and 350. For structural excavation neat line limits see Section 2-04.4.

2-09 SUBGRADE PREPARATION AND PROTECTION

2-09.5 PAYMENT (GSP 08-15-18)

Delete the last paragraph in this Section and replace it with the following:

Where specified in the Contract, or where directed by the Engineer, Mineral Aggregate backfill used instead of native material will be paid as "Mineral Aggregate, (Type)" as specified in Section 4-01.

Add 2-H

~~**2-19 GEOTECHNICAL INSTRUMENTATION (SP 03-10-16)**~~

Replace the section heading with the following:
2-19 Geotechnical instrumentation for Union St Ped Bridge (sp 03-10-20)

2-19.1 DESCRIPTION

This work must consist of the design and implementation of the Contractor's Geotechnical Monitoring Plan to monitor movements as a result of construction including monitoring of the Public Storage building at 1334 Alaskan Way, the Wester Avenue Wall, and Seattle City Light Vault 0102-T-012. This Special Provision does not relieve the Contractor of their responsibility of protection outlined in Section 1-07.16 and liabilities covered elsewhere in the Contract. The implementation of the Geotechnical Monitoring Plan includes furnishing, installing, monitoring, reporting, maintaining, and removing the instrumentation.

2-19.2 MATERIALS

Structure Settlement Points consist of fixed reflector targets bonded to buildings and other structures/improvements.

Utility Settlement Points for Seattle City Light Vaults consist of Structure Settlement Points installed on the top of vault access castings

2-19.1(1) SUBMITTALS

Contractor Qualifications and Field Personnel: A minimum of 30 calendar days prior to the start of excavation, the Contractor must submit a list identifying the surveyors and instrumentation specialist assigned to the project performing geotechnical instrument monitoring. The list must demonstrate that the individuals meet the experience requirements specified herein.

At a minimum, the surveyor's experience must consist of survey monitoring experience on similar construction projects and the lead surveyor must be a registered Land Surveyor in the state of Washington.

The instrumentation specialist must be a Professional Engineer, licensed under Title 18 RCW, State of Washington, with a minimum 3 years of experience in instrumentation installation and monitoring of similar instrumentation.

The Engineer will approve or reject the qualifications of the surveyors and instrumentation specialist within 14 calendar days after receipt of the submission. Construction must not start until the surveyor and instrumentation specialist are approved by the Engineer. The Engineer may suspend construction if the Contractor provides or substitutes unapproved or unqualified personnel. Delays as a result of such substitutions will be non-compensable.

Geotechnical Monitoring Plan: A minimum of 30 calendar days prior to performing the Work, the Contractor must submit a detailed plan for monitoring the work. The Engineer will review the Contractor's plan within 14 calendar days after receipt of the submission. The plan must include:

A schedule and outline of procedures for instrument installation and performance of monitoring.

Detailed description of the Contractor's proposed method for monitoring the Geotechnical Instrumentation. The description must demonstrate that the proposed method will provide the data required to adequately monitor the work.

Detailed layout drawing of instrument locations. The drawing must include a designation for each instrument.

Structures identified for pre-construction structure inspection by the Contractor.

Pre-Construction Structure Inspection Survey: A minimum of 30 calendar days prior to start of the Work, the Contractor must submit the results of the pre-construction structure inspection survey of the structures identified by the Contractor.

Instrument Installation: The Contractor must submit within 72 hours of installation, detailed descriptions of instrument installations, including as-built Drawings of the instrumentation on a maximum scale of 1 inch = 20 feet.

Baseline Readings: A minimum of 2 working days prior to starting the Work, the Contractor must submit to the Engineer, both in the latest version of Microsoft Excel and in paper copies:

The raw data from readings of the Geotechnical Instrumentation. The Contractor must present the survey data using the project datum, project stationing, left or right offsets from centerline looking up-station, and project coordinates.

Plots of the data:

Utility Settlement Points plotted as settlement vs. time

Structure Settlement Points plotted as settlement vs. time and horizontal movement vs. time

Data must be plotted at scales that reflect the accuracy of the instrument or survey system and anticipated maximum change.

Weekly Monitoring Point Summary: The Contractor must submit the following information to the Engineer on a weekly basis, both in the latest version of Microsoft Excel and in paper copies. Information for the week must be submitted by the following Monday.

A short summary of the week's work that notes the work being performed, times that monitoring was conducted, and what work required the monitoring. Locations of points monitored for the week's work. The Contractor must include observations that will help in describing the monitoring for that week.

A description of the work occurring when there is a displacement of 0.02 foot or greater, including any possible reasons for the displacement.

The raw data from readings of the Geotechnical Instrumentation. The Contractor must present the survey data using the project datum, project stationing, left or right offsets from centerline looking up-station, and project coordinates.

Plots of the data:

Utility Settlement Points plotted as settlement vs. time

Structure Settlement Points plotted as settlement vs. time and horizontal movement vs. time

Data must be plotted at scales that reflect the accuracy of the instrument or survey system and anticipated maximum change.

2-19.3 CONSTRUCTION REQUIREMENTS

2-19.3(1) GENERAL REQUIREMENTS

The Geotechnical Instrumentation and described in this Special Provision delineates the minimum required instruments and monitoring locations as a part of this Contract. The Contractor must add instrumentation as necessary to adequately monitor the Work.

The Contractor must not perform any of the work items anticipated to result in movement to items requiring monitoring specified herein until the Geotechnical Instrumentation is installed and baseline readings are completed and submitted to the Engineer. The Contractor must furnish and install all instruments shown in the Drawings and as described herein. All reading devices, fixtures, cables, and necessary software for the various monitoring systems must be furnished by the Contractor. The Contractor must perform readings and data collection, analyses, record keeping, and preparation of summary reports for all instruments. The Contractor must maintain and protect all instruments and replace damaged instruments at no additional cost to the Owner.

The Contractor must establish the initial elevations and horizontal coordinates of the Monitoring Points to 0.01 foot and must measure and record the subsequent elevations of Monitoring Points to plus or minus 0.005 foot.

The Contractor must maintain the manufacturer's minimum calibration requirements for the instrumentation systems at all times during the monitoring program. The Contractor must replace instruments that fail or for any other reasons of non-performance within 24 hours of detection with acceptable instruments, at no cost to Owner. The Contractor must be fully liable for the additional costs resulting from replacement of instruments for reasons of non-performance or failure and no adjustments in contract time resulting from the suspension of work will be allowed. The Contractor must correlate the new instruments with the previously acceptable data from the replaced instruments to develop continuous plots of instrumentation data, but with an arrow and note indicating the date of replacement on each instrument plot and data table.

The Contractor must conduct the work in a manner such that displacements do not exceed the limits specified herein. The Contractor must take the following actions if any displacement measurement reaches 75 percent of the threshold limits specified herein:

Take immediate steps to stop the cause of displacement.

Notify the Engineer.

Implement corrective actions.

Verify success of corrective actions.

If corrective actions are not successful or measurements reach the limits specified herein, cease all related operations contributing to the displacements and then:

- *Notify the Engineer.*
- *Provide a Corrective Actions Plan.*
- *Transmit the Corrective Actions Plan to the Engineer for review. Allow 48 hours for review.*
- *Implement the Corrective Actions Plan.*

The Contractor is solely responsible for conducting the work in a manner such that displacements do not exceed the following limits:

Instrumentation Type	Threshold Limits
Structure Settlement Points	
1334 Alaskan Way (Public Storage Building)	Vertical Displacement: 0.4-inch total settlement and 0.2 inch differential settlement between adjacent points
Western Ave Wall at Union Street	Vertical Displacement: 0.4-inch total settlement and 0.2 inch differential settlement between adjacent points
Utility Settlement Points	
Seattle City Light Vault 102-T-012	Vertical Displacement: 1.5-inch total settlement, 0.75-inch differential settlement of the vault.

The Contractor must remove all instruments at the end of the Contract, after requesting and receiving the express written permission of the Engineer.

The Contractor must not disclose data reports or any other unprocessed data, readings, and observations to third parties outside of the Contract without the express written permission of the Engineer.

2-19.3(2) DEFINITIONS

Geotechnical Instrumentation: Instruments used to measure vertical and horizontal movement of structures, and vertical movement of utilities.

Monitoring Points: Settlement Points and benchmarks.

Pre-Construction Structure Inspection: A documented inspection of structures identified by the Contractor based on their independent review of potential construction-induced damage.

Settlement Points: Structure Settlement Points and Utility Settlement Points. All Settlement Points are monitored by optical or laser survey methods to determine vertical and horizontal displacements.

Structure Settlement Points: Fixed markers monitored to determine horizontal and vertical displacements.

Utility Settlement Points: Fixed markers, placed on below-ground utilities, including vaults, monitoring changes in elevation of existing utilities.

2-19.3(3) PRE-CONSTRUCTION STRUCTURE INSPECTION

Prior to the start of the Work, the Contractor must complete detailed examinations of the structures identified in their Geotechnical Monitoring Plan. At a minimum, the Contractor must perform an inspection of the interior of 1334 Alaskan Way (Public Storage). The Owner will provide a Right of Entry to 1334 Alaskan Way to allow the Contractor access to perform the pre-construction structural inspection. The Contractor must notify the Engineer at least 10 Working Days prior to performing each structure inspection. The items included in the inspection must be determined by the Contractor. Typically, the inspections include, in survey scale drawings, all existing cracks, structural distress, location and volumes of groundwater seepage. For buildings, sticking doors and windows and architectural distress is also documented. Measuring and recording all initial existing crack lengths and widths and placing two-dimensional plastic crack measuring templates (crack monitoring points) at critical and representative cracks are also common elements. High-resolution, digital photographs and videos of the features

documented are typically included. Document and submit the results of the preconstruction inspection on a DVD or in a bound volume prior to start of the Work.

2-19.3(4) INSTRUMENT INSTALLATION

The Contractor must verify buried utilities and structures by having utility locates performed in advance of installation of instruments in accordance with Section 1-07.28.

The Contractor must install survey benchmarks and Structure Settlement Points and Utility Settlement Points at least 5 calendar days prior to beginning construction or earlier if necessary to meet the instrument monitoring schedule. The Contractor must establish a benchmark a minimum of 500 feet from the project site.

Provide a minimum of 3 Structure Settlement Points at 1334 Alaskan Way. Install one point on the northwest corner of the building at Alaskan Way and Union Street. Install additional points on the building columns on the north side of the building near the proposed elevator approximately 15-feet apart. .

Provide a minimum of 3 Structure Settlement Points on the Western Wall near Pier 1. Space points approximately 20-feet apart with the middle point centered at the proposed location of Pier 1.

Provide 2 Utility Settlement Points on Seattle City Light Vault 102-T-012. Install points on top of each access frame/casting. Work with the Engineer to identify the installation locations.

2-19.3(5) PROTECTION AND MAINTENANCE

The Contractor must protect and maintain all instruments. The Contractor must repair or replace damaged or missing instrument or entire instruments as required at no additional cost to the Owner within 24 hours of detection of damage.

2-19.3(6) INSTRUMENT MONITORING SCHEDULE

Before adjacent construction is started, the Contractor must take at least four sets of initial baseline measurements and readings, comparable and equal within the rated instrument accuracy, at all the Monitoring Points specified herein. The Contractor must take additional readings of the Monitoring Points until at least two comparable sets are obtained, which are within the rated instrument or survey accuracy.

The Contractor must monitor and report on all required instruments on the schedule described below:

Monitor all Monitoring Points within 50 feet of active pile driving, shaft installation, excavation, and compaction, not less than once a week until the work within 50 feet of the points is complete.

Monitor all Monitoring Points on 1334 Alaskan Way after elevator installation and testing is completed.

One last reading immediately prior to removal of the instruments.

Should the Contractor's measures fail to maintain displacements within the threshold limits, the Engineer reserves the right to stop work at no additional expense to the Owner until the Contractor implements measures in accordance with the approved contingency plan.

2-19.3(7) REMOVAL OF INSTRUMENTS

All Monitoring Points installed by the Contractor, must be removed at the end of the contract and the areas restored to the conditions existing before installation of the Monitoring Points.

2-19.4 MEASUREMENT

Measurement for "Settlement Monitoring" will be per lump sum.

Measurement for "Pre-Construction Structure Inspection" will be per lump sum.

2-19.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-19 will be made at the Bid Item prices. Bid only for the Bid Items listed or referenced as follows:

1. **“Settlement Monitoring”**, per lump sum

The Bid Item price for “Settlement Monitoring” must be full pay for performing the work as specified in the Contract Documents, including furnishing, installing, monitoring, reporting, maintaining, and removing settlement monitoring instruments for the entire project.

2. **“Pre-Construction Structure Inspection”**, per lump sum.

The Bid Item price for “Pre-Construction Structure Inspection” must be full pay for performing the pre-construction inspection of structures identified by the Contractor based on their independent review of potential construction-induced damage.

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Add 2-I

Add the following new section:

2-20 GEOTECHNICAL INSTRUMENTATION FOR MARION STREET PEDESTRIAN BRIDGE (SP 03-10-20)**2-20.1 DESCRIPTION**

This Special Provision does not relieve the Contractor of their responsibility of protection outlined in Section 1-07.16 and liabilities covered elsewhere in the Contract. The implementation of the Geotechnical Monitoring Plans includes furnishing, installing, monitoring, reporting, maintaining, and removing the instrumentation for Marion Street Pedestrian Bridge. This work must consist of the design and implementation of the Contractor's Geotechnical Monitoring Plan to monitor movements as a result of construction including monitoring vibration levels and structure movements of the existing Marion Street pedestrian bridge from vibration- or deformation-causing construction activities. These activities include a partial removal of the existing Marion Street pedestrian bridge, drilled shaft casing installation and removal, drilled shaft excavation, concrete sidewalk/pavement breaking and removal, fill compaction, and sidewalk/pavement restoration for constructing new Marion Street approach pedestrian bridge foundations at piers 3, 4 and 5 as shown on plans.

2-20.1(1) SUBMITTALS

Contractor Qualifications and Field Personnel: A minimum of 30 calendar days prior to the start of vibration- or deformation-causing construction activities, the Contractor must submit a list identifying the surveyors, instrumentation specialist, and field personnel performing vibration and geotechnical instrument monitoring assigned to the project. The list must demonstrate that the individuals meet the experience requirements specified herein.

At a minimum, the surveyor experience must consist of survey monitoring experience on similar construction projects and the surveyor must be a registered Land Surveyor in the state of Washington.

The instrumentation specialist must be a Professional Engineer, licensed under Title 18 RCW, State of Washington, with a minimum 3 years of experience in instrumentation installation and monitoring of similar instrumentation.

At a minimum, the field personnel performing the monitoring of vibrations and geotechnical instrumentation must have 1 year of experience with monitoring and reporting data from similar instrumentation.

The Engineer will approve or reject the qualifications of the surveyors, instrumentation specialist, and field personnel within 14 calendar days after receipt of the submission. Construction must not start until the surveyor and instrumentation specialist are approved by the Engineer. The Engineer may suspend construction if the Contractor provides or substitutes unapproved or unqualified personnel. Delays as a result of such substitutions will be non-compensable.

Geotechnical Monitoring Plan: A minimum of 30 calendar days prior to the start performing the Work, the Contractor must submit a detailed monitoring plan for the work. The Engineer will review the Contractor's monitoring plan within 14 calendar days after receipt of the submission. The monitoring plan must include:

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A schedule and outline of procedures for instrument installation and performance of monitoring.

Detailed description of the Contractor's proposed method for monitoring the geotechnical instrumentation. The description must demonstrate that the proposed method will provide the data required to evaluate whether or not the allowable limits have been exceeded.

Specifications and installation procedures for each type of instrumentation.

Detailed layout drawing of instrument locations. The detailed plan must include a designation for each instrument, including proposed vibration monitor locations relative to the active work area.

Documentation of calibration checks on vibration monitors. Including recalibration after any damage or disturbance.

Sample data tables and plots, including sample instrument calibration data, construction information (i.e., station and offset of excavation, excavation depth) for each instrument type.

The manufacturer's certification that products, materials, and equipment provided meets the specified requirements.

Corrective Actions Plan of possible actions that might be required if 75 percent of any of the allowable limits presented in this Special Provision are exceeded for any instrument.

Pre-Construction Structure Inspection Survey: A minimum of 30 calendar days prior to start of the Work, the Contractor must submit the results of the pre-construction structure inspection survey of the structures specified herein. The inspection survey must include:

1. Documented baseline vibrations.
2. A plan documenting baseline foundation elevations (for future settlement calculations).
3. Baseline conditions documented by means of audio/video methods.
4. A photo log plan documenting details of found distresses.

Instrument Installation: The Contractor must submit within 72 hours of installation, detailed descriptions of instrument installations, including as-built Drawings of the instrumentation on a maximum scale of 1 inch = 20 feet.

Baseline Readings: A minimum of 2 working days prior to starting the Work, the Contractor must submit to the Engineer, both in the latest version of Microsoft Excel and in paper copies:

The raw data from readings of the geotechnical instrumentation. The Contractor must present the survey data using the project datum, project stationing, left or right offsets from centerline looking up-station, and project coordinates.

Plots of the data:

Structure movement points plotted as settlement vs. time and horizontal movement vs. time

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Mean temperature

Data must be plotted at scales that reflect the accuracy of the instrument or survey system and anticipated maximum change and must include pertinent construction progress data.

A graph showing the vibration data, including the time of its recording.

Monitoring Point Summary: Within 8 working hours after the readings are taken that indicate a displacement of 0.02 foot or greater compared to the baseline reading, the Contractor must submit to the Engineer, both in the latest version of Microsoft Excel and in paper copies, the following:

A description of the work occurring prior to the displacement of 0.02 foot or greater, including any possible reasons for the displacement. The Contractor must include observations that will help in describing the monitoring.

The raw data from readings of the geotechnical instrumentation. The Contractor must present the survey data using the project datum, project stationing, left or right offsets from centerline looking up-station, and project coordinates.

Plots of all the data from the baseline readings to the most current reading:

Structure movement points plotted as settlement vs. time and horizontal movement vs. time from

Mean temperature

Data must be plotted at scales that reflect the accuracy of the instrument or survey system and anticipated maximum change and must include pertinent construction progress data.

An overall analysis of all monitoring data to date.

Vibration Monitoring Summary: The Contractor must submit to the Engineer summary reports of the vibration monitoring prepared by instrumentation specialist within 8 working hours after the readings are taken. The summary must include:

A short summary of the work that notes the work being performed when the vibration monitoring exceeded 0.75 inch/second, including any possible reasons for the readings, and times that monitoring was conducted. The Contractor must include observations that will help in describing the monitoring.

A copy of the raw data (both electronic and hard copy) collected since the last submittal.

A graph showing the vibration data, including the time of its recording and the work being done during the recording.

An overall analysis of all monitoring data to date.

Post-Construction Structure Inspection Survey: Within a maximum of 7 calendar days after the completion of fill compaction, and sidewalk/pavement restoration and as approved by the Engineer, the Contractor must complete the post-construction structure inspection survey. A maximum of 30 calendar days after the completion of constructing new Marion Street approach pedestrian bridge foundations at piers 3, 4 and 5, the Contractor must submit the results of the post-construction structure inspection survey of the structures specified herein.

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2-20.2 MATERIALS

2-20.2(1) STRUCTURE MOVEMENT MONITORING POINTS

Structure movement points must consist of fixed reflector targets bonded to the permanent existing bridge structures at locations as specified herein.

2-20.2(2) VIBRATION MONITORS

The Contractor must provide at least two portable seismographs for monitoring the velocities of structure vibrations resulting from construction activities. The number of seismographs provided must be:

Sufficient to monitor the structures specified herein.

Determined by the Contractor based on the Contractor's selected means and methods and construction sequencing.

The furnished seismographs must be Model Blastmate III, as manufactured by Instantel Inc., Multiseis Plus, as manufactured by Vibra-Tech Inc., or approved equal having the following features:

External triaxial geophone and air overpressure microphone.

Three channels for vibration monitoring plus a fourth channel for air overpressure monitoring.

Two power sources: internal rechargeable battery and charger and 115 Vac. Battery must be capable of supplying power to monitor vibrations continuously for up to 30 days.

Self-triggering waveform capture mode that provides the following information: plot of wave forms, peak particle velocities, peak overpressure, frequencies of peaks.

Continuous monitoring mode must be capable of recording single-component peak particle velocities and frequency of peaks with an interval of 1 minute or less.

Computer software for performing continuous monitoring, data downloading, analysis, and to produce reports.

The portable seismographs must meet the following measurement requirements:

Seismic range: Up to 10 inches per second.

Seismic accuracy: ± 5 percent or 0.02 inch per second, whichever is larger between 4 and 125 Hz.

Seismic resolution: 0.005 inch per second or less.

Acoustic range: 88 to 148 dB.

Acoustic accuracy: ± 10 percent or ± 1 dB, whichever is larger between 4 and 125 Hz.

Acoustic resolution: 0.0000363 pound per square inch or less.

Acoustic frequency response: 2 to 250 Hz.

Capable of internal dynamic calibration.

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2-20.3 CONSTRUCTION REQUIREMENTS**2-20.3(1) GENERAL REQUIREMENTS**

The Geotechnical Instrumentation and described in this Special Provision delineates the minimum required instruments and monitoring locations as a part of this Contract. The Contractor must add instrumentation as necessary to adequately monitor the Work.

The Contractor must not perform any of the work items anticipated to result in movement to items requiring monitoring specified herein until the Geotechnical Instrumentation is installed and baseline readings are completed and submitted to the Engineer. The Contractor must furnish and install all instruments shown in the Drawings and as described herein. All reading devices, fixtures, cables, and necessary software for the various monitoring systems must be furnished by the Contractor. The Contractor must perform readings and data collection, analyses, record keeping, and preparation of summary reports for all instruments. The Contractor must maintain and protect all instruments and replace damaged instruments at no additional cost to the Owner.

The Contractor must establish the initial elevations and horizontal coordinates of the Monitoring Points to 0.01 foot and must measure and record the subsequent elevations of Monitoring Points to plus or minus 0.005 foot.

The Contractor must maintain the manufacturer's minimum calibration requirements for the instrumentation systems at all times during the monitoring program. The Contractor must replace instruments that fail or for any other reasons of non-performance within 24 hours of detection with acceptable instruments, at no cost to Owner. The Contractor must be fully liable for the additional costs resulting from replacement of instruments for reasons of non-performance or failure and no adjustments in contract time resulting from the suspension of work will be allowed. The Contractor must correlate the new instruments with the previously acceptable data from the replaced instruments to develop continuous plots of instrumentation data, but with an arrow and note indicating the date of replacement on each instrument plot and data table.

The Contractor must conduct the work in a manner such that displacements do not exceed the limits specified herein. The Contractor must take the following actions if any displacement measurement reaches 75 percent of the threshold limits specified herein:

Take immediate steps to stop the cause of displacement.

Notify the Engineer.

Implement corrective actions.

Verify success of corrective actions.

If corrective actions are not successful or measurements reach the limits specified herein, cease all related operations contributing to the displacements and then:

- *Notify the Engineer.*
- *Provide a Corrective Actions Plan.*
- *Transmit the Corrective Actions Plan to the Engineer for review. Allow 48 hours for review.*
- *Implement the Corrective Actions Plan.*

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Under some circumstances, corrective actions will require modification of construction procedures. If it is determined that the exceedance of the displacement is due to the Contractor operations, all the costs for modifications of construction procedures and repair must be responsible by the Contractor.

The Contractor must be responsible for the delay associated with the exceedance of the Peak Particle Velocity limit and developing the plan to the approval of the Engineer with the exception of the 48-hour review time. If the revised Corrective Actions Plan does not reduce the Peak Particle Velocity to below the allowable limit, the Contractor must cease all related operations contributing to the vibrations and repeat the process of developing and submitting a revised Corrective Actions Plan as listed above. The Engineer's review of the revised Corrective Actions Plan must not alleviate the Contractor of the responsibility for conducting the work in a manner such that displacements or vibrations do not exceed the following limits:

Instrumentation Type	Allowable Limits
Structure Movement Points	Vertical/Horizontal Displacement
Existing Marion Street Pedestrian Bridge: North and South Column at Piers 6 and 5*	0.2-inch differential between adjacent points at north and south column within the same pier
Existing Marion Street Pedestrian Bridge: North and South Column at Piers 6 and 5*	0.4-inch maximum movement of a single point
Vibration Monitors	Peak Particle Velocity
Existing Marion Street Pedestrian Bridge	1.14 in./sec.

*Existing Pier 6 and Pier 5 are the existing two column bents on the West and East side of Western Avenue and Marion respectively.

The Contractor must monitor structure vibration of work operations with calibrated equipment to ensure compliance with vibration limitations specified herein. A record of all vibration measurements must be retained for inspection by the Engineer and be included in daily summary reports and a final report.

The Contractor must remove all instruments at the end of the contract, after requesting and receiving the express written permission of the Engineer.

The Contractor must not disclose data reports or any other unprocessed data, readings, and observations to third parties outside of the contract without the express written permission of the Engineer.

The Contractor must increase the frequency of data collection (including hourly if 0.25 inch or greater of total accumulate displacement), install additional instrumentation, or provide additional monitoring at no additional cost to Owner in the event of noted abnormal monitoring data, in the event of construction-induced damage, or in the event that the Contractor or Engineer requires additional data to monitor the integrity of adjacent structures.

2-20.3(2) DEFINITIONS

Baseline Range: A range of measured values (displacements or vibrations) for a particular monitoring point determined before vibration- or deformation-causing construction activities occur.

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Geotechnical Instrumentation: Instruments used to measure vibration, and vertical and horizontal movement of structures, and vertical movement of utilities.

Monitoring Points: Settlement/Movement Points and benchmarks.

Pre-Construction Structure Inspection: A documented inspection of structures identified by the Contractor based on their independent review of potential construction-induced damage.

Movement Points: Structure Settlement/Movement Points. All Settlement/Movement Points are monitored by optical or laser survey methods to determine vertical and horizontal displacements.

Structure Movement Points: Fixed markers monitored to determine horizontal and vertical displacements.

Survey control: A system of precise field measurements of the types and kinds specified herein, utilizing suitable methods and equipment for determination of elevations, coordinates, and distances for performing geotechnical instrumentation monitoring.

Vibration monitors: Seismographs used to measure vibration levels in velocity and frequency.

Vibration- or Deformation-Causing Construction Activities: Activities including, but not limited to, a partial removal of the existing Marion Street pedestrian bridge, drilled shaft casing installation and removal, drilled shaft excavation, concrete sidewalk/pavement breaking and removal, fill compaction, and sidewalk/pavement restoration.

2-20.3(3) STRUCTURE INSPECTION SURVEYS

Prior to the start of the Work, complete detailed examinations of the structures identified requiring structural movement points in Section 2-20.3(8). After completion of construction and approved by the Engineer, complete detailed examinations of the structures identified requiring structural movement points in Section 2-20.3(8).

The detailed examination of each structure must be performed by (or under the direction of) a Professional Engineer, licensed under Title 18 RCW, and registered in the State of Washington. The examination must include, in survey scale drawings, all existing cracks, structural distress. Measure and record all initial existing crack widths and place 2-dimensional plastic crack measuring templates (crack monitoring points) at critical and representative cracks. High-resolution, digital photographs and video of the features documented must be provided. Document and submit the results of the preconstruction inspection in a bound volume with the seal of the responsible Professional Engineer on the title page.

The photo documentation must focus on existing defects on the existing structure. Photos must be taken in a digital format. At a minimum, the photo documentation plan must include the photographs and written documentation describing the location of the defect shown in the photo, the date of the photo, and other information that would be useful in documenting the defect.

At a minimum, the audio/video documentation plan must include the following elements: a description of the physical audio/video system and the photographic and written documentation process for the structures. The survey must be supported by appropriate audio description made simultaneously with video coverage. Such coverage for the

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columns, and concrete superstructure. Video coverage must extend to the maximum height of all structures as visible from the ground surface.

All video recording must be done during times of good visibility. Do not perform recording during periods of visible precipitation or when more than 10 percent of the ground area is covered with standing water, unless otherwise authorized by Engineer. Audio/video recording must comply with the following requirements:

- A.** Audio/video recordings must be provided to the Engineer on DVDs suitable for viewing on a personal computer. Provide a sample DVD to the Engineer for approval prior to beginning the recording of actual properties. The sample DVD must include both audio and video recordings for review by the Engineer for general conformance to these requirements.
- B.** Each recording must begin with the Owner's name, Contract name and number, Contractor's name, date, and location information such as street name, direction of travel, and viewing side.
- C.** Information appearing on the recording must be continuous. No editing or overlaying of information at a later date will be acceptable.
- D.** Digital information to appear in the upper left corner must be as follows:
 - (i) Name of Contractor
 - (ii) Day, date, and time
 - (iii) Name of Project and Specification Section Number
- E.** Time must be accurate and continuously generated.
- F.** Written documentation must coincide with the information on the recording so as to make easy retrieval at a later date of locations sought.
- G.** The video system must have the capability to transfer individual frames of video electronically into high quality hard copy prints or photographic negatives.
- H.** Audio must be recorded at the same time as the video recording and must have the same information as on the viewing screen. Special commentary must be given for unusual conditions of structures.
- I.** All DVDs must bear labels with the following information:
 - (i) DVD Number
 - (ii) Owner's Name
 - (iii) Date of Recording
 - (iv) Project Name and Number
- J.** Prior to commencement of audio/video recording, the Contractor must notify the Engineer in writing when and where the audio/video recording will begin. The Engineer may provide a designated representative to accompany and oversee coverage of all recording operations.

Audio/video recording completed without an Engineering representative present will be unacceptable unless specifically authorized by the Engineer.

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2-20.3(4) INSTRUMENT INSTALLATION

The Contractor must install survey benchmarks and movement points at least 5 calendar days prior to beginning construction or earlier if necessary to meet the instrument monitoring schedule. The Contractor must establish a benchmark a minimum of 500 feet from the project site.

Installations at locations different from specified location or approved monitoring plan require the Engineer's prior written acceptance.

The Contractor must place vibration monitors on the structure surface of the structures being monitored. Geophones must be installed in accordance with the manufacturer's recommendations. Geophones must be oriented towards the construction activity.

2-20.3(5) PROTECTION AND MAINTENANCE

The Contractor must protect and maintain all instruments. The Contractor must repair or replace damaged or missing instrument or entire instruments as required at no additional cost to the Owner within 24 hours of detection of damage.

2-20.3(6) INSTRUMENT MONITORING SCHEDULE

The Contractor must make initial readings on all instruments. The Contractor must take at least four sets of initial baseline measurements and readings, comparable and equal within the rated instrument accuracy, at all of the monitoring points specified herein, before adjacent construction is started. The Contractor must take additional readings of the monitoring points until at least two comparable sets are obtained, which are within the rated instrument or survey accuracy.

The Contractor must monitor and report on all instruments on the schedule described below:

Monitor all monitoring points twice daily within 30 feet of vibration- or deformation-causing construction activities, or other activities likely to cause soil displacements. Readings must then be taken not less than weekly for one month after the cessation of these activities and then one last reading immediately prior to removal of the instruments.

Conduct continuous measurements of vibration of the structures closest to where vibration-causing construction activities are used to construct foundation elements within 100 feet (horizontally) of the monitored structures. Move vibration monitors as necessary to monitor the structures closest to the active construction activity or as specified by the Engineer. In cases of conflict between construction activities that require monitoring along the project corridor, place vibration monitors at locations approved by the Engineer. The Contractor must demonstrate that the vibration levels are below the threshold values specified herein at all times.

Should the Contractor's measures fail to maintain displacements or vibrations within the allowable limits, the Engineer reserves the right to stop work at no additional expense to the Owner until the Contractor implements measures in accordance with the approved contingency plan.

The Contractor must provide unrestricted access to all instruments and monitoring points to the Engineer. The Engineer reserves the right to take measurements of the instruments and monitoring points. The Contractor must provide the Engineer with

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equipment necessary, except for survey equipment, to take measurements within 8 hours of request. In addition, the Engineer may request additional monitoring and the Contractor must take the measurements within 8 hours after the request.

2-20.3(7) REMOVAL OF INSTRUMENTS

All Monitoring Points installed by the Contractor, must be removed at the end of the contract and the areas restored to the conditions existing before installation of the Monitoring Points.

2-20.3(8) GEOTECHNICAL INSTRUMENT LOCATIONS

The locations of geotechnical instrumentation shall be installed as specified herein. For structure movement monitoring measurements, the monitoring devices shall be installed at the most visible locations approximately 5-ft above the ground surface on the north and south column of the existing piers 6 and 5, which are protected in place during construction. For structure vibration monitoring measurements, the vibration monitor mounts shall be located as close as possible to the walkway surface of the monitored existing Marion Street pedestrian bridge, which remains operating during the construction of new Marion Street approach pedestrian bridge foundations at piers 3, 4 and 5. The Contractor must install the instruments as close as practicable to the locations specified herein. The Contractor must adjust the locations for actual conditions in the field. The exact locations of instruments must be field-determined and must be approved by the Engineer prior to installation.

The Contractor must obtain vibration monitoring measurements for the existing Marion Street pedestrian bridge (protect in place) at the bridge deck level from a location closest to where vibration-causing construction activities are within 100 feet of the existing Marion Street pedestrian bridge and from approximately the middle of Western Avenue at the bridge deck level. The geotechnical instrument shall not impede the pedestrian walkway usage. The installation of geophones, and their locations, must be subject to approval by the Engineer.

2-20.4 MEASUREMENT

The Contractor must determine the number of vibration monitors required to perform the Work based on the Contractor's schedule for completing the Work in this Contract.

Measurement for "**Movement Monitoring (Description)**" will be per lump sum.

Measurement for "**Vibration Monitoring (Description)**" will be per lump sum

Measurement for "**Pre-Construction and Post-Construction Structure Inspection (Description)**" will be per lump sum.

Measurement for "**Structure Inspection Surveys (Description)**" will be per lump sum.

2-20.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-20 will be made at the Bid Item prices. Bid only for the Bid Items listed or referenced as follows:

"Movement Monitoring (Description)", per lump sum

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The Bid Item price for “Movement Monitoring (Description)” must be full pay for performing the work as specified, including furnishing, installing, monitoring, reporting, maintaining, and removing movement monitoring instruments for the entire project.

“Vibration Monitoring (Description)”, per lump sum.

The Bid Item price for “Vibration Monitoring (Description)” must be full pay for performing the work as specified, including furnishing, installing, monitoring, reporting, maintaining, and removing vibration monitoring instruments for the Contract.

“Pre-Construction and Post-Construction Structure Inspection (Description)”, per lump sum.

The Bid Item price for “Pre-Construction and Post-Construction Structure Inspection (Description)” must be full pay for performing the pre-construction and post-construction inspection of structures specified herein for the Contract.

“Structure Inspection Surveys (Description)”, per lump sum.

The Bid Item price for “Structure Inspection Surveys (Description)” must be full pay for performing the structure inspection surveys specified herein for the Contract.

DIVISION 4: BASES

4-01 MINERAL AGGREGATES

4-01.5 PAYMENT (GSP 10-09-17)

Delete the first 2 paragraphs under Item 3, and replace them with the following:

Unless included in other Bid Items for payment, the Bid Item price for “Mineral Aggregate, (Type)” for backfill of walls and utility trenches includes all costs for the work required by the cubic yard in place as determined by the neat lines shown on the Drawings or Standard Plans less the volume of pipes and Structures greater than 6 inches outside diameter or other minor Structures greater than 1 cubic yard.

Unless included in other Bid Items for payment, the Bid Item price for “Mineral Aggregate, (Type)” backfill of foundations and drains, except behind a wall, includes all costs for the work required by the cubic yard in place as determined by the neat lines shown on the Drawings or the Standard Plans. Payment for minor and local quantities of backfill for drains surrounding weep holes of 1 cubic yard or less will be included in the Bid Item price for concrete in place per Section 6-02.5 and no separate or additional payment will be made.

Add 1-J

5-05.3 CONSTRUCTION REQUIREMENTS

Add the following:

DIVISION 5: SURFACE TREATMENTS AND PAVEMENTS

5-05.3(22)

CONCRETE COLLARS

Contractor must install concrete collars in accordance with the SCL Construction Standard 0223.33 at the locations shown in the plans.

5-05.4 MEASUREMENT (SP 03-14-16)

Add 1-K

~~Add the following:~~ *Replace with the following:*
Measurement for "Concrete Collars" will be per lump sum.
~~Measurement for "Concrete Collar" will be per each.~~

5-05.5 PAYMENT (SP 03-14-16)

~~Add the following:~~

Add 1-L

~~14. "Concrete Collar", per each.~~

~~The Bid Item price for "Concrete Collar" must include all costs for the work required to furnish and install the concrete collar and reinforcing steel as shown in the SCL Construction Standard.~~

Replace with the following:

14. "Concrete Collars" per lump sum.

The Bid Item price for "Concrete Collars" must include all costs for the work required to furnish and install the concrete collars indicated on the Drawings and as required by SCL Construction Standard 0223.33.

DIVISION 6: STRUCTURES

Add 2-J

6-01 GENERAL REQUIREMENTS – STRUCTURES

6-01.8 WORKING DRAWINGS (GSP 06-25-18)

This section is deleted and replaced with the following:

All working drawings (Shop Drawings) required for bridges and other Structures must conform to Section 1-05.3 Submittals.

Add the following:

For proprietary products and elements required for the bridges and other Structures, Contractor must submit product data for Engineer review prior to construction and/or application. This includes Evazote, Cordek, joint material, grating, and non-skid paint.

6-02 CEMENT CONCRETE STRUCTURES AND CEMENT CONCRETE FOR MISCELLANEOUS WORK

6-02.1 DESCRIPTION (SP 07 22-19)

Supplement this Section with the following:

This Section also provides concrete requirements for the concrete elevator pit and associated column anchorages for the elevator tower, electrical room floor, and upper plaza slab.

6-02.2 MATERIALS

Supplement this Section with the following:

6-02.2(1) JOINT TREATMENTS (SP 07 22-19)

Evazote EV30 or approved equivalent material must be placed at concrete joints and at columns as specified on the Drawings.

6-02.2(2) RESIN BONDED ANCHORS (SP 12-12-19)

The resin bonded anchor system must include the nut, washer, and threaded anchor rod, which is installed into hardened concrete with a resin bonding material.

Resin bonding material used in overhead and horizontal application must be specifically recommended by the resin manufacturer for those applications.

Resin bonding material used in submerged liquid environment must be specifically recommended by the resin manufacturer for this application.

The resin bonded anchor system must conform to the following requirements:

1. Threaded Anchor Rod and Nuts

Threaded anchor rods must conform to ASTM A193, Grade B7, or ASTM A449, except as otherwise noted, and be fully threaded. Threaded anchor rods for stainless steel resin bonded anchor systems must conform to ASTM F593 and must be Type 304 unless otherwise specified.

Nuts must conform to ASTM A563, Grade DH, except as otherwise noted. Nuts for stainless steel resin bonded anchor systems must conform to ASTM F594 and must be Type 304, unless otherwise specified.

Washers must conform to ASTM F436 and must meet the same requirements as the supplied anchor rod, except as otherwise noted. Washers for stainless steel resin bonded anchor systems must conform to ASTM A240 and the geometric requirements of ASME B18.21.1 and must be Type 304 Stainless Steel, unless otherwise specified.

Nuts and threaded anchor rods, except those manufactured of stainless steel, must be galvanized in accordance with AASHTO M232. Galvanized threaded anchor rods must be

tested for embrittlement after galvanizing in accordance with either ASTM A143 (if the rod length is equal to or greater than five times the bolt diameter) or ASTM F606 Section 7 (if the rod length is less than five times the nominal bolt diameter).

Threaded anchor rods used with resin capsules must have the tip of the rod chiseled in accordance with the resin capsule manufacturer's recommendations. Galvanized threaded rods must have the tip chiseled prior to galvanizing.

2. Resin Bonding Material

Resin bonding material must be a two-component epoxy resin conforming to Type IV ASTM C881 or be one of the following:

- a. Vinyl ester resin
- b. Polyester resin
- c. Methacrylate resin

3. Ultimate Anchor Tensile Capacity

Resin bonded anchors must be tested in accordance with ASTM E488 to have the following minimum ultimate tensile load capacity when installed in concrete having a maximum compressive strength of 6,000 pounds per square inch (psi) at the embedment specified below:

Anchor Diameter (inch)	Tensile Capacity (pounds)	Embedment (inch)
3/8	7,800	3-3/8
1/2	12,400	4-1/2
5/8	19,000	5-5/8
3/4	27,200	6-3/4
7/8	32,000	7-7/8
1	41,000	9
1-1/4	70,000	11-1/4

The Contractor must submit items 1 and 2 below to the Engineer for all resin bonded anchor systems. If the resin bonded anchor system and anchor diameter are not listed in the current WSDOT Qualified Products List, the Contractor must also submit item 3 below to the Engineer.

For resin bonded anchor systems that are installed in a submerged liquid environment, the Contractor must submit items 1, 2, and 4 below. If the resin bonded anchor system and anchor diameter are not listed in the current WSDOT Qualified Products List, the Contractor must also submit item 3 below to the Engineer.

1. The resin manufacturer's written installation procedure for the anchors.
2. The manufacturer's certificate of compliance for the threaded anchor rod certifying that the anchor rod meets these requirements.
3. Test results by an independent laboratory certifying that the threaded anchor rod system meets the ultimate anchor tensile load capacity specified in the above table. The tests must be performed in accordance with ASTM E488.
4. For threaded anchors intended to be installed in submerged liquid environments, the Contractor must submit tests performed by an independent laboratory within the past 24 months, which certifies that anchors installed in a submerged environment meet the strength requirements specified in the above table.

6-02.2(3) EPOXY BONDING AGENT FOR SURFACES AND FOR STEEL REINFORCING BAR DOWELS (SP 07 22-19)

Epoxy bonding agent for surfaces must be Type II, as specified in Section 9-26.1. Epoxy bonding agent for steel reinforcing bar dowels must be either Type I or Type IV, as specified in Section 9-26.1. The

grade and class of epoxy bonding agent must be as recommended by the resin manufacturer and approved by the Engineer.

6-02.3 CONSTRUCTION REQUIREMENTS

6-02.3(2)A CONTRACTOR MIX DESIGN (SP 03 14-16)

Supplement this Section with the following:

All Class 4000D concrete must conform to the following requirements (the requirements in Cementitious Requirement for Concrete do not apply):

1. Aggregate must use combined gradation in accordance with Section 9-03.1(4) with a nominal maximum aggregate size of 1-1/2 inches.
2. Permeability must be less than 2,000 coulombs at 56 days in accordance with AASHTO T277.
3. Freeze-thaw durability must be provided by one of the following methods:
 - a. The concrete must maintain an air content between 4.5 and 7.5 percent.
 - b. The concrete must maintain a minimum air content that achieves a durability factor of 90 percent, minimum, after 300 cycles in accordance with AASHTO T 161, Procedure A. This air content must not be less than 3.0 percent. Test samples must be obtained from concrete batches of a minimum of 3.0 cubic yards.
4. Shrinkage at 28 days must be less than 0.032 percent in accordance with AASHTO T 160.
5. Modulus of elasticity must be measured in accordance with ASTM C469.
6. Density must be measured in accordance with ASTM C138.

The Contractor must submit the mix design in accordance with Section 6-02.3(2)A. The submittal must include test reports for all tests listed above that follow the reporting requirements of the AASHTO/ASTM procedures. Mix designs using shrinkage reducing admixture must state the specific quantity required. Samples for testing may be obtained from either laboratory or concrete plant batches. If concrete plant batches are used, the minimum batch size must be 3.0 cubic yards. Testing samples of mixes using shrinkage reducing admixture must use the admixture amount specified in the mix design submittal. The Contractor must submit the mix design to the Engineer at least 30 calendar days prior to the placement of concrete in the bridge deck.

6-02.3(4) READY-MIX CONCRETE

6-02.3(4)D TEMPERATURE AND TIME FOR PLACEMENT

Supplement this Section with the following:

When air temperature is between 80 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

Class 4000D concrete temperatures must remain between 55 and 75 degrees F while the concrete is being placed.

6-02.3(6) PLACING CONCRETE

Supplement this Section with the following:

Contractor must coordinate locations of conduit, junction boxes, and other embedded items with reinforcement locations prior to concrete pour in order to avoid conflicts. Contractor must provide reinforcing shop drawings to show reinforcing layout overlaid with embedded elements for Engineer review prior to concrete placement.

6-02.3(10) BRIDGE DECK AND BRIDGE APPROACH SLABS

6-02.3(10)D CONCRETE PLACEMENT, FINISHING, AND TEXTURING

Supplement this Section with the following:

6-02.3(10)D1 PLACING BRIDGE DECK CONCRETE

TEST SLAB USING BRIDGE DECK CONCRETE

After the Contractor receives the Engineer's approval for the Class 4000D concrete mix design, and a minimum of 7 calendar days prior to the first placement of bridge deck concrete, the Contractor must construct a test slab using concrete of the approved mix design.

The test slab may be constructed on grade, must have a minimum thickness of 8 inches, must have minimum plan dimensions of 10 feet along all four edges and must be square or rectangular.

During construction of the test slab, the Contractor must demonstrate concrete sampling and testing, use of the concrete temperature monitoring system, the concrete fogging system, concrete placement system, and the concrete finishing operation. The Contractor must conduct the demonstration using the same type of equipment to be used for the production bridge decks, except that the Contractor may elect to finish the test slab with a hand-operated strike-board.

After the construction of the test slab and the demonstration of bridge deck construction operations is complete, the Contractor must remove and dispose of the test slab in accordance with Section 2-02.3.

6-02.3(10)D2 MONITORING CONCRETE TEMPERATURE AFTER PLACEMENT

The Contractor must measure and record the concrete temperature and ambient temperature a minimum of every hour for seven calendar days after concrete placement. The Contractor must place two temperature sensors in the bridge deck at locations specified by the Engineer. The Contractor must measure ambient temperature near the locations where concrete temperature is being measured. When the bridge deck is being enclosed and heated to meet cold weather requirements, ambient temperature readings must be taken within the enclosure. Submit the concrete temperature and ambient temperature data in spreadsheet format within 14 calendar days from placing the bridge deck concrete.

The Contractor must submit the type and model of each device and the method used to measure and record the temperatures. The placement and operation of the temperature monitoring devices will be an agenda item at the pre-concreting conference for the first bridge deck to be cast.

6-02.3(11) CURING CONCRETE (SP 03 14-16)

Supplement this Section with the following:

6-02.3(11)B CURING BRIDGE DECKS

6-02.3(11)B1 EQUIPMENT

The Contractor must maintain a wet sheen, without developing pooling or sheeting water, using a fogging apparatus consisting of pressure washers with a minimum nozzle output of 1,500 psi, or other means approved by the Engineer.

The Contractor must submit a bridge deck curing plan to the Engineer a minimum 14 calendar days prior to the pre-concreting conference. The Contractor's plan must describe the sequence and timing that will be used to fog the bridge deck, apply pre-soaked burlap, install soaker hoses and cover the deck with white reflective sheeting.

6-02.3(11)B2 CURING

The fogging apparatus must be in place and charged for fogging prior to beginning concrete placement for the bridge deck.

The Contractor must presoak all burlap to be used to cover the deck during curing.

Immediately after the finishing machine passes over finished concrete, the Contractor must implement the following tasks:

1. Fog the bridge deck while maintaining a wet sheen without developing pooling or sheeting water.
2. Apply the presoaked burlap to the top surface to fully cover the deck without damaging the finish, other than minor marring of the concrete surface. Do not apply curing compound.
3. Continue to keep the burlap wet by fog spraying until the burlap is covered by soaker hoses and white reflective sheeting. Place the soaker hoses and white reflective sheeting after the concrete has achieved initial set. Charge the soaker hoses frequently so as to keep the burlap covering the entire deck wet during the course of curing.

The wet curing regime as described must remain in place for at least 14 consecutive calendar days.

6-02.3(13) EXPANSION JOINTS (SP 07 22-19)

Supplement this Section with the following:

The expansion joints at the stair corbel and at the west stair end must be Delastic LS Pourable Bridge Seal by D.S. Brown, or approved equal. Expansion joint widths must be as specified on the Drawings.

Compression seal must be provided at joint between the bridge and elevator plaza, as specified on the Drawings.

The expansion joint system must be installed in accordance with the manufacturer's written recommendations. The Contractor must submit the manufacturer's written installation procedure to the Engineer prior to installing the expansion joint system.

After the joint system is installed, the joint area must be flooded with water and inspected, from below the joint, for leakage. If leakage is observed, the joint system must be repaired by the Contractor, as recommended by the manufacturer and approved by the Engineer, at no additional cost to the Owner.

6-02.3(14) FINISHING CONCRETE SURFACES (SP 07 22-19)

Supplement this Section with the following:

The bridge deck must receive a sand blasted finish to a nominal amplitude of 1/16 inch along the walking surface.

1. Abrasive-Blast Finish: Provide abrasive-blast finish for bridge deck where indicated on the Drawings. Abrasive-blast finish is noted as "sandblast" or "sandblasted" on the Drawings.
 - a. Contractor to produce 4'x4' mockup of proposed bridge deck finish for approval by Engineer.
 - b. Perform abrasive blasting 24 to 72 hours after casting.
 - c. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be abrasive blasted are treated at the same age for uniform results.
2. Surface Continuity: Perform abrasive blast finishing in as continuous an operation as possible, utilizing same work crew to maintain continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference mock-up.
3. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mock-up, as follows:
 - a. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color. Maximum reveal 1/16-inch.
4. Concrete Cleaning: After abrasive blasting to required depth is completed, clean surface with commercial concrete cleaner according to the manufacturer's instructions and recommendations.
 - a. Thoroughly neutralize and flush cleaning solution from finished surfaces with water under pressure.
 - b. Protect adjacent materials and finishes from washing and run-off.

6-02.3(14)C PIGMENTED SEALER FOR CONCRETE SURFACES (SP 07 22-19)

Supplement this Section with the following:

The color of the pigmented sealer must be: "Insignia White."

6-02.3(17) FALSEWORK AND FORMWORK

Supplement this Section with the following:

Contractor must survey the formwork top of curb line at one foot increments along south deck edge and submit for Engineer's approval prior to pouring the curb and/or deck.

Contractor must clearly mark out locations of guardrail and screen wall posts and anchors along forms to verify that locations match intended design.

6-02.3(17)C FALSEWORK AND FORMWORK AT SPECIAL LOCATIONS (SP 07 22-19)

Supplement this Section with the following:

Access to the loading bays must be maintained during construction as specified on the Drawings. Temporary structures, falsework, and formwork must be placed outside of the required clearance envelope(s) for the loading bay(s).

6-02.3(18) PLACING ANCHOR BOLTS (SP 07 22-19)

This section is deleted and replaced with the following:

The Contractor must comply with the following requirements in setting anchor bolts in piers, abutments, deck curbs, or pedestals:

1. If the bolts are set in drilled holes, hole diameter must exceed bolt diameter by at least 1 inch.
2. Grouting must comply with Section 6-02.3(20).
3. Hole locations for railing posts must be set prior to pouring curbs using embedded PVC pipe with an O.D. half the final drilled hole diameter, or similar method, to eliminate rebar conflicts.

ALTERNATIVELY, CONTRACTOR MAY CHOOSE TO CAST ANCHORS FOR RAILING POSTS DIRECTLY IN DECK CURBS DURING CONCRETE PLACEMENT. "USE RESIN-BONDED ANCHORS ALONG THE WESTERN AVE SIDEWALK CURBS AS SHOWN IN THE DRAWINGS.6-02.3(18)A RESIN BONDED ANCHORS (SP 12-12-19)

The embedment depth of the anchors must be as specified in the Drawings. If the embedment depth of the anchor is not specified in the Drawings, then the embedment depth must be as specified in the table of minimum and maximum torque below.

The anchors must be installed in accordance with the resin manufacturer's written procedure.

Holes must be drilled as specified in the Drawings. Holes may be drilled with a rotary hammer drill when core drilling is not specified in the Drawings. If holes are core drilled, the sides of the holes must be roughened with a rotary hammer drill after core drilling.

Holes must be prepared in accordance with the resin manufacturer's recommendations and must meet the minimum requirements as specified in the Contract Documents. Holes drilled into concrete must be thoroughly cleaned of debris, dust, and laitance prior to installing the threaded rod and resin bonding material. Holes must not have any standing liquid at the time of installation of the threaded anchor rod.

The anchor nuts must be tightened to the following torques when the embedment equals or exceeds the minimum embedment specified.

Anchor Diameter (inch)	Minimum Torque (ft-lbs)	Maximum Torque (ft-lbs)	Minimum Embedment (inch)
3/8	12	18	3-3/8

1/2	22	35	4-1/2
5/8	55	80	5-5/8
3/4	106	140	6-3/4
7/8	165	190	7-7/8
1	195	225	9
1-1/4	370	525	11-1/4

When the anchor embedment depth is less than the minimum values specified, the anchor nuts must be tightened to the torque values specified in the Drawings, or as recommended by the resin bonded anchor system manufacturer and approved by the Engineer.

6-02.3(19) BRIDGE BEARINGS

This section is deleted and replaced with the following:

Reinforced elastomer pad bearings must be provided at locations as shown on the Drawings.

The Contractor must design the bearing assemblies based on the current AASHTO LRFD Bridge Design Specifications, including latest interims, and also based on the following:

1. The bearing assembly design requirements for loads, movements, and rotations must be as shown on the Drawings.
2. The bearing assembly must be removable and replaceable by raising the bridge superstructure 1/8 inch maximum.

The Contractor may submit design calculations for all the bearing components to the Engineer for approval. The design calculations must accompany the shop Drawings. The calculations must provide, but not be limited to the following information:

1. Compressive stresses in the bearing due to applied loads at maximum design load and eccentricity.
2. Concrete bearing pressure under the bearing at maximum bearing pressure and eccentricity.

The Contractor must not begin bearing fabrication until receiving the Engineer's written approval of the calculations.

The Contractor must submit shop drawings to the Engineer for approval in accordance with Section 6-03.3(7). These drawings must include but not be limited to the following information:

1. Minimum and maximum horizontal and vertical service loads.
2. Magnitude and direction of movements at all bearing support points.
3. Minimum and maximum rotation capacity.
4. Construction rotation requirements, per the Contractor's approved construction sequence.
5. Plan and elevation of the assembled bearing and each of the components showing dimensions and tolerances.
6. Complete details of all components and sections showing all materials incorporated into the bearing.
7. All AASHTO, ASTM, and other material designations.
8. All surface finishes, including the corrosion protection method.
9. Bearing manufacturer's recommendations and procedures for bearing assembly shipment, storage, and installation.

The Contractor must not begin fabricating the bearings until receiving the Engineer's approval of the shop drawings.

6-02.3(20) GROUT FOR ANCHOR BOLTS AND BRIDGE BEARINGS (SP 07-25-19)

Supplement this Section with the following:

Grout placed at the following locations must conform to the requirements of this section.

1. Epoxy grout for base plate grout pads at guardrail anchorages.
2. Non-shrink grout for base plate grout pads at elevator tower anchorages.

6-02.3(24) REINFORCEMENT

Supplement this Section with the following:

6-02.3(24)D SPLICING (SP 12-12-19)

6-02.3(24)D1 SPLICING OF HOOP REINFORCEMENT FOR COLUMNS AND SHAFTS

When the Drawings show steel reinforcement bar hoops, the hoops must be spliced by one of the following methods:

1. Resistance butt weld splice, welded in accordance with Section 6-02.3(24)E as supplemented in these Special Provisions.
2. Welded direct butt splice, welded in accordance with Section 6-02.3(24)E as supplemented in these Special Provisions.
3. Welded lap splice if shown in the Drawings, welded in accordance with Section 6-02.3(24)E as supplemented in these Special Provisions.

Resistance Butt Weld Splicing of Hoop Reinforcement for Columns and Shafts

Splicing Quality Control Manager

The Contractor must designate in writing a Splicing Quality Control Manager (SQCM). The SQCM must be responsible for the quality of all hoop reinforcement splicing, including the inspection of materials and workmanship, and submitting, receiving, and approving all correspondence, required Submittals, and reports regarding hoop reinforcement splicing to and from the Engineer.

Splice Sample Test Facilities

Qualification testing and testing of production sample splices must be performed at an independent qualified testing laboratory at no additional expense to the Owner. The laboratory must have the following:

1. Proper facilities, including a tensile testing machine capable of breaking full-size samples of all steel reinforcing bar splices.
2. Operators who have received documented training for performing the testing requirements of ASTM A 370.
3. A record of annual calibration of testing equipment performed by an independent third party that has standards that are traceable to the National Institute of Standards and Technology and a formal reporting procedure, including published test forms. Calibration records must be made available for the Engineer's review upon request.

Splice Qualification Report

The Contractor must submit a Splice Qualification Report. This report must include, at a minimum:

1. Name of the designated Splicing Quality Control Manager (SQCM).
2. Splice material information
3. Names of the operators who will be performing the splicing

4. Descriptions of the positions, locations, equipment, and procedures that will be used in the splice work.
5. Fabricator's Quality Control Manual for the fabrication of hoops including, but not be limited to, the following:
 - a. The pre-production procedures for the qualification of material and equipment.
 - b. The methods and frequencies for performing quality control procedures during production.
 - c. The calibration procedures and calibration frequency for all equipment.
 - d. The welding procedure specification for resistance welding.
 - e. The method for identifying and tracking lots.
6. Certifications from the fabricator for qualifications of operators and procedures based on sample qualification tests performed within the past 24 months of the date of the Splice Qualification Report submittal.
 - a. Each operator must be certified by performing two sample splices for each bar size of each splice type that the operator will be performing in the work.
7. Certified test results for all qualification sample splices, tested by an independent qualified testing laboratory and conforming to the specified production test criteria.

Production Control Splice Test Criteria

For the purpose of hoop reinforcement splice testing, a lot of splices are defined as 200, or a fraction thereof, of the same type of splice for each bar diameter that is used in the work. A production control sample must consist of four splices removed from each lot of completed splices.

The Contractor must select the splices comprising the lot. The Engineer will select the product control sample of four splices to be tested from each lot.

Production control testing must be performed for all hoop reinforcement splices used in the work. Production control samples must be tested in accordance with ASTM A 370.

Sample Test Criteria

After the splices in a lot have been completed, the SQCM must notify the Engineer in writing that the splices in this lot conform to these Specifications and are ready for testing.

At least one week before sample testing, the Contractor must notify the Engineer in writing of the date and location of the testing.

Samples must achieve at least 125 percent of the specified yield strength of the bar. In addition, either necking of the bar or a plateau of the stress-strain curve must be evident at rupture.

Sample Acceptance Criteria

If all four sample splices from a lot conform to the requirements of the Sample Test Criteria subsection of this Special Provision, all splices in the lot represented by the test will be considered acceptable.

If only two or three of the four sample splices from a lot conform to the requirements of the Splice Test Criteria subsection of this Special Provision, the Engineer will select an additional set of four samples for re-test from the same lot of splices. Should any of the four sample splices from this additional test fail to conform to these requirements, all splices in the lot will be rejected.

Should only one sample splice from a lot conform to the requirements of the Splice Test Criteria, subsection of this Special Provision, all splices in the lot will be rejected.

Whenever a lot of splices are rejected, the rejected lot and subsequent lots of splices must not be used in the work until the following requirements are met:

1. The SQCM performs a complete review of the Contractor's quality control process for these splices.
2. A written report is submitted to the Engineer describing the cause of the failure of the splices in this lot and provisions for preventing similar failures in future lots.
3. The Engineer has provided the Contractor with written notification that the report and any corrective action is acceptable.

All bars within a lot must be visually inspected to verify bar offset at the joint doesn't exceed what is permitted in ANSI/AWS D1.4/D1.4M:2011 Section 4.2.1. Any splice with offsets exceeding those as specified in ANSI/AWS D1.4/D1.4M:2011 Section 4.2.1 will be rejected.

Reporting Test Results

A Production Control Test Report for all testing performed on each lot must be prepared by the independent testing laboratory performing the testing and submitted to the SQCM. The report must include the following information for each test:

1. Contract number.
2. Dates received and tested.
3. Lot number.
4. Bar diameter, hoop diameter, and bar length.
5. Type of splice.
6. Length of test specimen.
7. Physical condition of the test sample splice and description of break and location in relation to splice.
8. Any noticeable defects.
9. Ultimate tensile strength of each splice.

The SQCM must review, approve with a signature, and submit each Production Control Test Report as a working drawing. The Contractor must not encase the splices represented by the report in concrete until receiving the Engineer's written response to the Submittal.

Welded Direct Butt Splicing of Hoop Reinforcement for Columns and Shafts

Welded Direct Butt Splices

Welded direct butt splices must be complete joint penetration butt welds conforming to ANSI/AWS D1.4/D1.4M figure 3.2. Split pipe backing must not be used.

Thermite welding is not allowed.

Nondestructive Splice Tests

Radiographic examinations must be performed on 25 percent of all complete joint penetration butt welded splices from a lot defined as 200, or a fraction thereof, of the same type of splice for each bar diameter that is used in the work.

All splices must be 100 percent visually inspected.

All required radiographic examinations must be performed by the Contractor in accordance with ANSI/AWS D1.4/D1.4M and as specified below.

Before radiographic examination, welds must conform to ANSI/AWS D1.4/D1.4M Section 4.4.

Radiographic acceptance must be in accordance with ANSI/AWS D1.4/D1.4M Table 4.1.

Should more than 12 percent of the splices which have been radiographically examined in any lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same lot, must be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same lot be defective, all remaining splices in the lot must be radiographically examined.

All defects must be repaired in accordance with ANSI/AWS D1.4/D1.4M, latest edition.

The Contractor must notify the Engineer in writing a minimum of 48 hours before performing any radiographic examinations.

The radiographic procedure used must conform to ANSI/AWS D1.1, ANSI/AWS D1.4/D1.4M Section 7.9, and the following:

1. Two exposures must be made for each splice. For each of the two exposures, the radiation source must be centered on each bar to be radiographed. The first exposure must be made with the radiation source placed at zero degrees from the top of the weld and perpendicular to the weld root and identified with a station mark of "0". The second exposure must be at 90 degrees to the "0" station mark and must be identified with a station mark of "90". When obstructions prevent a 90-degree placement of the radiation source for the second exposure, and when approved in writing by the Engineer, the source may be rotated, around the centerline of the steel reinforcing bar, a maximum of 25 degrees.
2. If more than one weld is to be radiographed during one exposure, the angle between the root line of each weld and the direction to the radiation source must not be less than 65 degrees.
3. Radiographs must be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays must have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays must be from the iridium 192 isotope and the emitting specimen must not exceed 0.18 inches in the greatest diagonal dimension.
4. The radiographic film must be placed perpendicular to the radiation source at all times; parallel to the root line of the weld unless source placement determines that the film must be turned; and as close to the root of the weld as possible.
5. The minimum source to film distance must be maintained so as to ensure that all radiographs maintain a maximum geometric unsharpness of 0.020 at all times, regardless of the size of the steel reinforcing bars.
6. Penetrameters must be placed on the source side of the bar and perpendicular to the radiation source at all times. One penetrometer must be placed in the center of each bar to be radiographed, perpendicular to the weld root, and adjacent to the weld. Penetrometer images must not appear in the weld area.
7. When radiography of more than one weld is being performed per exposure, each exposure must have a minimum of one penetrometer per bar, or three penetrameters per exposure. When three penetrameters per exposure are used, one penetrometer must be placed on each of the two outermost bars of the exposure, and the remaining penetrometer must be placed on a centrally located bar.
8. An allowable weld buildup of 0.16 inch may be added to the total material thickness when determining the proper penetrometer selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrometer blocks must not be used.
9. Penetrameters must be sufficiently shimmed using a radiographically identical material. Penetrometer image densities must be a minimum of 2.0 and a maximum of 3.6.
10. Radiographic film must be Class 1, regardless of the size of the steel reinforcing bars.
11. Radiographs must be free of film artifacts and processing defects, including, but not limited to, streaks, scratches, pressure marks or marks made for the purpose of identifying film or welding indications.

12. Each splice must be identified on each radiograph and the radiograph identification and marking system must be established between the Contractor and the Engineer before radiographic inspection begins. Film must be identified by lead numbers only; etching, flashing or writing in identifications of any kind will not be permitted. Each piece of film identification information must be legible and must include, as a minimum, the following information:

- a. The Contractor's name.
- b. The name of the nondestructive testing firm.
- c. Contract number.
- d. Date of the test.
- e. Initials of the radiographer.
- f. Part number.
- g. Weld number.

The letter "R" and repair number must be placed directly after the weld number to designate a radiograph of a repaired weld.

13. Radiographic film must be developed within a time range of one minute less to one minute more than the film manufacturer's recommended maximum development time. Sight development will not be allowed.

14. Processing chemistry must be done with a consistent mixture and quality, and processing rinses and tanks must be clean to ensure proper results. Records of all developing processes and any chemical changes to the developing processes must be kept and furnished to the Engineer upon request. The Engineer may request, at any time, that a sheet of unexposed film be processed in the presence of the Engineer to verify processing chemical and rinse quality.

15. The results of all radiographic interpretations must be recorded on a signed certification and a copy kept with the film packet.

Technique sheets prepared in accordance with ASME Boiler and Pressure Vessels Code Section V, Article 2, Section T-291 must also contain the developer temperature, developing time, fixing duration and all rinse times.

The Contractor must maintain the radiographs and the radiographic inspection report(s) in the shop until the Engineer reviews them or requests copies. If the Engineer reviews them in the shop then the film and reports must be released to the Engineer for permanent record keeping at that time. If copies are requested, the Contractor must submit a working drawing consisting of the film and a PDF or two paper copies of the radiographic inspection report. Adequate facilities and equipment must be provided the Engineer for examining film, if performed in the shop.

If the Engineer has not reviewed the film and reports in the shop or requested copies within ten (10) working days of completion of the lot, the Contractor must submit a working drawing consisting of the film and reports.

Welded Lap Splicing of Hoop Reinforcement for Shafts

All production splices must be 100 percent visually inspected for weld quality, size and length.

All welded splices of hoop reinforcement must be welded in the shop.

6-02.3(24)I DRILLING HOLES FOR, AND SETTING, STEEL REINFORCING BAR DOWELS (SP 07-22-19)

Where called for in the Drawings, holes must be drilled into existing concrete to the size and dimension shown in the Drawings. The Contractor may use any method for drilling the holes provided the method

selected does not damage the concrete and the steel reinforcing bar that is to remain. Core drilling will be required when specifically noted in the Drawings.

The Contractor must exercise care in locating and drilling the holes to avoid damage to existing steel reinforcing bars and concrete. Location of the holes may be shifted slightly with the approval of the Engineer to avoid damaging the existing steel reinforcing bars. All damage caused by the Contractor's operations must be repaired by the Contractor at no cost to the Owner, and the repair must be as approved by the Engineer.

Set steel reinforcing bars into the holes noted in the Drawings with epoxy resin. The holes must be blown clean with dry compressed air before placing the resin.

The Contractor must demonstrate, to the satisfaction of the Engineer, that the method used for setting the steel reinforcing bars completely fills the void between the steel reinforcing bar and the concrete with epoxy resin. Dams must be placed at the front of the holes to confine the epoxy and must not be removed until the epoxy has cured in the hole.

6-02.4 MEASUREMENT (SP 07-22-19)

Supplement this Section with the following:

"Superstructure (Union Street Pedestrian Bridge and Stairs)" will be per lump sum.

The bid item "Superstructure (Union Street Pedestrian Bridge and Stairs)" contains the following approximate quantities of materials and work:

Superstructure Falsework	1 EA
Epoxy-Coated St. Reinf. Bar (Grade 60)	17,000 LBS
St. Reinf. Bar (Grade 60)	16,000 LBS
Concrete Class 4000D	74 CY
Concrete Class 4000	50 CY
Elastomeric Bearing Pads	2 EA
Eastern Jump Span Steel Plate	2,460 LBS
Eastern Jump Span Steel Angle	180 LBS
Bridge Expansion Joint – Compression Seal	1 EA
Bridge Expansion Joint – Hot Poured Seal	2 EA
Evazote EV30	1 LS
Survey Monuments for Joint Monitoring	1 LS

The quantities listed only for the convenience of the Contractor to assist in determining the volume of work involved and are not guaranteed to be accurate. The prospective bidders must verify these quantities prior to submitting a bid. No adjustments other than for approved changes will be made to the lump sum contract price for "Superstructure – Union Street Pedestrian Bridge and Stairs" should the actual quantities required deviate from those listed.

Measurement for "Concrete Curb at Existing Western Avenue Wall" will be per lump sum.

6-02.5 PAYMENT (SP 07-22-19)

Supplement this Section with the following:

Add 2-K For the purposes of payment, such bridge structure items as butyl sheeting, Evazote filler, etc. for which there is no pay item included in the proposal, are considered as bridge structure minor items. ~~All costs in connection with furnishing and installing these bridge structure minor items as shown and noted~~
Replace the last sentence of the first paragraph with the following:
All costs in connection with the furnishing and installing these bridge structure minor items as shown and noted in the Drawings, the standard specifications, and these Special Provisions must be included in "Conc. Class 4000", "Conc Class 5000", and "Superstructure (Union St Ped Bridge & Stairs)". "Conc. Class 4000 for Bridge (Union St Ped Bridge)" includes concrete for pier columns. "Conc. Class 5000 for Bridge (Union St Ped Bridge)" includes concrete for stair pile cap and elevator pit foundation and pile cap. For materials relating to drilled shafts, see Section 6-19 Shafts.

Replace the Payment description for No. 1 with the following:

Add 2-K The unit Contract Price per lump sum for "Superstructure (Union St Ped Bridge & Stairs)" must be full pay for all costs in connection with furnishing all materials, labor, tools, and equipment necessary to construct the superstructure as shown on the Drawings including concrete for bridge girders, stair beams, deck slabs, and diaphragms and other associated elements.

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~~in the Drawings, the standard specifications, and these Special Provisions must be included in "Conc. Class 4000" and "Superstructure Union Street Pedestrian Bridge and Stairs".~~

1. **"Superstructure – Union Street Pedestrian Bridge and Stairs"**, per lump sum

~~The unit Contract Price per lump sum for "Superstructure Union Street Pedestrian Bridge and Stairs" must be full pay for all costs in connection with furnishing all actual materials, labor, tools, and equipment necessary to construct superstructure as shown in the Drawings.~~

2. **"Concrete Curb at Existing Western Avenue Wall"**, per lump sum.

The lump sum Contract Price for "Concrete Curb at Existing Western Avenue Wall" must be full pay for all costs in connection with furnishing all materials, labor, tools, and equipment necessary to construct the reinforced concrete curb at the existing retaining wall and sidewalk slab as specified and as shown in the Drawings, including roughening and cleaning the top of wall or sidewalk and attaching the curb to the wall or sidewalk with dowels. It also includes the cost of the embedded steel plate at the top of curb at the pedestrian bridge.

Add the following to the end of the section:

3. **"Con. Class 4000 for Bridge (Union St Ped Bridge)"**, per cubic yard is for all work associated with pier columns.
4. **"Con. Class 5000 for Bridge (Union St Ped Bridge)"**, per cubic yard is for all work associated with stair pile cap, elevator foundation and pier pile cap.
5. **"Steel Reinforcement Bar for Bridge (Union St Ped Bridge)"**, per pound is for all reinforcing steel in pier columns, stair pile cap, and elevator pit foundation/pile cap.

Add 4-C

6-07 PAINTING

6-07.3(9) PAINTING NEW STEEL STRUCTURES

Replace second sentence of second paragraph with the following:

Stainless steel surfaces are not required to be painted, with the exception of coatings on stainless steel walking surfaces as noted on the Drawings (sheet ST41).

Supplement Division 6 with the following:

6-12 PILES (SP 2-10-20)

6-12.1 DESCRIPTION

6-12.1(1) GENERAL DESCRIPTION

This Work consists of constructing micropiles as shown on the Drawings and approved working drawings and as specified herein. The Contractor is responsible for furnishing of all design, materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing techniques required for design, installation and testing of micropiles and micropile top attachments for this project.

The Contractor must select the micropile construction type, installation means and methods, estimate the ground-grout bond value and determine the required grout bond length. The Contractor must design and install micropiles that will develop the load capacities indicated on the Drawings. The micropile load capacities must be verified by proof load testing as required and must meet the test acceptance criteria specified herein.

6-12.1(2) SYSTEM DESCRIPTION

The micropiles specified herein consist of small diameter steel pipe casing with a sheathed double corrosion protected (DCP) threadbar centered in the pipe and extending below the base of the pipe in a drilled hole in the underlying till-like layers (bond length). The load-bearing component of the micropile is the untensioned threadbar that is pressure grouted below the base of the pipe. The threadbars are kept in the center of the pipe and drilled hole by centralizers.

The double corrosion protection must consist of the following:

- a. Sheathed threadbars, pre-grouted before delivery to site; and
- b. Grouted cylinders formed by grouting the drilled holes and steel pipe casings.

The Work must consist of the following:

- a. Drilling holes through the soil to the minimum lengths indicated on the Drawings.
- b. Installing steel pipe casings through the soil to achieve the minimum penetration into the till-like material as shown on the Drawings and cleaning out the pipes.
- c. Installing sheathed threadbars through the void of the steel pipe casings into the drilled holes in the underlying till-like layers, grouting the drilled holes and testing the threadbars in tension.
- d. Grouting the annulus between the sheathed threadbar and the steel pipe casings, following acceptance of the test results by the Engineer.

The following conditions require special attention:

- a. Abandoned utilities: Given the nature of the brownfield site, there may be potential to encounter old abandoned utilities during drilling.
- b. Cobbles and boulders: Cobbles and boulders may be encountered during drilling in glacially over- consolidated soils, as well as in overlying soils.
- c. Logs and Debris: Logs, old timber piling, and other debris (sawdust, concrete, brick, etc.) may be encountered during drilling.

6-12.1(3) DEFINITIONS

Admixture: Substance added to the grout to control bleed and/or shrinkage, improve flowability, reduce water content, or retard setting time.

Alignment Load (AL): A minimum initial load (5 percent DL maximum) applied to micropile during testing to keep the testing equipment correctly positioned.

Bonded Length: The length of the micropile that is bonded to the ground and transfer the applied axial loads to the surrounding soil. Also known as the load transfer length.

Bond-breaker: A sleeve placed over the steel reinforcement to prevent load transfer.

Casing: Steel tube introduced during the drilling process to temporarily stabilize the drill hole. This is usually withdrawn as the micropile is grouted. Some casing is permanently left in place in the no-load zone to provide added lateral support.

Centralizer: A device to support and position the reinforcing steel in the drill hole and/or so that a minimum grout cover is provided.

Design Load (DL): The LRFD extreme event design load expected to be applied to the micropile during its service life. The design load (DL) is as specified on the contract Drawings.

Free (unbonded) length: The designed length of the micropile that is permanently cased and is not bonded to the surrounding ground or grout. Also known as the no-load zone.

Micropile: A small-diameter, bored, cast-in-place composite pile, in which the applied load is resisted by steel reinforcement, cement grout and frictional grout/ground bond.

Maximum Test Load: The maximum load to which the micropile is subjected during testing.

Nominal Grout-to-Ground Bond Strength: The estimated ultimate geotechnical unit grout-to-ground bond strength selected for use in design. Same as α Bond Nominal Strength (SLD and LFD).

Overburden: Material, natural or placed, that may require cased drilling methods to provide an open borehole to underlying strata.

Plunge Length: The length of the permanent casing that is pushed or plunged down into the pressure grout bulb immediately following pressure grouting.

Post-grouting: The injection of additional grout into the load transfer length of a micropile after the primary grout has set. Also known as re-grouting or secondary grouting.

Pressure Grouting: Portland-cement-based grout injected into the micropile hole after the installation of the reinforcement as the temporary casing is removed (if used) to direct the load transfer to the surrounding ground along the micropile bonded length. Pressure grout is placed under pressure.

Proof Load Test: Incremental loading of a production micropile, recording the total movement at each increment.

Threadbar: The steel component of the micropile that accepts and/or resists applied loadings.

Spacer: A device to separate elements of a multiple-element reinforcement to ensure full bond development of each steel element.

Stressing Length: The sum of the free (unbonded or no-load) length plus the length of the central reinforcing bar from the top of the free length up to the jack loading point.

Tremie Grout: Portland-cement-based grout placed from the bottom of the hole after the reinforcement is installed.

Water: Water used in the grout mix must conform to AASHTO T26 and must be potable, clean, and free from substances that may be injurious to cement and steel.

6-12.2 MATERIALS

6-12.2(1) REFERENCED CODES AND STANDARDS

The following publications form a part of this specification to the extent indicated by the references. The latest publication as of the issue date of this specification must govern, unless indicated otherwise. The soil boring logs are available for review and reference, they are made available for information on factual data only and not as a warranty of subsurface conditions.

ASTM	AASHTO	SPECIFICATION TEST
A36, A572	M183, M223	Structural Steel
A252		Welded and Seamless Steel Pipe Piles
A615	M31	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
A775		Epoxy -Coated Reinforcing Steel Bars
C 33	M80	Concrete Aggregates
C 109	T106	Compressive Strength of Hydraulic Cement Mortar
C 144	M45	Aggregate for Masonry Mortar
C 150	M85	Portland Cement
C 494	M194	Chemical Admixtures for Concrete
D 1143		Method of Testing Micropiles Under Static Axial Compressive Load
D 1784		Polyvinyl Chloride (PVC) Pipe (Class 13464-B)
D 3350	M252	Polyethylene Corrugated Tubing
D 3689		Method of Testing Individual Micropiles Under Static Axial Tensile Load
	T26	Quality of Water to be Used in Concrete

Additionally, the following references from the American Welding Society (AWS) must apply:

- a. D1.1 Structural Welding Code-Steel
- b. D1.2 Structural Welding Code-Reinforcing Steel

6-12.2(1) GENERAL MATERIALS REQUIREMENTS

The Contractor must furnish materials new and without defects. Defective materials must be replaced at no additional cost. Materials for micropiles must consist of the following:

- A. Steel Pipe Casing: Steel pipe casing for micropiles must have the diameter and at least the minimum wall thickness shown on the approved shop drawings. Steel pipe used for micropile permanent casing must incorporate an additional 1/16 inch thickness of sacrificial steel for corrosion protection. Steel pipe micropiles must conform to ASTM A53, Grade B (yield strength of 35 ksi), including tolerances for pipe diameter, edge alignment, end match marking, roundness and straightness and conform to the steel micropile splice welding requirements specified herein.
 - 1. Steel pipe must not be joined by welded lap splicing. Steel pipe seams and splices must be complete penetration welds. Partial welds of steel pipe may be restored to complete penetration welds in conformance with AWS D1.1.
 - 2. The manufacturer or fabricator of steel piping must furnish a certificate of compliance stating that the piping being supplied conforms to these specifications. The certificate of compliance must include test reports for tensile and chemical tests. Samples for testing must be taken from the base metal, steel, coil or from the manufactured or fabricated piling. The certificate of compliance must be in English units.
 - 3. Steel pipe micropile splices that are made in the field must be complete penetration welds and must conform to the requirements of AWS D1.1.
 - 4. Welded circumferential joints in pipe must develop the strength of the pipe section.
 - 5. Threaded pipe joints must develop at least the nominal resistance used in the design of the micropile and must be flush.
- B. Plates and Shapes: Structural steel plates and shapes for micropile top attachments must conform to ASTM A36 / AASHTO M183, or ASTM A572 / AASHTO M223, Grade 50. Hex nuts must be compatible with the threadbar system. Anchorage components must develop 100% of the minimum ultimate strength of the threadbar in tension and compression.
- C. Threadbars: Threadbar must be full-length, straight, undamaged threaded bars in accordance with ASTM A 615/AASHTO M31, Grade 75. Threads must be hot-rolled onto the bar without any reductions to the nominal diameter of the bar. Threadbars must be double corrosion protected over the lengths shown on the Drawings. Threadbars must be centralized and pre-grouted into sheathing prior to insertion in the steel pipe and drilled hole.
- D. Sheathing: Primary sheathing must be 30 mil HDPE or PVC corrugated ducting or approved alternate. Sheathing must be as provided by DYWIDAG Systems International or approved alternate Supplier.
- E. Bar couplers: Splicing of threadbar, if required, must be done with couplers capable of developing 140 percent of the ultimate tensile strength of the bars without evidence of any failure.
- F. Centralizers and Spacers: Centralizers and spacers must be fabricated from schedule 40 PVC pipe or tube, steel, or material non-detrimental to the reinforcing steel. Wood must not be used. Centralizers and spacers must be:
 - 1. securely attached to the reinforcement;
 - 2. sized to position the reinforcement within 3/8 inch of plan location from center of micropile;

3. sized to allow grout tremie pipe insertion to the bottom of the drillhole;
 4. and sized to allow grout to freely flow up the drillhole and casing and between adjacent reinforcing bars.
- G. Grout: Grouting method must be selected by Contractor and approved by the Engineer. Multi-staging grouting may be required. Mix design for grout must be prepared by the Contractor to meet the requirements specified herein.
1. Neat cement or sand/cement mixture with a minimum 3-day compression strength of 3000 psi and a 28-day compressive strength of 4000 psi per AASHTO T106/ASTM C109.
 2. All cement must be Portland cement conforming to ASTM C 150/AASHTO M85, Types II, III or V.
 3. If sand-cement grout is used, sand must conform to ASTM C144/AASHTO M45.
 4. Water must be clean and free from injurious amounts of oil, alkali, organic matter or other deleterious material.
 5. Maximum water/cement ratio must be 0.38.
 6. Admixtures must conform to the requirements of ASTM C494 or AASHTO M194. Admixtures that control bleed, improve flowability, reduce water content, and retard set may be used in the grout, subject to the review and acceptance of the Engineer. Admixtures must be compatible with the grout and mixed in accordance with the manufacturer's recommendations.
 - a. Expansive admixtures must only be added to the grout used for filling sealed encapsulations and anchorage covers and in accordance with manufacturer's directions.
 - b. Accelerators are not permitted.
 - c. Admixtures containing chlorides are not permitted.
 7. Provide minimum one-inch (1") grout cover over threadbars (excluding bar coupler locations).

6-12.3 CONSTRUCTION REQUIREMENTS

6-12.3(1) CONTRACTOR EXPERIENCE REQUIREMENTS

The Contractor or Subcontractor performing this Work must have North American experience in micropile installation for a minimum of 5 years. Prior to the beginning of construction, the Contractor must submit a list containing at least five projects on which the Contractor has micropile installation experience. A brief description of each project and a reference must be included for each project listed. As a minimum, the reference must include an individual's name and current phone number.

The Contractor must assign an engineer to supervise the Work with at least 3 years of experience in the design and construction of micropiles. The Contractor must not use consultants or manufacturer's representatives in order to meet the requirements of this Section. Drill operators and on-site supervisors must have a minimum of 1 year of experience installing micropiles.

The Contractor must allow up to 15 calendar days for the Engineer's review of the qualifications and staff as noted above.

6-12.3(2) SUBMITTALS

Contractor must provide submittal items at least 21 calendar days prior to initiating micropile installation and testing. The Contractor must allow the Engineer 7 calendar days to review the construction submittals after a complete set has been received. Work must not begin until the construction submittals have been received, reviewed, and accepted in writing by the Engineer. Additional time required due to

incomplete or unacceptable submittals must not be cause for delay or impact claims. All costs associated with incomplete or unacceptable Contractor submittals must be the responsibility of the Contractor.

At minimum, the Contractor must submit to the Engineer the following submittals for the micropile system to be constructed:

- A. Detailed step-by-step description of the proposed micropile construction procedure, including personnel, testing and equipment to assure quality control. This step-by-step procedure must be shown on the shop drawings in sufficient detail to allow the Engineer to monitor the construction and quality of the micropiles.
- B. Proposed start date and time schedule and micropile installation schedule providing the following:
 - 1. Micropile number and corresponding design load
 - 2. Type and size of reinforcing steel
 - 3. Minimum total bond length and total micropile length
 - 4. Micropile top footing attachment
- C. If welding of casing is proposed, the Contractor must submit the proposed welding procedure for approval by the Engineer.
- D. Manufacturer's information, model, size, and type of equipment, auger or drill bit sizes to be used for installing micropiles, with appropriate manufacturer's literature for review. Include detailed description of the drilling equipment and methods proposed to be used to provide drillhole support and prevent detrimental ground movements.
- E. Information on headroom and space requirements for installation equipment that verify the proposed equipment can perform at the site. Plan describing how surface water, drill flush, and excess waste grout will be controlled and disposed.
- F. Certified mill test results for all threadbars, together with properly marked samples specifying the guaranteed ultimate strength, yield strength, elongation and chemical composition.
- G. Proposed grouting plan, with complete descriptions, details, and supporting calculations for the following:
 - 1. Grout mix design and type of materials to be used in the grout including certified test data and trial batch reports.
 - 2. Grouting equipment, including capacity and relation to the grouting demand and working conditions as well as provisions for back-up equipment and spare parts.
 - 3. Types and sizes of grout hoses, connections, and grout delivery systems.
 - 4. Methods and equipment for placing, positioning, and supporting the steel pipe casing and reinforcing bars.
 - 5. Methods and equipment for accurately monitoring and recording the grout depth, grout volume and grout pressure as the grout is being placed.
 - 6. Procedures and schedules for grout batching, mixing, and pumping including provisions for handling drilling fluid and for post grouting.
 - 7. Grouting rate calculations, when requested by the Engineer. The calculations must be based on the initial pump pressures or static head on the grout and losses throughout the placing system, including anticipated head of drilling fluid to be displaced.
 - 8. Contingency procedures for handling blockage of ducts or equipment breakdowns.
 - 9. Estimated curing time for grout to achieve specified strength. Previous test results for the proposed grout mix completed within one year of the start of grouting may be submitted for initial sacrificial verification and acceptance and start of production work.

During production, grout must be tested in accordance with the requirements of this Special Provision.

10. Procedure and equipment for Contractor monitoring of grout quality.

- H. Detailed Drawings for the proposed micropile load testing method. This must include all drawings, details, and structural design calculations necessary to clearly describe the proposed test method, reaction load system capacity and equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and micropile top movements in accordance with Section (6-12.3(6) Micropile Load Testing).
- I. Calibration reports and data for each test jack, pressure gauge and master pressure gauge and electronic load cell to be used. The calibration tests must have been performed by an independent testing laboratory, and tests must have been performed within 30 calendar days of the date submitted. Testing must not commence until the Engineer has reviewed and accepted the jack, pressure gauge, master pressure gauge and electronic load cell calibration data.
- J. Shop drawings in accordance with Section 6-01.8. The shop drawings must include all information required for the construction and quality control of the piling. Shop drawings must include, but not be limited to, the following items:
 - 1. A plan view of the micropile structure identifying reference baseline and elevation datum, the offset from the construction centerline or baseline to the face of the micropile structure in horizontal alignment, rights-of-way, locations of all known active and abandoned existing utilities, adjacent structures or other potential interference.
 - 2. An elevation view of the micropile structure(s) identifying micropile locations, elevations, vertical and horizontal spacing.
 - 3. Existing and finish grade profiles both behind and in front of the micropile structure.
 - 4. Design parameters and applicable codes.
 - 5. General notes for constructing the micropile structure including construction sequencing or other special construction requirements.
 - 6. A listing of the summary of quantities on the elevation drawing of each micropile structure showing pay item estimated quantities.
 - 7. Micropile structure typical sections including micropile spacing; minimum drillhole diameter; pipe casing and reinforcing bar sizes and details; splice types and locations; centralizers and spacers; grout bond zone and casing plunge lengths and corrosion protection details; and connection details to the substructure footing, anchorage, plates, etc.
 - 8. Details, dimensions, and schedules for all micropiles, casing and reinforcing steel, including reinforcing bar bending details.
 - 9. Details for terminating micropiles.

The Contractor must revise the approved shop drawings and re-submit for review when plan dimensions are changed due to field conditions or for other reasons.

The Contractor must also provide revised design calculations signed by the approved Registered Professional Engineer for all design changes made during the construction of the micropile structure.

6-12.3(3) PRE-CONSTRUCTION MEETING AND SURVEY

Prior to start of any micropile construction activity, the Contractor and Engineer must jointly inspect the site to observe and document the pre-construction condition of the site, existing structures and facilities. This meeting must be held at least 5 working days prior to the Contractor beginning any micropile Work at

the site to discuss construction procedures, personnel, and equipment to be used. The list of materials specified on the Record of Materials (ROM) form for this item of Work will also be discussed.

To confirm location and extent of existing building foundations, Contractor must excavate and expose the top surface of the pile caps and survey along their north edge using a range pole. Contractor must conduct survey at least 3 months prior to micropile construction and provide survey to Engineer for review.

6-12.3(4) STORAGE AND HANDLING

Any sheathed threadbar that is damaged or defective in any way that could adversely affect the strength or serviceability of the unit will be rejected and must be removed from the Site by the Contractor. Rejected sheathed threadbars must be replaced by new ones at the Contractor's cost.

Prior to transporting the sheathed threadbars, pre-grouting must be allowed to cure at least 48 hours and achieve a minimum compressive strength of 3000 psi. When lifting or transporting the sheathed threadbars, the Contractor must provide slings or other equipment to prevent breaking, cracking or overstressing during handling. Sheathed threadbars must not be handled in a manner that could cause corrosion, large deflections or distortions during handling. Sheathed threadbars must not be dropped during handling and must be protected from impact of any kind.

6-12.3(5) INSTALLATION

The Contractor must select the drilling method, the grouting procedure, and the grouting pressure used for the installation of the micropiles. The Contractor must also determine the micropile casing size, final drillhole diameter and bond length necessary to develop the specified load capacities and load testing requirements.

Micropiles must be installed in the locations shown on the Drawings. Allowable installation tolerances must be as follows:

- A. Centerline of piling must not be more than six inches (6") from indicated plan location.
- B. Micropile must be plumb within 2 percent of total micropile length.
- C. Top elevation of micropile must be plus 1 inch or minus 2 inch maximum from vertical elevation indicated.
- D. Centerline of reinforcing steel must not be more than 1/2 inch from indicated location.

Drilling equipment must be capable of drilling straight and clean holes through materials varying from very soft to extremely hard. Boulders or cobbles may be encountered. The drilling equipment and methods must be suitable for drilling through the conditions to be encountered, without causing damage to any overlying or adjacent structures or services.

- A. The drillhole must be open along its full length to at least the design minimum drillhole diameter prior to placing grout and reinforcement.
- B. Temporary casing or other approved method of micropile drillhole support will be required in caving or unstable ground to permit the micropile shaft to be formed to the minimum design drillhole diameter.
- C. The Contractor's proposed method(s) to provide drillhole support and to prevent detrimental ground movements must be reviewed by the Engineer. Detrimental ground movement is defined as movement which requires remedial repair measures.
- D. Use of drilling fluid containing bentonite is not allowed.
- E. Each drilled hole must be installed at the locations and to the minimum lengths indicated on the Drawings unless otherwise directed by the Engineer.

- F. Cuttings must be flushed from the holes through highly compressed air or other methods acceptable to the Engineer. At final penetration, the drilled hole must be thoroughly cleaned.
- G. Subsidence or other detrimental impact from drilling must be cause for immediate suspension of drilling operations.
- H. Repair of any damage to existing structures due to drilling operations must be by and at the expense of the Contractor.

The tip elevations shown on the Drawings are preliminary estimates of the depths required. The Engineer will establish the final tip elevations for steel pipe casings based on penetration into the sand layer and for sheathed threadbars based on design loads and the results of verification testing. The anticipated tip elevations, maximum tip elevations and design loads (unfactored) are noted on the Drawings.

Steel pipe casings may be advanced into the dense sand by driving, drilling or other suitable means. If driving is used, sufficient lengths of pipe above cut-off must be allowed so that no part of the head of the pipe damaged during driving remains in the Work. Any pipe so damaged as to be unfit for the use for which it is intended and any pipe that cannot be brought within tolerance for location will be rejected. Rejected pipe must be extracted and replaced by new pipe. Costs associated with rejected pipes must be for the Contractor's account.

6-12.3(5)A PIPE CASING AND THREADBAR PLACEMENT

Reinforcement must be placed prior to tremie grouting and before temporary casing (if used) is withdrawn. Reinforcement surface must be free of deleterious substances such as soil, mud, grease or oil that might contaminate the grout or coat the reinforcement and impair bond. The Contractor must check micropile top elevations and adjust all installed micropiles to the planned elevations.

Centralizers and spacers must be provided at 10 feet on center maximum spacing. The upper and lower most centralizer must be located a maximum of 5 feet from the top and bottom of the micropile. Centralizers and spacers must permit the free flow of grout without misalignment of the reinforcing bar(s) and permanent casing. The central reinforcement bars with centralizers must be lowered into the stabilized drill hole and set. The reinforcing steel must be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars must not be driven or forced into the hole. Contractor must re-drill and re-insert reinforcing steel when necessary to facilitate insertion.

6-12.3(5)B GROUTING

Micropiles must be tremie- and pressure-grouted the same day the load transfer bond length is drilled. Prior to grouting, the drillhole must be flushed with water and/or air to remove drill cuttings.

Contractor must have means and methods of measuring the grout quantity and pumping pressure during the grouting operations. The grout pump must be equipped with a pressure gauge to monitor grout pressures. A second pressure gauge must be placed at the point of injection into the micropile top. The pressure gauges must be capable of measuring pressures of at least 150 psi or twice the actual grout pressures used, whichever is greater. Grout must be placed at a minimum of 50 psi.

The grouting equipment used must produce a grout free of lumps and undispersed cement. The grout must be kept in agitation prior to mixing. Grout must be placed within one hour of mixing. The grouting equipment must be sized to enable each micropile to be grouted in one continuous operation.

The tremie grout must be injected from the lowest point of the drill hole and injection must continue until uncontaminated grout flows from the top of the micropile. The grout may be pumped through grout tubes, casing, hollow-stem augers, or drill rods. The tremie pipe must always extend below the level of the existing grout in the drillhole. The grout pressures and grout takes must be controlled to prevent excessive heave or fracturing of soil formations. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout. After grouting, sheathed threadbars must be left undisturbed until the necessary grout strengths have been achieved.

After the entire bond zone is pressure grouted, push/plunge the casing back into the top 3 feet (minimum) of the grout bulb; this constitutes the plunge length. The permanent casing must be installed to elevations as shown on the Drawings.

The Contractor must submit shop drawings and details for the post-grouting system to the Engineer for review in accordance with the requirements of this Special Provision.

6-12.3(5)C GROUND HEAVE OR SUBSIDENCE

During construction, the Contractor must observe the conditions in the vicinity of the micropile construction site on a daily basis for signs of ground heave or subsidence. Immediately notify the Engineer if signs of movements are observed. Contractor must immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile structure is adversely affected, or if adjacent structures are damaged from the drilling or grouting. If the Engineer determines that the movements require corrective action, the Contractor must take corrective actions necessary to stop the movement or perform repairs. When due to the Contractor's methods or operations or failure to follow the specified/approved construction sequence, as determined by the Engineer, the costs of providing corrective actions will be borne by the Contractor. When due to differing site conditions, as determined by the Engineer, the costs of providing corrective actions will be paid as per Standard Specification Section 1-04.4.

6-12.3(6) MICROPILE LOAD TESTING

The Contractor must perform proof testing of micropiles at the locations specified in the Drawings or designated by the Engineer. The proof load tests must be performed in general accordance with ASTM D3689, except as modified herein.

All load testing must be performed in tension. Testing must not be carried out until the grout in the bond length has reached its specified strength.

6-12.3(6)A TESTING EQUIPMENT

Testing equipment must include dial gauges, dial gauge support, jack and pressure gauge, and electronic load cell and a reaction frame. The Contractor must provide a description of test setup and jack, pressure gauge and load cell calibration curves.

Design the testing reaction frame to be sufficiently rigid and of adequate dimensions such that excessive deformation of the testing equipment does not occur. Align the jack, bearing plates, and stressing anchorage such that unloading and repositioning of the equipment will not be required during the test.

Apply and measure the test load with a hydraulic jack and pressure gauge. The pressure gauge must be graduated in 75 psi increments or less. The jack and pressure gauge must have a pressure range not exceeding twice the anticipated maximum test pressure. Jack ram travel must be sufficient to allow the test to be done without resetting the equipment. Measure the micropile top movement (elongation of reinforcing bar) with a dial gauge capable of measuring to 1 mil (0.001 inch). The dial gauge must have a travel sufficient to allow the test to be done without having to reset the gauge. Visually align the gauge to be parallel with the axis of the micropile and support the gauge independently from the jack, micropile or reaction frame. Use a minimum of two dial gauges.

The jack must be independently supported and centered over the threadbar so that it does not carry the weight of the jack. The loads on the threadbars during the verification tests must be monitored with a pressure gauge, electric load cell or other methods acceptable to the Engineer. The Contractor must provide recent calibration curves, not less than one month old, in accordance with submittals. The stressing equipment must be placed over the threadbar in such a manner that the jack, bearing plates, load cell, and stressing anchorage are in alignment. The jack must be positioned at the beginning of the test such that unloading and repositioning the jack during the test will not be required.

The Contractor must supply all material, equipment and labor to perform the tests. The Contractor must measure and record all required data and submit the data to the Engineer for evaluation in an acceptable manner and within 24 hours of test completion. The Contractor's test submission must be signed by a Professional Engineer registered in the State of Washington with appropriate prior experience in conducting similar pile tests.

6-12.3(6)B MICROPILE PERFORMANCE TESTING

A minimum of three (3) performance tests must be carried out on production micropiles. These tests must be carried out prior to the start of production micropile installation so that the embedment length of the sheathed threadbars into native material can be adjusted, if required, and to verify the Contractor's procedures, subsurface conditions and structural capacity. At least one test must be carried out on a vertical micropile and at least one test must be carried out on a battered micropile. The Contractor must propose the micropiles to be performance tested for approval by the Engineer. The performance tested micropiles must be installed to the depths outlined on the Drawings.

Testing must be tested according to performance testing procedures outlined in the latest revision of "Recommendations for Prestressed Rock and Soil Anchors" by the Post Tensioning Institute. For the purpose testing, the design load (DL), must be taken as the working load shown on the Drawings. The Contractor must design, supply, install, dismantle and remove a suitable reaction frame to transfer the test load to the surrounding ground. Jacking against the steel pipe casing will not be permitted.

The Engineer will evaluate the results of the performance tests and adjust the required bond length of subsequent production thread bars accordingly. The Contractor must revise the production threadbar installation schedule to incorporate any increases in the quantity or lengths of threadbars required to satisfy the test acceptance criteria specified herein.

6-12.3(6)C MICROPILE PROOF TESTING

Micropiles not performance tested must be proof tested. The micropiles must be load tested to 133 percent of the estimated LRFD design capacity per ASTM D 3689 and as indicated herein.

The Contractor must submit for review and acceptance the micropile load testing program. The testing program submitted must be provided minimum one week prior to starting the load testing. The load testing program must indicate the minimum following information:

- A. Type of apparatus for measuring the load.
- B. Type of apparatus for applying the load.
- C. Type of apparatus for measuring the micropile deformation.
- D. Type of reaction to load system. Hydraulic jack calibration report within the last 30 days.

If a micropile proof load test fails to meet the design requirements, the micropile Contractor must revise the micropile design and retest the new system. After a failed proof test, additional testing may be required to confirm the acceptability of previously installed production micropiles. Additional testing due to a failed proof test must be at the Contractor's expense.

Proof load tests must be performed to verify the design and construction of production micropiles. All testing must be carried out before the related footings are constructed.

The drilling equipment and method, casing diameter, and pressure/post grouting process for the proof test micropiles must be identical to the other production micropiles. The central reinforcing bar must be proportioned such that the maximum stress does not exceed 80 percent of the ultimate strength of the steel. The jack must be positioned at the beginning of the test such that unloading and repositioning of the jack during the test will not be required.

The proof load tests must be made by incrementally loading the micropile in accordance with the following schedule:

Load	Hold Time	Max Deflection (measured on central reinf bar)
AL ^a	0 minutes	
0.25 DL ^b	5 minutes	
0.50 DL	5 minutes	
0.75 DL	5 minutes	
1.00 DL	5 minutes	
1.33 DL	10 minutes (see text below)	MD ^c
1.00 DL	5 minutes	
0.75 DL	5 minutes	
0.50 DL	5 minutes	
AL	0 minutes	

Notes:

a)AL = alignment load

b)DL = LRFD Extreme Event design load (65 kips)

c)Maximum Deflection = DL x (stressing length + ½ bond length) Area of Central Steel Bar x Modulus of Steel

The test load must be applied in increments of 25 percent of the design load. Each load increment must be held for a minimum of 5 minutes. Measurement of the micropile movement must be obtained at each load increment. The load-hold period at 1.33 DL must start as soon as the test load is applied. Micropile movement, with respect to a fixed reference, must be measured and recorded at 1, 2, 3, 4, 5, 6, and 10 minutes. If during the load hold, the movement of the end of the micropile between 1 and 10 minutes exceeds 0.04 inch, the test hold time must be extended for an additional 50 minutes. Total movement must be measured at 15, 20, 25, 30, 45, and 60 minutes. The load versus movement must be plotted between 1 and 60 minutes as a function of the logarithm of time.

6-12.3(7) GROUT TESTING

Grout within the micropile proof test micropiles must attain the minimum required 28-day compressive strength of 3600 psi prior to load testing. During production, micropile grout must be tested by the Contractor for compressive strength in accordance with AASHTO T106/ASTM C109 at a frequency of no less than one set of three 2 inch diameter grout cubes from each grout plant each day of operation. The compressive strength must be the average of the 3 cubes tested.

Grout consistency as measured by grout density must be determined by the Contractor per ASTM C 188/AASHTO T 133 at a frequency of at least one test per micropile, conducted just prior to the start of micropile grouting. The Baroid Mud Balance is an approved device for determining the grout density.

6-12.3(8) MICROPILE ACCEPTANCE CRITERIA

All acceptance test data must be recorded and made available to the Engineer. Load versus displacement data for each test must be plotted on a load extension graph.

The micropiles must sustain the tension design capacities (1.33 DL) with no more than the calculated maximum deflection of total vertical movement at the top of the micropile (central reinforcing bar) that is measured relative to the top of the micropile prior to the start of testing.

The load test will be considered successful if the micropile meets the criteria for a proof tested micropile in this section and a failure does not occur at the 1.33 DL maximum test load.

A threadbar must be considered acceptable when:

- A. The total movement at the maximum test load exceeds 80% of the theoretical elastic elongation of the unbonded length.
- B. The total movement at the maximum test load is less than 100% of the theoretical elastic elongation of the unbonded length plus 50% of the theoretical elastic elongation of the bond length.

If any threadbar fails the testing, the Contractor must carry out performance testing on all threadbars as directed by the Engineer.

Any threadbar that fails during proof or performance testing must be abandoned and replaced with a new micropile, complete with sheathed threadbar, steel pipe casing and grouting, to be installed in a location designated by the Engineer. If the failure is shown to be due to poor workmanship or failure of any materials, the Contractor must bear the expense of the replacement micropile, re-testing of the new threadbar and the costs of all additional threadbar tests ordered by the Engineer.

If the failure is due to insufficient penetration, the Engineer will provide to the Contractor, in writing, new threadbar embedment lengths. Payment for additional threadbars will be made in accordance with this Special Provision.

When a micropile fails, the Contractor must modify the design, the construction procedure, or both. These modifications may include, but are not limited to, installing replacement proof and/or verification test micropiles, modifying the installation methods, increasing the bond length, or changing the micropile type. Any modification that requires changes to the structure must have prior review and acceptance of the Engineer. Any modifications of design or construction procedures must be at the Contractor's expense.

6-12.3(9) PRODUCTION MICROPILES

Only methods that have been used to install successfully tested micropiles must be used for installation of production micropiles. Methods that differ from those used during installation of micropiles that have been successfully performance tested must require performance testing at the Contractor's expense, prior to approval.

Micropiles must be installed at the locations, and to the minimum penetration into dense sand, shown on the Drawings or as directed by the Engineer. Threadbars, and associated steel pipe casing, may be added or relocated as determined by the Engineer to accommodate actual field conditions. Where such modifications result from the Contractor's installation methods or omissions, all redesign, installation, re-testing and material costs must be borne by the Contractor.

6-12.3(10) MICROPILE INSTALLATION RECORDS

Contractor must prepare and submit to the Engineer fill-length installation records for each micropile installed. The records must be submitted within the same work shift that micropile installation is completed. The data must be recorded on the micropile installation log included at the end of this specification. A separate log must be provided for each micropile.

The Contractor must maintain accurate records that must contain the following information for each micropile:

- a. Contractor's name.

- b. Drill rig operator's name.
- c. Micropile location.
- d. Deviation from specified tolerances.
- e. Tip elevations of the steel pipe casing and sheathed threadbar.
- f. Design length of the steel pipe casing and sheathed threadbar.
- g. Installed length of the steel pipe casing and sheathed threadbar.
- h. Groundwater conditions.
- i. Caving or sloughing of excavation.
- j. Casing requirements.
- k. Drilling difficulties.
- l. Date and time of start and finish of drilling.
- m. Date, time and method grout was placed.
- n. Total daily quantity of grout placed.
- o. Design changes.
- p. Grout test results.
- q. All test records.

Installation logs and daily production reports for each micropile, including data recorded as specified herein, must be submitted at the beginning of the following production week.

Records must be signed in ink by the Contractor and filed with the Engineer at the end of each day of drilling. Within 30 days of completion of the Work, a complete record of the construction activities must be submitted to the Engineer.

6-12.4 MEASUREMENT

Measurement for "Micropiles" will be per each

Measurement for "Micropiles Proof Load Testing" will be per each

6-12.5 PAYMENT

Payment will be made for the following Bid Items when they are included in the Bid:

1. **"Micropile"**, per each

The unit contract price for "Micropile" must include, but not limited to, the drilling, furnishing, and placing the reinforcing steel and casing, grouting, and pile top attachments. The micropile Contractor is also responsible for estimating the grout take. There will be no extra payment for grout overruns.

2. **"Micropile Proof Load Testing"**, per each

Supplement Division 6 with the following:

6-19 SHAFTS (SP 12-12-19)

6-19.1 DESCRIPTION

This section describes constructing shafts in accordance with the Drawings, these specifications, and as designated by the Engineer.

The work must also include the following:

Pavement and cement concrete sidewalk removal at Marion Street as shown in plans must be incidental to shaft construction and must meet the requirements of Section 2-02.

Temporary pavement patching at Marion Street as shown in plans must be incidental to shaft construction and must meet the requirements of Section 5-04.

6-19.2 MATERIALS

Materials must meet the requirements of the following sections:

Portland Cement and Blended Hydraulic Cement: 9-01

Aggregates for Portland Cement Concrete: 9-03.1

Deformed Steel Bars: 9-07.2

Epoxy Coated Steel Reinforcing Bars: 9-07.3

Concrete Curing Materials, Pozzolans and Admixtures: 9-23

Fly Ash: 9-23.6

Ground Granulated Blast Furnace Slag (GGBFS): 9-23.7

Microsilica Fume: 9-23.8

Water for Concrete: 9-25.1

Permanent Casing: 9-39.1(1)

Temporary Casing: 9-39.1(2)

Mineral Slurry: 9-39.2(1)

Synthetic Slurry: 9-39.2(2)

Water Slurry: 9-39.2(3)

Steel Reinforcing Bar Centralizers: 9-39.3

Access Tubes and Caps: 9-39.4

Grout for Access Tubes: 9-39.5

6-19.3 CONSTRUCTION REQUIREMENTS

6-19.3(1) QUALITY ASSURANCE

6-19.3(1)A SHAFT CONSTRUCTION TOLERANCES

Contractor must use metric sized casing for drilled shaft construction. Upsizing or downsizing of specified shaft diameters is not permitted. Shafts for Union Street Pedestrian Bridge piers P1, P2, P3 must be 1.5m (4.92 feet) in diameter and shafts for Union Street Pedestrian Bridge pier P4 and P5 must be 1.2m (3.94 feet) in diameter. Shafts for Marion Street Pedestrian Bridge must be as shown in the drawings.

Shafts must be constructed so that the center at the top of the shaft and permanent casing is within the following horizontal and vertical tolerances:

Shaft Diameter (feet)	Tolerance (inches)
Less than or equal to 2	3
Greater than 2 and less than 5	4

5 or larger	6

Shafts must be within 1.5 percent of plumb. For rock excavation, allowable tolerance can be increased to 2 percent maximum.

During drilling or excavation of the shaft, the Contractor must make frequent checks on the plumbness, alignment, and dimensions of the shaft and permanent casing. Deviations exceeding the allowable tolerances must be corrected with a procedure approved by the Engineer.

Shaft steel reinforcing bar placement tolerances must conform to Section 6-02.3(24)C.

The elevation of the top of the reinforcing cage for drilled shafts must be within +6 inches and -3 inches from the elevation shown in the Drawings.

6-19.3(1)B NONDESTRUCTIVE TESTING OF SHAFTS

6-19.3(1)B1 NONDESTRUCTIVE QUALITY ASSURANCE (QA) TESTING OF SHAFTS

Unless otherwise specified, the Contractor must perform nondestructive QA testing of shafts. Either crosshole sonic log (CSL) testing in accordance with ASTM D 6760 or thermal integrity profiling (TIP) testing in accordance with ASTM D 7949 must be used.

6-19.3(1)B2 NONDESTRUCTIVE QUALITY VERIFICATION (QV) TESTING OF SHAFTS

The Owner may perform QV nondestructive testing of shafts that have been QA tested by the Contractor. The Owner may test up to 10 percent of the shafts. The Engineer will identify the shafts selected for QV testing and the testing method the Owner will use.

The Contractor must accommodate the Owner's nondestructive testing.

6-19.3(1)C SHAFT PRECONSTRUCTION CONFERENCE

A shaft preconstruction conference must be held at least 5 working days prior to the Contractor beginning shaft construction work at the site to discuss construction procedures, personnel, and equipment to be used, and other elements of the approved shaft installation narrative as specified in Section 6-19.3(2)B. Those attending must include:

1. (Representing the Contractor) – The superintendent, on site supervisors, and all foremen in charge of excavating the shaft, placing the casing and slurry as applicable, placing the steel reinforcing bars, and placing the concrete. If synthetic slurry is used to construct the shafts, the slurry manufacturer's representative or approved Contractor's employees trained in the use of the synthetic slurry must also attend.
2. (Representing the Owner) – The Engineer, key inspection personnel, and representatives from the Owner.

If the Contractor proposes a significant revision of the approved shaft installation narrative, as determined by the Engineer, an additional conference must be held before additional shaft construction operations are performed.

6-19.3(2) SHAFT CONSTRUCTION SUBMITTAL

The shaft construction submittal must be comprised of the following four components: construction experience; shaft installation narrative; shaft slurry technical assistance; and nondestructive QA testing personnel. The submittal must be submitted in a PDF format.

The construction experience and shaft installation narrative components of the submittal must be submitted to allow the Engineer a minimum of 20 working days review time in accordance with Section 1-05.3. The Contractor must not proceed with shaft construction until comments from the Engineer have been addressed.

The slurry technical assistance and nondestructive QA testing components of the submittal must be submitted a minimum of 5 working days prior to the start of the work. These components are for the Owner's information.

6-19.3(2)A CONSTRUCTION EXPERIENCE

The Contractor must submit a project reference list to the Engineer for approval verifying the successful completion by the Contractor of at least three separate foundation projects with shafts of diameters and depths similar to or larger than those shown in the Drawings, and ground conditions similar to those identified in the Contract. A brief description of each listed project must be provided along with the name and current phone number of the project owner or the owner's Contractor.

The Contractor must submit a list identifying the on-site supervisors and drill rig operators potentially assigned to the project to the Engineer. The list must contain a brief description of each individual's experience in shaft excavation operations and placement of assembled steel reinforcing bar cages and concrete in shafts. The individual experience lists must be limited to a single page for each supervisor or operator.

1. On-site supervisors must have a minimum 2-years' experience in supervising construction of shaft foundations of similar size (diameter and depth) and scope to those shown in the Drawings, and similar geotechnical conditions to those described in the boring logs and summary of geotechnical conditions. Work experience must be direct supervisory responsibility for the on-site shaft construction operations. Project management level positions indirectly supervising on-site shaft construction operations is not acceptable for this experience requirement.
2. Drill rig operators must have a minimum of 1-year experience in construction of shaft foundations.

The Contractor will not be allowed to perform work with subcontractors or personnel that are not approved by the Engineer. The Contractor must be fully liable for the additional costs resulting from the suspension of work, and no adjustments in Contract Time resulting from the suspension of work will be allowed.

6-19.3(2)B SHAFT INSTALLATION NARRATIVE

The Contractor must submit a shaft installation narrative to the Engineer. In preparing the narrative, the Contractor must reference the available subsurface data provided in the contract test hole boring logs, the Summary of Geotechnical Conditions, and the geotechnical report(s) prepared for this project. This narrative must provide at least the following information:

1. Proposed overall construction operation sequence.
2. Description, size, and capacities of proposed equipment, including but not limited to, cranes, drills, auger, bailing buckets, final cleaning equipment, and drilling unit. The narrative must describe why the equipment was selected and describe equipment suitability to the anticipated site conditions and work methods. The narrative must include a project history of the drilling equipment demonstrating the successful use of the equipment on shafts of equal or greater size in similar soil/rock conditions. The narrative must also include details of shaft excavation and cleanout methods.
3. Details of the method(s) to be used to ensure shaft stability (i.e., prevention of caving, bottom heave, using temporary casing, slurry, or other means) during excavation (including pauses and stoppages during excavation) and concrete placement. If permanent casings are required, casing dimensions and detailed procedures for installation must be provided.
4. A slurry mix design, including all additives and their specific purpose in the slurry mix, with a discussion of its suitability to the anticipated subsurface conditions, must be submitted and include the procedures for mixing, using, and maintaining the slurry. A detailed plan for quality control of the selected slurry, including tests to be performed, test methods to be used, and minimum and maximum property requirements which must be met to ensure the slurry functions as intended, considering the anticipated subsurface conditions and shaft construction methods, in accordance with the slurry manufacturer's recommendations and these specifications must be included. As a minimum, the slurry quality control plan must include the following tests:

Property	Test Method
Density	Mud Weight (Density), API 13B-1, Section 1
Viscosity	Marsh Funnel and Cup, API 13B-1, Section 2.2
pH	Glass Electrode, pH Meter, or pH Paper
Sand Content	Sand, API 13B-1, Section 5

5. Description of the method used to fill or eliminate all voids below the top of shaft between the plan shaft diameter and excavated shaft diameter, when permanent casing is specified.
6. Details of concrete placement, including proposed operational procedures for pumping methods, and a sample uniform yield form to be used by the Contractor for plotting the approximate volume of concrete placed versus the depth of shaft for all shaft concrete placement (except concrete placement in the dry).
7. When shafts are constructed in water, the submittal must include seal thickness calculations, seal placement procedure, and descriptions of provisions for casing shoring dewatering and flooding.
8. Description and details of the storage and disposal plan for excavated material and drilling slurry (if applicable).
9. Reinforcing steel Shop Drawings with details of reinforcement placement, including bracing, centering, and lifting methods, and the method to ensure the reinforcing cage position is maintained during construction, including use of bar boots and rebar cage base plates, and including placement of rock backfill below the bottom of shaft elevation, provided the conditions of Section 6-19.3(5)D are satisfied.

The reinforcing steel Shop Drawings and shaft installation narrative must include, at a minimum:

- a. Procedure and sequence of steel reinforcing bar cage assembly.
- b. The tie pattern, tie types, and tie wire gages for all ties on permanent reinforcing and temporary bracing.
- c. Number and location of primary handling steel reinforcing bars used during lifting operations.
- d. Type and location of all steel reinforcing bar splices.
- e. Details and orientation of all internal cross-bracing, including a description of connections to the steel reinforcing bar cage.
- f. Description of how temporary bracing is to be removed.
- g. Location of support points during transportation.
- h. Cage weight and location of the center of gravity.
- i. Number and location of pick points used for lifting for installation and for transport (if assembled off-site).
- j. Crane charts and a description and/or catalog cuts for all spreaders, blocks, sheaves, and chockers used to equalize or control lifting loads.
- k. The sequence and minimum inclination angle at which intermediate belly rigging lines (if used) are released.
- l. Pick point loads at 0, 45, 60, and 90 degrees and at all intermediate stages of inclination where rigging lines are engaged or slackened.
- m. Methods and temporary supports required for cage splicing.
- n. For picks involving multiple cranes, the relative locations of the boom tips at various stages of lifting, along with corresponding net horizontal forces imposed on each crane.

The Engineer will evaluate the shaft installation narrative for conformance with the Drawings, Specifications, and Special Provisions, within the review time specified. If deemed necessary by the Engineer, a Shaft Installation Narrative Submittal Teleconference Meeting will be scheduled by the Owner following review of the Contractor's initial submittal of the narrative and prior to Owner's formal response to the initial submittal. Teleconference participants must include the following:

1. (Representing the Contractor) – The superintendent, on-site supervisors, and other Contractor personnel involved in the preparation of the shaft installation narrative.
2. (Representing the Owner) – The Engineer, key inspection personnel, and representatives from the Owner.

6-19.3(2)C SHAFT SLURRY TECHNICAL ASSISTANCE

If slurry other than water slurry is used to construct the shafts, the Contractor must provide or arrange for technical assistance in the use of the slurry as specified in Section 6-19.3(4)A. The Contractor must submit the following to the Engineer:

1. The name and current phone number of the slurry manufacturer's technical representative assigned to the project, and the frequency of scheduled visits to the project site by the synthetic slurry manufacturer's representative.
2. The name(s) of the Contractor's personnel assigned to the project and trained by the slurry manufacturer in the proper use of the slurry. The submittal must include a signed training certification letter from the slurry manufacturer for each trained Contractor's employee listed, including the date of the training.

6-19.3(2)D NONDESTRUCTIVE QA TESTING ORGANIZATION AND PERSONNEL

The Contractor must submit the names of the testing organizations, and the names of the personnel who will conduct nondestructive QA testing of shafts. The Submittal must include documentation that the qualifications specified below are satisfied. For TIP testing, the testing organization is the group that performs the data analysis and produces the final report. For TIP testing, the testing organization is the group that performs the data analysis and produces the final report. The testing organizations and the testing personnel must meet the following minimum qualifications:

1. The testing organization must have performed nondestructive tests on a minimum of three deep foundation projects in the last two years.
2. Personnel conducting the tests for the testing organization must have a minimum of one year of experience in nondestructive testing and interpretation.
3. The experience requirements for the organization and personnel must be consistent with the testing methods the Contractor has selected for nondestructive testing of shafts.
4. Personnel preparing test reports must be a Professional Engineers, licensed under Title 18 RCW, State of Washington, and seal the report in accordance with WAC 196-23-020.

6-19.3(3) SHAFT EXCAVATION

Shafts must be excavated to the required depth as shown in the Drawings. Shaft excavation operations must conform to this Section and the shaft installation narrative as approved by the Engineer.

Shaft excavation must not be started until the Contractor has received the Engineer's acceptance for the reinforcing steel centralizers required when the casing is to be pulled during concrete placement.

Variations in the till and bearing layer elevation from that shown in the Drawings may be encountered. The Contractor must make provisions for additional permanent casing and equipment on-site capable of excavating to additional depths below that shown in the Drawings if required. The Contractor shall have equipment on-site capable of excavating an additional 20 percent of depth below that shown in the Drawings.

Except as otherwise noted, the Contractor must not commence subsequent shaft excavations until receiving the Engineer's acceptance of the first shaft, based on the results and analysis of the nondestructive testing for the first shaft. The Contractor may commence subsequent shaft excavations prior to receiving the Engineer's acceptance of the first shaft, provided the following condition is satisfied:

The Engineer permits continuing with shaft construction based on the Engineer's observations of the construction of the first shaft, including, but not limited to, conformance to the shaft installation narrative in accordance with Section 6-19.3(2)B, and the Engineer's review of Contractor's daily reports and Inspector's daily logs concerning excavation, steel reinforcing bar placement, and concrete placement. All operations for drilled shaft foundations scheduled on the Drawings must be monitored by the Resident Engineer.

Union Street Pedestrian Bridge Requirements

The Contractor must furnish each shaft steel reinforcing bar cage, including access tubes for non-destructive QA testing in accordance with Section 6-19.3(6), 20 percent longer than specified in the Drawings. The Contractor shall add the increased length to the bottom of the cage. The Contractor shall trim the shaft steel reinforcing bar cage to the proper length prior to placing it into the excavation. If trimming the cage is required and access tubes are attached to the cage, the Contractor shall either shift the access tubes up the cage or cut the access tubes provided that the cut tube ends are adapted to receive the watertight cap as specified.

Where the presence of till is indicated in the drawings, the Contractor may choose to carry out exploratory drilling at each pier location to confirm depth of till and required permanent casing depths. Contractor to obtain approval by geotechnical engineer prior to installation of drilled shafts. Alternatively, Contractor may choose to use longer length of permanent casing, over the approximate length of 35', to account for potential increase in casing depth or have additional casing segments available to splice. Splicing of permanent casing segments must be carried out using complete joint penetration welds.

Oscillator method must be utilized for drilled shaft construction. For the Union Street Pedestrian Bridge this is required to be sure the shaft footprint fits into the tight space constrained by utilities. This may include installation of permanent casing to design depth and tooling used within rock. Measures must be taken while reaming the lower portion of the hole to avoid vertical settlement of the permanent casing.

Temporary casing may be used to stabilize the shaft excavation for full depth oscillator construction of shafts with upper 35-ft left in place if so desired by the Contractor. In this case, extraction loads must be pre-approved by Engineer and must avoid loading existing vaults. Permanent casing to be installed to required extents per Drawings. Telescoping casing and permanent slip casings are not allowed for the Union Street Pedestrian Bridge.

For shaft construction at Union Street Pedestrian Bridge Pier P1, the Contractor must consider the existence of abandoned concrete tank and the close proximity to the existing SPU storm sewer that runs through a portion of the abandoned concrete tank. The Contractor must provide means to excavate down to the tank level prior to shaft construction and remove conflicting portions of the abandoned concrete tank through the footprint of shaft using hand tools and methods to minimize disturbance to existing sewer line. The general expected sequence is as follows:

- a) Install temporary shoring box (or similar), excavate down to concrete tank level, and identify existing sewer pipe. Location of existing pipe must be visually confirmed prior to shaft construction. Contractor to CCTV the existing pipe both prior to and after shaft construction.
- b) Remove obstruction as required within shaft footprint.
- c) Maintain excavated pit.
- d) Advance shaft casing starting at the lower elevation of the removed abandoned tank bottom slab using the casing oscillator method.
- e) Place shaft reinforcement cage.

- f) Pour concrete within shaft up to construction joint level.
- g) Backfill area with approved diggable material as indicated on the Drawings.
- h) Remove temporary shoring box.

Contractor to consider location of existing vaults within Union Street and avoid imparting loads to existing infrastructure during shaft installation.

6-19.3(3)A CONDUCT OF SHAFT EXCAVATION OPERATIONS

Once the excavation operation has been started, the excavation must be conducted in a continuous operation until the excavation of the shaft is completed, except for pauses and stops as noted, using approved equipment capable of excavating through the type of material expected. Pauses during this excavation operation, except for casing splicing, tooling changes, slurry maintenance, and removal of obstructions, are not allowed.

Pauses, defined as momentary interruptions of the excavation operation, will be allowed only for casing splicing, tooling changes, slurry maintenance, and removal of obstructions. Shaft excavation operation interruptions not conforming to this definition must be considered stops. Stops for uncased excavations (including partially cased excavations) must not exceed 16-hour duration. Stops for fully cased excavations, excavations in rock, and excavations with casing seated into rock, must not exceed 65-hour duration.

For stops exceeding the time durations specified above, the Contractor must stabilize the excavation using one or both of the following methods:

1. For an uncased excavation, before the end of the work day, install casing in the hole to the depth of the excavation. The outside diameter of the casing must not be smaller than 6 inches less than either the plan diameter of the shaft or the actual excavated diameter of the hole, whichever is greater. Prior to removing the casing and resumption of shaft excavation, the annular space between the casing and the excavation must be sounded. If the sounding operation indicates that caving has occurred, the casing must not be removed, and shaft excavation must not resume until the Contractor has stabilized the excavation in accordance with the shaft installation narrative conforming to Section 6-19.3(2)B, item 3.
2. For both a cased and uncased excavation, backfill the hole with granular material. The Contractor must backfill the hole to the ground surface, if the excavation is not cased, or to a minimum of 5 feet above the bottom of casing (temporary or permanent), if the excavation is cased. Backfilling of shafts with casing fully seated into rock, as determined by the Engineer, will not be required.

During stops, the Contractor must stabilize the shaft excavation to prevent bottom heave, caving, head loss, and loss of ground. The Contractor bears full responsibility for selection and execution of the method(s) of stabilizing and maintaining the shaft excavation, in accordance with Section 1-07.13. Shaft stabilization must conform to the shaft installation narrative in accordance with Section 6-19.3(2)B, item 3.

If slurry is present in the shaft excavation, the Contractor must conform to the requirements of Section 6-19.3(4)B regarding the maintenance of the slurry and the minimum level of drilling slurry throughout the stoppage of the shaft excavation operation and must recondition the slurry to the required slurry properties in accordance with Section 9-39.2 prior to recommencing shaft excavation operations.

6-19.3(3)B TEMPORARY AND PERMANENT SHAFT CASING

The Contractor must furnish and install required temporary and permanent shaft casings as shown in the Drawings and as specified in these Special Provisions.

6-19.3(3)B1 GENERAL SHAFT CASING REQUIREMENTS

Shaft casing must be watertight and clean prior to placement in the excavation.

The outside diameter of the casing for the Union Street Pedestrian Bridge must not be less or greater than the specified diameter of the shaft.

The outside diameter of the casing for the Marion Street Bridge must not be less than the specified diameter of the shaft. The inside diameter of the casing must not be greater than the specified diameter of the shaft plus 6 inches, except as otherwise noted for shafts 5 feet or less in diameter, and as otherwise noted in Section 6-19.3(3)B4 for temporary telescoping casing. The inside diameter of casings for shafts 5 feet or less in diameter must not be greater than the specified diameter of the shaft plus 1 foot.

Shaft casing must be equipped with cutting teeth or a cutting shoe and installed by either rotating or oscillating the casing. Installing the casing by vibratory means will not be allowed.

When installing casing, the casing must be advanced prior to or concurrently with the excavation. Excavation in advance of the casing tip must not be allowed, except with approval of the Geotechnical Engineer.

Due to the limited clearances from the SPU storm sewer, slip casing must not be used for the Union Street Pedestrian Bridge. Permanent casing must be furnished for the shaft construction with a minimum length of 35-ft or as specified by the Geotechnical Engineer.

6-19.3(3)B2 PERMANENT SHAFT CASING

Permanent casing is defined as casing designed as part of the shaft structure and installed to remain in place after construction is complete. All permanent casing must be of ample strength to resist damage and deformation from transportation and handling, installation stresses, and all pressures and forces acting on the casing. Where the minimum thickness of permanent casing is specified in the Drawings, it is specified to satisfy structural design requirements only. The Contractor must increase the casing thickness as necessary to satisfy the requirements of this Section.

6-19.3(3)B3 TEMPORARY SHAFT CASING

Temporary casing is defined as casing installed to facilitate shaft construction only, which is not designed as part of the shaft structure, and which must be completely removed after shaft construction is complete unless otherwise shown in the Drawings. All temporary casing must be of ample strength to resist damage and deformation from transportation and handling, installation and extraction stresses, and all pressures and forces acting on the casing. The casing must be capable of being removed without deforming and causing damage to the completed shaft and without disturbing the surrounding soil.

To maintain stable excavations and to facilitate construction, the Contractor may furnish and install temporary casing in addition to the required casing specified. The Contractor must provide temporary casing at the site in sufficient quantities to meet the needs of the anticipated construction method.

6-19.3(3)B4 TEMPORARY TELESCOPING SHAFT CASING

Temporary telescoping shaft casing must not be used for all drilled shafts.

6-19.3(3)B5 PERMANENT SLIP CASING

Permanent slip casing is defined as casing installed vertically inside the temporary casing within the limits of the column-shaft splice zone, and wet-set into the shaft concrete no more than 3 feet below the column-shaft construction joint, allowing subsequent removal of the temporary casing. The casing diameter requirements of Section 6-19.3(3)B1 do not apply to permanent slip casing, but the inside diameter of the permanent slip casing must provide the steel reinforcing bar clearance specified in Section 6-19.3(5)C.

6-19.3(3)C CONDUCT OF SHAFT CASING INSTALLATION AND REMOVAL AND SHAFT EXCAVATION OPERATIONS

The Contractor must conduct casing installation and removal operations and shaft excavation operations such that the adjacent soil outside the casing and shaft excavation for the full height of the shaft is not disturbed. Disturbed soil is defined as soil whose geotechnical properties have been changed from those of the original in situ soil, and whose altered condition adversely affects the structural integrity of the shaft foundation. In no case must shaft excavation and casing placement extend below the bottom of shaft excavation shown in the Drawings.

6-19.3(3)D BOTTOM OF SHAFT EXCAVATION

The Contractor must use appropriate means such as a cleanout bucket or air lift to clean the bottom of the excavation of all shafts. An air lift must not be used to clean the bottom of shaft excavations when the air lift or air lift process could decrease stability of soils at the base of the excavation. No more than 2 inches of loose or disturbed material must be present at the bottom of the shaft just prior to placing concrete.

The excavated shaft must be inspected and approved by the Engineer prior to proceeding with construction. The bottom of the excavated shaft must be sounded with an airlift pipe, a tape with a heavy weight attached to the end of the tape, or other means acceptable to the Engineer to determine that the shaft bottom meets the requirements in the Contract. Tip elevations must be approved by Engineer prior to placement of reinforcing steel and concrete.

6-19.3(3)E SHAFT OBSTRUCTIONS

When obstructions are encountered, the Contractor must notify the Engineer promptly. An obstruction is defined as a specific object (including, but not limited to, boulders, logs, and man-made objects) encountered during the shaft excavation operation which prevents or hinders the advance of the shaft excavation. When efforts to advance past the obstruction to the design shaft tip elevation result in the rate of advance of the shaft drilling equipment being significantly reduced relative to the rate of advance for the portion of the shaft excavation in the geological unit that contains the obstruction, then the Contractor must remove, break up, or push aside the obstruction under the provisions of Section 6-19.5. The method of dealing with such obstructions, and the continuation of excavation must be as proposed by the Contractor and approved by the Engineer. The method of dealing with potential obstructions must be reviewed and approved by the Engineer prior to commencement of shaft excavation.

6-19.3(3)F VOIDS BETWEEN PERMANENT CASING AND SHAFT EXCAVATION

When permanent casing is specified, excavation must conform to the specified outside diameter of the shaft. After the casing has been filled with concrete, all void space occurring between the casing and shaft excavation must be filled with a material which approximates the geotechnical properties of the in-situ soils, in accordance with the shaft installation narrative specified in Section 6-19.3(2)B, item 5, and as approved by the Engineer.

6-19.3(3)G OPERATING SHAFT EXCAVATION EQUIPMENT FROM AN EXISTING BRIDGE

Drilling equipment must not be operated from an existing bridge, except as otherwise noted. If necessary and safe to do so, and if the Contractor submits a written request to the Engineer in accordance with Section 6-01.5, the Engineer may approve the operation of drilling equipment on a bridge.

6-19.3(3)H SEALS FOR SHAFT EXCAVATION IN WATER

When shafts are constructed in water and the Drawings show a seal between the casing shoring and the upper portion of the permanent casing of the shaft, the Contractor must construct a seal in accordance with the shaft installation narrative specified in Section 6-19.3(2)B, item 7.

Concrete for the casing shoring seal must be Class 4000W conforming to Section 6-02.

The seal thickness shown in the Drawings is designed to resist the hydrostatic uplift force with the corresponding seal weight and adhesion of the seal to the permanent casing and the casing shoring of 20 psi, based on the casing shoring dimension and the seal vent water surface elevation specified in the Drawings. If the Contractor uses a casing shoring diameter other than that specified in the Drawings, the Contractor must submit a revised seal design to the Engineer for approval in accordance with Section 6-19.3(2)B, item 7, and as approved by the Engineer.

6-19.3(3) REQUIRED USE OF SLURRY IN SHAFT EXCAVATION

The Contractor must use slurry, in accordance with Section 6-19.3(4), to maintain a stable excavation during excavation and concrete placement operations whenever the shaft excavation is extended below the groundwater elevation indicated in the Drawings or the groundwater level indicated on boring logs or piezometric data provided in the geotechnical reports. In addition, slurry must be used once water begins to enter the shaft excavation at an infiltration rate of 12 inches of depth or more in 1 hour. If the excavation is performed in the dry and concrete is to be placed in the dry, the Contractor must pump all accumulated water in the shaft excavation down to a 3-inch maximum depth prior to beginning concrete placement operations.

6-19.3(4) SLURRY INSTALLATION REQUIREMENTS

6-19.3(4)A SLURRY TECHNICAL ASSISTANCE

If slurry other than water slurry is used, the manufacturer's representative, as identified to the Engineer in accordance with Section 6-19.3(2)C, must:

1. Provide technical assistance for the use of the slurry,
2. Be at the site prior to introduction of the slurry into the first drilled hole requiring slurry, and
3. Remain at the site during the construction of at least the first shaft excavated to adjust the slurry mix to the specific site conditions.

After the manufacturer's representative is no longer present at the site, the Contractor's employee trained in the use of the slurry, as identified to the Engineer in accordance with Section 6-19.3(2)C, must be present at the site throughout the remainder of shaft slurry operations for this project to perform the duties specified in items 1 through 3 above.

6-19.3(4)B MINIMUM LEVEL OF SLURRY IN THE EXCAVATION

When slurry is used in a shaft excavation the following is required:

1. The height of the slurry must be as required to provide and maintain a stable hole to prevent bottom heave, caving, or sloughing of all unstable zones.
2. The Contractor must provide casing, or other means, as necessary to meet these requirements.
3. The slurry level in the shaft while excavating must be maintained above the groundwater level the greater of the following dimensions:
 - a. Not less than 5 feet for mineral slurries.
 - b. Not less than 10 feet for water slurries.
 - c. Not less than 10 feet for synthetic slurries.
4. The slurry level in the shaft throughout all stops as specified in Section 6-19.3(3)A and during concrete placement as specified in Section 6-19.3(7) must be no lower than the water level elevation outside the shaft.

6-19.3(4)C SLURRY SAMPLING AND TESTING

Mineral slurry and synthetic slurry must be mixed and thoroughly hydrated in slurry tanks, ponds, or storage areas. The Contractor must draw sample sets from the slurry storage facility and test the

samples for conformance with the specified viscosity and pH properties before beginning slurry placement in the drilled hole. Mineral slurry must conform to the material specifications in Section 9-39.2(1). Synthetic slurry must conform to 9-39.2(2), the quality control plan included in the shaft installation narrative in accordance with Section 6-19.3(2)B, item 4, and as approved by the Engineer. A sample set must be composed of samples taken at mid-height and within 2 feet of the bottom of the storage area.

When synthetic slurry is used, the Contractor must keep a written record of all additives and concentrations of the additives in the synthetic slurry. These records must be provided to the Engineer once the slurry system has been established in the first drilled shaft on the project. The Contractor must provide revised data to the Engineer if changes are made to the type or concentration of additives during construction.

The Contractor must sample and test all slurry in the presence of the Engineer, unless otherwise directed. The date, time, names of the persons sampling and testing the slurry, and the results of the tests must be recorded. A copy of the recorded slurry test results must be submitted to the Engineer at the completion of each shaft, and during construction of each shaft when requested by the Engineer.

Sample sets of all slurry, composed of samples taken at mid-height and within 2 feet of the bottom of the shaft and the storage area, must be taken and tested once every 4 hours minimum at the beginning and during drilling shifts and prior to cleaning the bottom of the hole to verify the control of the viscosity and pH properties of the slurry. Sample sets of all slurry must be taken and tested at least once every 2 hours if the previous sample set did not have consistent viscosity and pH properties. All slurry must be recirculated, or agitated with the drilling equipment, when tests show that the sample sets do not have consistent viscosity and pH properties. Cleaning of the bottom of the hole must not begin until tests show that the samples taken at mid-height and within 2 feet of the bottom of the hole have consistent viscosity and pH properties.

Sample sets of all slurry, as specified in the Contract Documents, must be taken and tested to verify control of the viscosity, pH, density, and sand content properties after final cleaning of the bottom of the hole just prior to placing concrete. Placement of the concrete must not start until tests show that the samples taken at mid-height and within 2 feet of the bottom of the hole have consistent specified properties.

6-19.3(4)D MAINTENANCE OF REQUIRED SLURRY PROPERTIES

The Contractor must clean, recirculate, de-sand, or replace the slurry to maintain the required slurry properties.

6-19.3(4)E MAINTENANCE OF A STABLE SHAFT EXCAVATION

The Contractor must demonstrate to the satisfaction of the Engineer that stable conditions are being maintained. If the Engineer determines that stable conditions are not being maintained, the Contractor must immediately take action to stabilize the shaft. The Contractor must submit a revised shaft installation narrative that addresses the problem and prevents future instability. The Contractor must not continue with shaft construction until the damage that has already occurred is repaired in accordance with the specifications, and until receiving the Engineer's approval of the revised shaft installation narrative.

When mineral slurry conforming to Section 9-39.2(1) is used to stabilize the unfilled portion of the shaft, the Contractor must remove the excess slurry buildup inside of the shaft diameter prior to continuing with concrete placement. The Contractor must use the same methods of shaft excavation and the same diameter of drill tools to remove the excess slurry buildup as was used to excavate the shaft to its current depth.

6-19.3(4)F DISPOSAL OF SLURRY AND SLURRY CONTACTED SPOILS

The Contractor must manage and dispose of the slurry wastewater in accordance with Section 8-01.3. Slurry-contacted spoils must be disposed of as specified in the shaft installation narrative in accordance with Section 6-19.3(2)B, item 8, and in accordance with the following requirements:

1. Uncontaminated spoils in contact with water-only slurry may be disposed of as clean fill.

2. Uncontaminated spoils in contact with water slurry mixed with flocculants approved in Section 8-01.3(2)D1 may be disposed of as clean fill away from areas that drain to surface waters of the state or that could impact groundwater as specified under 8-01.3(2)D1.
3. Spoils in contact with synthetic slurry or water slurry with polymer-based additives or flocculants not approved in Section 8-01.3(2)D1 must be disposed of in accordance with Section 1-07.3. With permission of the Engineer, the Contractor may re-use these spoils on-site.
4. Spoils in contact with mineral slurry must be disposed of in accordance with Section 1-07.3. With permission of the Engineer, the Contractor may re-use these spoils on-site.

6-19.3(5) ASSEMBLY AND PLACEMENT OF REINFORCING STEEL

6-19.3(5)A STEEL REINFORCING BAR CAGE ASSEMBLY

The reinforcing cage must be rigidly braced to retain its configuration during handling and throughout construction. Individual or loose bars will not be permitted. The Contractor must show bracing and extra reinforcing steel required for fabrication of the cage on the Shop Drawings. Shaft reinforcing bar cages must be supported on a continuous surface to the extent possible. All rigging connections must be located at primary handling bars, as identified in the reinforcing steel assembly and installation plan as approved by the Engineer. Internal bracing is required at each support and lift point.

The reinforcement must be carefully positioned and securely fastened to provide the minimum clearances listed below, and to ensure no displacement of the reinforcing steel bars occurs during placement of the concrete. The steel reinforcing bars must be securely held in position throughout the concrete placement operation.

6-19.3(5)B STEEL REINFORCING BAR CAGE CENTRALIZERS

The Contractor must submit details of the proposed reinforcing cage centralizers along with the shop drawings. The reinforcing steel centralizers at each longitudinal space plane must be placed at least at the quarter points around the circumference of the steel reinforcing bar cage, and at a maximum longitudinal spacing of either 2.5 times the shaft diameter or 20 feet, whichever is less. The Contractor must furnish and install additional centralizers as required to maintain the specified concrete cover throughout the length of the shaft.

6-19.3(5)C CONCRETE COVER OVER STEEL REINFORCING BARS

Steel reinforcing bars must be placed as shown in the Drawings with minimum concrete cover as shown below:

Shaft Diameter (feet)	Minimum Concrete Cover, and Concrete Cover Tolerance (Inches)
Less than or equal to 3	3, -1 ¹ / ₂
Greater than 3 and less than 4	3, -1 ¹ / ₂
Greater than or equal to 4 and less than 5	4, -2
5 or larger	6, -3 ^a
^a Minimum Concrete Cover at Permanent Slip Casing (inches)=3 inches	

The concrete cover tolerances specified above apply to the concrete cover specified in the Drawings, even if they exceed the minimum concrete cover.

6-19.3(5)D STEEL REINFORCING BAR CAGE SUPPORT AT BASE OF SHAFT EXCAVATION

For shafts with temporary casing within 15 feet of the bottom of shaft elevation as specified in the Drawings, the Contractor may place quarry spalls or other rock backfill approved by the Engineer into the shaft below the specified bottom of shaft elevation as a means to support the steel reinforcing bar cage, provided that the materials and means to accomplish this have been addressed by the shaft installation narrative, as specified in Section 6-19.3(2)B, item 9. The use of bar boots and/or rebar cage base plates is required when quarry spalls or other rock backfill is placed at the base of the shaft excavation.

6-19.3(6) CONTRACTOR FURNISHED ACCESSORIES FOR NONDESTRUCTIVE QA TESTING

6-19.3(6)A SHAFTS REQUIRING ACCESS TUBES

The Contractor must furnish and install access tubes in all shafts receiving CSL testing or the thermal probe method of TIP testing except as otherwise noted in Section 6-19.3(1)B1. Steel pipes provided as access tubes for testing must be in accordance with Standard Specifications and these Special Provisions.

6-19.3(6)B ORIENTATION AND ASSEMBLY OF THE ACCESS TUBES

The Contractor must securely attach the access tubes to the interior of the reinforcement cage of the shaft. One access tube must be furnished and installed for each foot of shaft diameter, rounded to the nearest whole number, as shown in the Drawings. The number of access tubes for shaft diameters specified as "X feet Y inches", where Y is equal to or larger than 6, must be rounded up to the next higher whole number. The access tubes must be placed around the shaft, inside the spiral or hoop reinforcement, and bundled with the vertical reinforcement. Where circumferential components of the rebar cage bracing system prevent bundling the access tubes directly to the vertical reinforcement, the access tubes must be placed inside the circumferential components of the rebar cage bracing system as close as possible to the nearest vertical steel reinforcement bar.

The access tubes must be installed in straight alignment and as near to parallel to the vertical axis of the reinforcement cage as possible. The access tubes must extend from the bottom of the reinforcement cage to a minimum of 2 feet above finished ground. Splice joints in the access tubes, if required to achieve full length access tubes, must be watertight. The Contractor must clear the access tubes of all debris and extraneous materials before installing the access tubes. The tops of access tubes must be deburred. Care must be taken to prevent damaging the access tubes during reinforcement cage installation and concrete placement operations in the shaft excavation.

6-19.3(6)C CARE FOR ACCESS TUBES FROM ERECTION THROUGH NONDESTRUCTIVE QA TESTING

The access tubes must be filled with potable water before concrete placement, and the top watertight PVC caps must be reinstalled and secured in accordance with Section 9-39.4. The Contractor must keep all of a shaft's access tubes full of water through the completion of nondestructive QA testing of that shaft. When temperatures below freezing are possible, the Contractor must protect the access tubes against freezing by wrapping the exposed tubes with insulating material, adding antifreeze to the water in the tubes, or other methods as approved by the Engineer.

6-19.3(6)D SHAFTS REQUIRING THERMAL WIRE

The Contractor must furnish and install thermal wire in all shafts receiving the thermal wire method of TIP testing, except as otherwise noted in Section 6-19.3(1)B1.

6-19.3(6)E THERMAL WIRE AND THERMAL ACCESS POINTS (TAPs)

The thermal wire and associated couplers must be obtained from an approved source unless specified in the Special Provisions.

The Contractor must securely attach the thermal wire to the interior of the reinforcement cage of the shaft in conformance with the Supplier's instructions. At a minimum, one thermal wire must be

furnished and installed for each foot of shaft diameter, rounded to the nearest whole number. The number of thermal wires for shaft diameters specified as "X feet 6 inches", must be rounded up to the next higher whole number. The thermal wires must be placed around the shaft, inside the spiral or hoop reinforcement, and tied to the vertical reinforcement with plastic "zip" ties at a maximum spacing of 2 feet. Steel tie wire must not be used.

The thermal wire must be installed in straight alignment and taut, but with enough slack to not be damaged during reinforcing cage lofting. The wires must be as near to parallel to the vertical axis of the reinforcement cage as possible. The thermal wire must extend from the bottom of the reinforcement cage to the top of the shaft, with a minimum of 5-feet of slack wire provided above the top of shaft. All thermal wires in a shaft must be of equal length. Care must be taken to prevent damaging the thermal wires during reinforcement cage installation and concrete placement operations in the shaft excavation.

After completing shaft reinforcement cage fabrication at the site and prior to installation of the cage into the shaft excavation, the Contractor must install and connect thermal access points (TAPs) to the thermal wires. The TAPs must record data for at least 1 hour after the cage is placed in the excavation to measure the slurry temperature and ensure the steel and slurry temperatures have equilibrated prior to placing concrete in the shaft. The TAPs must record and store data every 15 minutes. The TAPs must remain active for a minimum of 36 hours.

Prior to beginning concrete placement, the TAPs must be checked to ensure they are recording data and that the wires have not been damaged. If a TAP unit is not functioning due to a damaged wire, the Contractor must repair or replace the wire. If a TAP unit fails or a wire breaks after concrete placement has started, the Contractor must not stop the concrete placement operation to repair the wire.

6-19.3(6)F USE OF ACCESS TUBES FOR TIP TESTING UNDER THE THERMAL PROBE METHOD

The Contractor may use access tubes for TIP testing under the thermal probe method. Access tubes must be cared for in accordance with Section 6-19.3(6)C. Prior to TIP testing under the thermal probe method, the water in each tube must be removed, collected, and stored in an insulated container. The access tube must be blown dry and swabbed to remove residual water. After TIP testing, the collected and stored tube water must be introduced back into the access tube. New potable water may be used, provided the water temperature is not more than 10 degrees F cooler than the average concrete temperature measured by the probe.

6-19.3(7) PLACING CONCRETE

6-19.3(7)A CONCRETE CLASS FOR SHAFT CONCRETE

Shaft concrete must be Class 5000P conforming to Section 6-02.

6-19.3(7)B CONCRETE PLACEMENT REQUIREMENTS

Concrete placement must commence immediately after completion of excavation by the Contractor and inspection by the Engineer. Immediately prior to commencing concrete placement, the shaft excavation and the properties of the slurry (if used) must conform to Sections 6-19.3(3)D and 6-19.3(4), respectively. Concrete placement must continue in one operation to the top of the shaft, or as shown in the Drawings. The Contractor must place concrete between the upper construction joint of the shaft and the top of the shaft in the dry.

During concrete placement, the Contractor must monitor, and minimize, the difference in the level of concrete inside and outside of the steel reinforcing bar cage. The Contractor must conduct concrete placement operations to maintain the differential concrete head as 1-foot maximum.

If water is not present, the concrete must be deposited through the center of the reinforcement cage by a method that prevents segregation of aggregates and splashing of concrete on the reinforcement cage. The concrete must be placed such that the free-fall is vertical down the center of the shaft without hitting the sides, the steel reinforcing bars, or the steel reinforcing bar cage bracing. The Section 6-02.3(6) restriction for 5 feet maximum free fall must not apply to placement of concrete into a shaft.

6-19.3(7)C CONCRETE VIBRATION REQUIREMENTS

When placing concrete in the dry, only the top 5 feet of concrete must be vibrated, in accordance with Section 6-02.3(9), except that the entire depth of concrete placed in the shaft-column steel reinforcing bar splice zone must be vibrated. If a temporary casing is used, it must be removed before vibration. This requirement may be waived if a temporary casing is used and removed with a vibratory hammer during the concrete placement operation. Vibration of concrete does not affect the maximum slump allowed for the concrete class specified.

6-19.3(7)D REQUIREMENTS FOR PLACING CONCRETE UNDERWATER

When placing concrete underwater, including when water in a shaft excavation exceeds 3 inches in depth, the Contractor must place the concrete by pressure feed using a concrete pump, with a watertight tube having a minimum diameter of 4 inches. The discharge end of the tube on the concrete pump must include a device to seal out water while the tube is first filled with concrete. Alternatively, the Contractor may use a plug that is inserted at the hopper of the concrete pump and travels through the tube to keep the concrete separated from the water and slurry. Concrete placement by gravity feed is not allowed.

Throughout the underwater concrete placement operation, the discharge end of the tube must remain submerged in the concrete at least 5 feet and the tube must always contain enough concrete to prevent water from entering. The concrete placement must be continuous until the work is completed, resulting in a seamless, uniform shaft.

The Contractor may use a tremie instead of a concrete pump, subject to the following conditions:

1. The tremie must have a hopper at the top that empties into a watertight tube at least eight inches in diameter.
2. The discharge end of the tube on the tremie must include a device to seal out water while the tube is first filled with concrete.

6-19.3(7)E TESTING AND REPAIR OF SHAFT CONCRETE PLACED UNDERWATER

If the underwater concrete placement operation is interrupted, the Engineer may require the Contractor to prove by core drilling or other tests that the shaft contains no voids or horizontal joints. If testing reveals voids or joints, the Contractor must repair them or replace the shaft at no expense to the Owner. Responsibility for coring costs, and calculation of time extension, must be in accordance with Section 6-19.3(9)H.

6-19.3(7)F CLEANING AND REMOVAL OF PREVIOUSLY PLACED SHAFT CONCRETE

Before placing fresh concrete against concrete deposited in water or slurry, the Contractor must remove all scum, laitance, loose gravel, and sediment on the upper surface of the concrete deposited in water or slurry and chip off high spots on the upper surface of the existing concrete that would prevent the steel reinforcing bar cage from being placed in the position required by the Drawings.

Prior to performing QA testing operations specified in Section 6-19.3(9), the Contractor must remove the concrete at the top of the shaft down to sound concrete.

6-19.3(7)G PROTECTION OF FRESH AND CURING CONCRETE FROM VIBRATION

The Contractor's construction operation in the vicinity of a shaft excavation with freshly placed concrete and curing concrete must conform to Section 6-02.3(6)D.

6-19.3(7)H UNIFORM YIELD FORM

Except for shafts where the shaft concrete is placed in the dry, the Contractor must complete a uniform yield form, consistent with the sample form submitted to the Engineer as part of the shaft installation narrative as specified in Section 6-19.3(2)B, item 6, for each shaft and must submit the completed form to the Engineer within 24 hours of completing the concrete placement in the shaft.

6-19.3(7)I REQUIREMENTS FOR PLACING CONCRETE ABOVE THE TOP OF SHAFT

Concrete must not be placed above the top of shaft (for column splice zones, columns, footings, or shaft caps) until the Contractor receives the Engineer's acceptance of nondestructive QA testing, if performed at that shaft, and acceptance of the shaft.

6-19.3(8) CASING REMOVAL

6-19.3(8)A CONCRETE HEAD REQUIREMENTS DURING TEMPORARY CASING REMOVAL

As the temporary casing is withdrawn, the Contractor must maintain the concrete and slurry inside the casing at a level sufficient to balance the hydrostatic pressure outside the casing.

6-19.3(8)B REMOVING PORTIONS OF PERMANENT CASING ABOVE THE TOP OF SHAFT

Tops of permanent casings for the shafts must be removed to the top of the shaft or finished groundline, whichever is lower, unless shown otherwise in the Drawings or directed otherwise by the Engineer. For those shafts constructed within a permanent body of water, tops of permanent casings for shafts must be removed to the low water elevation, unless directed otherwise by the Engineer.

6-19.3(8)C REQUIREMENTS FOR LEAVING TEMPORARY CASING IN PLACE

The Contractor must completely remove all temporary casings, except as noted. The Contractor may leave some or all of the temporary casing in place provided all the following conditions are satisfied:

1. The Contractor must submit a Structural Shop Drawing of the following information:
 - a. Complete description of the portion of the temporary casing to remain.
 - b. Specific reason(s) for leaving the portion of the temporary casing in place.
 - c. Structural calculations, using the design specifications and design criteria specified in the General Notes of structure Drawings, in accordance with Section 6-01.8, indicating that leaving the temporary casing in place is compatible with the structure as designed in the Drawings.
2. The Contractor must have received the Engineer's written approval of the submitted request to leave the temporary casing in place.

6-19.3(9) NONDESTRUCTIVE QA TESTING OF SHAFTS

The Contractor must provide nondestructive QA testing and analysis on all shafts with access tubes or thermal wires and TAPs or thermal wires and TAPs facilitating the testing (See Section 6-19.3(1)B). The testing and analysis must be performed by the testing organizations identified by the Contractor's Submittal in accordance with Section 6-19.3(2)D.

The Engineer may direct that additional testing be performed at a shaft if anomalies or a soft bottom are detected by the Contractor's testing. If additional testing at a shaft confirms the presence of a defect(s) in the shaft, the testing costs and the delay costs resulting from the additional testing must be borne by the Contractor in accordance with Section 1-05.6. If the additional testing indicates that the shaft has no defect, the testing costs and the delay costs resulting from the additional testing will be paid by the Owner in accordance with Section 1-05.6, and, if the shaft construction is on the critical path of the Contractor's schedule, a time extension equal to the delay created by the additional testing will be granted in accordance with Section 1-08.8.

6-19.3(9)A TIP TESING USING THERMAL PROBE OR TIP TESTING USING THERMAL PROBE OR CSL TESTING

If selected as the nondestructive QA testing method by the Contractor, TIP testing using thermal probes, or CSL testing must be performed after the shaft concrete has cured at least 96 hours. Additional curing time prior to testing may be required if the shaft concrete contains admixtures, such as set retarding admixture or water-reducing admixture, added in accordance with Section 6-02.3(3). The

additional curing time prior to testing required under these circumstances must not be grounds for additional compensation or extension of time to the Contractor in accordance with Section 1-08.8.

6-19.3(9)B INSPECTION OF ACCESS TUBES

After placing the shaft concrete and before beginning the crosshole sonic log testing of a shaft, the Contractor must inspect the access tubes. Each access tube that the test probe cannot pass through must be replaced, at the Contractor's expense, with a 2-inch diameter hole cored through the concrete for the entire length of the shaft. Unless directed otherwise by the Engineer, cored holes must be located approximately 6 inches inside the reinforcement and must not damage the shaft reinforcement. Descriptions of inclusions and voids in cored holes must be logged and a copy of the log must be submitted to the Engineer. Findings from cored holes must be preserved, identified as to location, and made available for inspection by the Engineer.

6-19.3(9)C TIP TESTING WITH THERMAL WIRES AND TAPS

If selected as the nondestructive QA testing method by the Contractor, TIP testing with thermal wires and TAPs (See Section 6-19.3(6)E) must be performed. The TIP testing must commence at the beginning of the concrete placement operation, recording temperature readings at 15-minute intervals until the peak temperature is captured in the data. Additional curing time may be required if the shaft concrete contains admixtures, such as set retarding admixture or water-reducing admixture, added in accordance with Section 6-02.3(3). The additional curing time required under these circumstances must not be grounds for additional compensation or extension of time to the Contractor in accordance with Section 1-08.8.

TIP testing must be conducted at all shafts in which thermal wires and TAPs have been installed for thermal wire analysis (Section 6-19.3(6)A).

6-19.3(9)D NONDESTRUCTIVE QA TESTING RESULTS SUBMITTAL

The Contractor must submit the results and analysis of the nondestructive QA testing for each shaft tested. The Contractor must submit the test results within 3 working days of testing. Results must be presented in a written report.

TIP reports must include:

1. A map or plot of the wire/tube location within the shaft and their position relative to a known and identifiable location, such as North.
2. Graphical displays of temperature measurements versus depth of each wire or tube for the analysis time selected, overall average temperature with depth, shaft radius or diameter with depth, concrete cover versus cage position with depth, and effective radius.
3. Identification of unusual temperatures, particularly significantly cooler local deviations from the overall average.
4. The location and extent where satisfactory or questionable concrete is identified.
 - a. Satisfactory (S) - 0 to 6 percent Effective Radius Reduction and Cover Criteria Met
 - b. Questionable (Q) - Effective Local Radius Reduction greater than 6 percent, Effective Local Average Diameter Reduction greater than 4 percent, or Cover Criteria Not Met
5. Variations in temperature between wire/tubes (at each depth) which in turn correspond to variations in cage alignment.
6. Where shaft specific construction information is available (e.g. elevations of the top of shaft, bottom of casing, bottom of shaft, etc.), these values must be noted on all pertinent graphical displays in the reports.

CSL reports must include:

1. A map or plot of the tube location within the shaft and their position relative to a known and identifiable location, such as North.

2. Graphical displays of CSL Energy versus Depth and CSL signal arrival time versus depth or velocity versus depth.
3. The location and extent where good, questionable, and poor concrete is identified, where no signal was received, or where water is present.
 - a. Good (G) - No signal distortion and decrease in signal velocity of 10 percent or less is indicative of good quality concrete.
 - b. Questionable (Q) - Minor signal distortion and a lower signal amplitude with a decrease in signal velocity between 10 percent and 20 percent.
 - c. Poor (P) - Severe signal distortion and much lower signal amplitude with a decrease in signal velocity of 20 percent or more.
 - d. No Signal (NS) - No signal was received.
 - e. Water (W) - A measured signal velocity of nominally $V = 4,800$ to $5,000$ fps.

All QA test reports will provide a recommendation to accept the shaft as-is, recommendation for further review by the Engineer, or will provide a plan for further testing, investigation, or repair to address all deficiencies identified by the testing.

6-19.3(9)E VACANT

6-19.3(9)F CONTRACTOR'S INVESTIGATION AND REMEDIAL ACTION PLAN

For all shafts determined to be unacceptable, the Contractor must submit a plan for further investigation or remedial action to the Engineer for approval. All modifications to the dimensions of the shafts, as shown in the Drawings, required by the investigation and remedial action plan must be supported by calculations and shop drawings as specified in Section 6-01.8. All investigation and remedial correction procedures and designs must be submitted to the Engineer for approval.

6-19.3(9)G REJECTION OF SHAFTS AND REVISIONS TO CONCRETE PLACEMENT OPERATIONS

If the Engineer determines that the concrete placed under slurry for a given shaft is structurally inadequate, that shaft will be rejected. The placement of concrete under slurry must be suspended until the Contractor submits to the Engineer written changes to the methods of shaft construction needed to prevent future structurally inadequate shafts and receives the Engineer's written approval of the submittal.

6-19.3(9)H CORED HOLES

At the Engineer's request, the Contractor must drill and retrieve a concrete core sample from any questionable quality shaft (as determined from CSL testing or TIP testing, and analysis or by observation of the Engineer) to explore the shaft condition.

Prior to beginning coring, the Contractor must submit the method and equipment used to drill and remove cores from shaft concrete to the Engineer and receive the Engineer's written approval. The coring method and equipment must provide for complete core recovery and must minimize abrasion and erosion of the core.

If a defect is confirmed, the Contractor must pay for all coring costs in accordance with Section 1-05.6. If no defect is encountered, the Owner will pay for all coring costs in accordance with Section 1-05.6, and, if the shaft construction is on the critical path of the Contractor's schedule, compensation for the delay will be granted by an appropriate time extension in accordance with Section 1-08.8. Materials and work necessary, including engineering analysis and redesign, to effect corrections for shaft defects must be furnished to the Engineer's satisfaction at no additional cost to the Owner.

6-19.3(9)I REQUIREMENTS FOR ACCESS TUBES AND CORED HOLES AFTER TESTING

All access tubes and cored holes must be dewatered and filled with grout conforming to Section 9-39.5 after tests are completed. The access tubes and cored holes must be filled using grout tubes that extend to the bottom of the tube or hole or into the grout already placed.

6-19.3(10) ENGINEER'S FINAL ACCEPTANCE OF SHAFTS

The Engineer will determine final acceptance of each shaft, based on the nondestructive QA test results and analysis for the tested shaft and will provide a response to the Contractor within 3 working days after receiving the test results and analysis submittal.

6-19.4 MEASUREMENT

Measurement for "Constructing ___ Diam. Shaft (Description)" will be measured by the linear foot. The linear foot measurement will be calculated using the top of shaft elevation and the bottom of shaft elevation for each shaft as shown in the Drawings.

Rock excavation for shaft, including haul, will be measured by the linear foot of shaft excavated. The linear feet measurement will be computed using the top of the rock line, defined as the highest bedrock point within the shaft diameter, and the bottom elevation shown in the Drawings.

Measurement for "QA Shaft Test (Description)" will be per each shaft tested.

Measurement for "Removing Shaft Obstructions (Description)" for pavement removal, cement concrete sidewalk removal, and temporary pavement patching on Marion Street will be incidental to shaft construction and will not be measured separately.

6-19.5 PAYMENT

1. "Constructing ___ Diam. Shaft (Description)", per linear foot.

The unit Contract Price per linear foot for "Constructing ___ Diam. Shaft (Description)" must be full pay for performing the Work as specified in the Contract Documents, including:

1. Soil excavation for shaft, including all costs in connection with furnishing, mixing, placing, maintaining, containing, collecting, and disposing of all mineral, synthetic and water slurry, and disposing of groundwater collected by the excavated shaft. Hauling of contaminated materials designated as Type A waste is not included in the contract price per linear foot for "Constructing ___ Diam. Shaft (Description)". Hauling of this material is included in the bid item "Offsite Disposal of Contaminated materials Designated as Type A Waste".
2. Pavement and cement concrete sidewalk removal on Marion Street.
3. Furnishing and placing temporary shaft casing, including temporary casing in addition to the required casing specified in the Special Provisions, and including all costs in connection with completely removing the casing after completing shaft construction.
4. Furnishing and placing permanent casing for shaft.
5. Furnishing and placing column silos and covers.
6. Casing shoring, including all costs in connection with furnishing and installing casing shoring above the specified upper limit for casing shoring but necessary to provide for sufficient water head pressure to resist artesian water pressure present in the shaft excavation, removing casing shoring, and placing seals when required.
7. Furnishing and placing steel reinforcing bar and epoxy-coated steel reinforcing bar, including furnishing and installing steel reinforcing bar centralizers.
8. Installation of CSL access tubes or thermal wires and TAPs.
9. Furnishing, placing and curing concrete to the top of shaft or to the construction joint at the base of the shaft-column splice zone as applicable.

10. Furnishing and installing steel cap plates, as shown in the Drawings, for the Marion Street Pedestrian Bridge shafts, including all other excavation required this is not already accounted for in connection with constructing the shafts.
11. Temporary pavement patching at Marion Street.

Payment for "Constructing___Diam. Shaft (Description)" will be made upon Engineer acceptance of the shaft, including completion of satisfactory QA shaft tests as applicable.

2. **"QA Shaft Test (Description)"**, per each.

The unit Contract Price per each for "QA Shaft Test (Description)" must be full pay for performing the Work as specified, including operating all associated accessories necessary to record and process data and develop the summary QA test reports. Section 1-04.5 does not apply to this Bid Item.

3. **"Removing Shaft Obstructions (Description)"**, estimated.

Payment for removing, breaking-up, or pushing aside shaft obstructions, as defined in Section 6-19.3(3)E, will be made for the changes in shaft construction methods necessary to deal with the obstruction. The Contractor and the Engineer must evaluate the effort made and reach agreement on the equipment and employees utilized, and the number of hours involved for each. Once these cost items and their duration have been agreed upon, the payment amount will be determined using the rate and markup methods specified in Section 1-09.6. For the purpose of providing a common proposal for all Bidders, the Owner has entered an amount for the item "Removing Shaft Obstructions (Description)" in the Bid to become a part of the total Bid by the Contractor.

If drilled shaft tools, cutting teeth, casing or Kelly bar is damaged as a result of the obstruction removal work, the Contractor will be compensated for the costs to repair this equipment in accordance with Section 1-09.6.

If shaft construction equipment is idled as a result of the Work required to deal with the obstruction and cannot be reasonably reassigned within the project, then standby payment for the idled equipment will be added to the payment calculations. If labor is idled as a result of the Work required to deal with the obstruction and cannot be reasonably reassigned within the project, then all labor costs resulting from Contractor labor agreements and established Contractor policies will be added to the payment calculations.

The Contractor must perform the amount of obstruction Work estimated by the Owner within the original time of the Contract. The Engineer will consider a time adjustment and additional compensation for costs related to the extended duration of the shaft construction operations, provided:

1. The dollar amount estimated by the Owner has been exceeded, and
2. The Contractor shows that the obstruction removal Work represents a delay to the completion of the project based on the current progress schedule provided in accordance with Section 1-08.3.

DIVISION 7: STORM DRAINS, CULVERTS, SANITARY AND COMBINED SEWERS, WATER MAINS AND RELATED STRUCTURES**7-05 MAINTENANCE HOLES, CATCH BASINS, INLETS, JUNCTION BOXES AND BRIDGE DRAINS****7-05.2 MATERIALS (SP 03-11-16)**

Supplement this Section with the following:

7-05.2(2) CATCH BASIN, TYPE 241 WITH BEEHIVE GRATE, ADA GRATE, OR SOLID COVER

Provide a Type 241 catch basin in accordance with Standard Plan 241A with grate or solid cover as required on the Drawings.

Beehive frame and grate: in accordance with Standard Plan 269.

ADA frame and grate: cast iron frame ASTM A48 CL30; ductile iron ASTM A536 CL80-55-06; Olympic Foundry 18" x 24" TWS Locking ADA/Pedestrian Proof Frame & Grate; Part No. SM50TWSDT; or approved equal.

Solid frame and cover: cast iron frame ASTM A48 CL30; ductile iron ASTM A536 CL80-55-06; Olympic Foundry 20" x 24" Frame and cover; Part No. SM60S; or approved equal.

7-05.4 MEASUREMENT (SP 02-14-20)

Measurement for "Catch Basin, Type 241 with _____", will be per each.

7-05.5 PAYMENT (SP 02-14-20)

Supplement this Section with the following:

11. "Catch Basin, Type 241 with _____", per each

The Bid Item price for "Catch Basin, Type 241 with _____" must include all costs for the work required to furnish and install the catch basin with the specified cover and frame, including trap, excavation, haul, stockpile and disposal of soil, backfill and compaction, adjustment brick and blocks, mortar, non-shrink grout, plaster, and castings.

7-08 MISCELLANEOUS PIPE CONNECTIONS**7-08.3 CONSTRUCTION REQUIREMENT****7-08.3(4) CATCH BASIN CONNECTIONS (GSP 08-15-18)**

Delete the last sentence of the 5th paragraph in this Section and replace it with the following:

Bedding for catch basin connection pipe must be as specified in Section 7-17.3(1) for the pipe material used.

7-08.3(5) INLET CONNECTIONS (GSP 08-15-18)

Delete the last sentence of the 5th paragraph in this Section and replace it with the following:

Bedding for inlet connection pipe must be as specified in Section 7-17.3(1) for the pipe material used.

7-08.5 PAYMENT (GSP 03-12-13)

Add the following after item 2:

All costs for supporting SPU and preparing the site for SPU core tap and tee installation must be included in the bid item price for "Pipe, Catch Basin Connection, (Material), (Class), (Size)"

7-17.4 MEASUREMENT (GSP 10-09-17)

Delete the last paragraph of this Section and replace it with the following:

Measurement for "Mineral Aggregate, (Type)" for trench backfill will be as specified in Section 4-01.5. Imported Mineral Aggregate used beyond these neat line limits will be at the Contractor's sole expense.

7-17.5 PAYMENT (GSP 10-09-17)

Delete Item 2. a. and replace it with the following:

a. Trench excavation, installing and joining pipe, and backfill and compaction of suitable native Material backfill;

Delete Item 2. d. and renumber the subsequent items.

Add the following to item 9:

All costs associated with preparing the site for tee installation by SPU per the SPU core tap procedures must be included in the applicable bid items of work.

7-20 ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO FINISH GRADE

7-20.4 MEASUREMENT (SP 03-27-18)

Add the following:

Measurement for "Adjust Existing Vault Casting" will be per each.

7-20.5 PAYMENT (SP 03-27-18)

Delete the third from last paragraph in this Section and replace it with the following:

The costs for placement and removal of asphalt or cement concrete used to secure castings before paving are considered incidental to the Work and no separate payment will be made.

12. "Adjust Existing Vault Casting", per each.

~~The Bid Item price for "Adjust Existing Vault Casting" includes all costs for the Work required to adjust the vault castings to the grades specified in the Drawings.~~

Add 1-M

Replace the third paragraphs with the following:

The Bid Item price for "Adjust Vault Casting" includes all costs for the Work required to adjust existing and owner provided replacement vault castings to the grades specified in the Drawings.

DIVISION 8: MISCELLANEOUS CONSTRUCTION

8-01 CONSTRUCTION STORMWATER POLLUTION PREVENTION

8-01.3(2)D TEMPORARY DISCHARGE PLAN

Add the following section:

Add 2-L

Replace the second sentence with the following:

Shaft drilling slurry wastewater must not be discharged to the surface waters of the State.

8-01.3(2)D1 SHAFT DRILLING SLURRY WASTEWATER (GSP 05-21-19)

Wastewater generated on-site during shaft drilling activity must be managed and disposed of in accordance with the requirements below. ~~No shaft drilling slurry wastewater must be discharged to surface waters of the State.~~ Neither the sediment nor liquid portions of the shaft drilling slurry wastewater must be contaminated, as detectable by visible or olfactory indication (e.g., chemical sheen or smell).

1. Water-only shaft drilling slurry or water slurry with approved flocculants may be infiltrated on-site. Flocculants used must meet the requirements of Section 9-14.19 or must be chitosan products listed as General Use Level Designation (GULD) on the Department of Ecology's stormwater treatment technologies webpage for construction treatment. Infiltration is permitted if the following requirements are met:
 - a. Wastewater must have a pH of 6.5 – 8.5 prior to discharge.
 - b. The amount of flocculant added to the slurry must be kept to the minimum needed to adequately settle out solids. The flocculant must be thoroughly mixed into the slurry.
 - c. The slurry removed from the shaft must be contained in a leak proof cell or tank for a minimum of 3 hours.
 - d. The infiltration rate must be reduced if needed to prevent wastewater from leaving the infiltration location. The infiltration site must be monitored regularly during infiltration activity. All wastewater discharged to the ground must fully infiltrate and discharges must stop before the end of each work day
 - e. Drilling spoils and settled sediments remaining in the containment cell or tank must be disposed of in accordance with Section 6-19.3(4)F.
 - f. Infiltration locations must be in upland areas at least 150 feet away from surface waters, wells, on-site sewage systems, aquifer sensitive recharge areas, sole source aquifers, well head protection areas, and must be marked on the plan sheets before the infiltration activity begins.
 - g. Prior to infiltration, the Contractor must submit a Shaft Drilling Slurry Wastewater Management and Infiltration Plan as a Structural Shop Drawing. This Plan must be kept onsite, adapted if needed to meet the construction requirements, and updated to reflect what is being done in the field. The submittal must include, at a minimum, the following information:
 - i. Plan sheet showing the proposed infiltration location and all surface waters, wells, on-site sewage systems, aquifer-sensitive recharge areas, sole source aquifers, and well-head protection areas within 150 feet.
 - ii. The proposed elevation of soil surface receiving the wastewater for infiltration and the anticipated phreatic surface (i.e., saturated soil).
 - iii. The source of the water used to produce the slurry.

- iv. The estimated total volume of wastewater to be infiltrated.
 - v. The approved flocculant to be used (if any).
 - vi. The controls or methods used to prevent surface wastewater runoff from leaving the infiltration location.
 - vii. The strategy for removing slurry wastewater from the shaft and containing the slurry wastewater once it has been removed from the shaft.
 - viii. The strategy for monitoring infiltration activity and adapting methods to ensure compliance.
 - ix. A contingency plan that can be implemented immediately if it becomes evident that the controls in place or methods being used are not adequate.
 - x. The strategy for cleaning up the infiltration location after the infiltration activity is done. Cleanup must include stabilizing any loose sediment on the surface within the infiltration area generated as a byproduct of suspended solids in the infiltrated wastewater or soil disturbance associated with BMP placement and removal.
2. Shaft drilling mineral slurry, synthetic slurry, or slurry with polymer additives not allowed for infiltration must be contained and disposed of by the Contractor at an approved disposal facility in accordance with Section 1-07.3. Spoils that have come into contact with mineral slurry must be disposed of in accordance with Section 6-19.3(4)F.

8-02 LANDSCAPE CONSTRUCTION

8-02.2 MATERIALS (SP 03-25-16)

Delete Item 3, and replace with the following:

- 3. Soil: Bioretention Soil must be used unless otherwise specified in the Contract. See Sections 9-14.1.

Delete Item 6, and replace with the following:

- 6. Mulch: Planting mulch for topdressing must consist of Bark Mulch as specified in Section 9-14.4(3)

8-02.3 CONSTRUCTION REQUIREMENTS

8-02.3(1) RESPONSIBILITY DURING CONSTRUCTION

8-02.3(1)A GENERAL (SP 03-07-16)

Supplement this Section with the following:

The Contractor must fully inform himself/herself of existing conditions of the site before submitting his/her bid, and must be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract.

Should the Contractor, in the course of Work, find any discrepancies between the Drawings and physical conditions or any omissions or errors in the Contract Documents, it will be the Contractor's duty to submit a written request for information (RFI) to inform the Engineer.

When conditions detrimental to plant growth are encountered, adverse drainage conditions, or obstructions, notify the Engineer before Planting Construction. Do not proceed with planting without specific written instructions from the Engineer.

Protect excavations by shoring, bracing, sheeting, underpinning, or other methods, as required to prevent cave-ins or loose dirt and surface water from entering or draining into excavated areas. Barricade open excavations and post warning lights at work adjacent to public streets and walks.

Plant installations on site must be in accordance with the approved "Landscape Construction Phasing Plan", as described in this Section, unless other alternate sequence is specified or approved by the Engineer.

Planting must not commence until all plant, planting soil, and accessory materials have been submitted and approved by the Engineer, including the following:

- Newly built underground drainage system.

- Newly built underground landscape irrigation system with tested verification of operation including drip irrigation and coverage.

- All other underground or buried utility services.

- Complete placement of planting soil mixes including verification of acceptability of grades, quality of planting soil mix materials, and quality of planting soil material placement.

Action Submittals

Plant Procurement List and Nursery Source Identification Log: Submit a complete list of all plant materials for the Project with nursery source identification for each plant material in accordance with the "Landscape Construction Phasing Plan" in this Section.

- Include in plant list the botanical and common names, size, quantity, form, depth and width of root ball, limb height (if applicable), to confirm compliance with standard specifications Section 9-14, and source locations for all plant materials.

- Include names, addresses, and phone numbers of each nursery source associated with each plant item.

- Include invoices or certificates of deposit from nursery(ies) guaranteeing timely delivery of all specified and tagged plant materials.

- Include a complete list of procurement dates for each Landscape Construction Phase that meets the minimum procurement milestones.

- Include color digital photographs of plant material. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than twenty plants are required, include a minimum of three representative photographs showing stock compliant with standards for acceptance, including the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery. Images must be at least 3" x 5" at 300 dpi and must be .jpg format.

- Plant list must include a unique serial number for each tree.

- Plant lists must clearly identify deviations from the specified plants, maintained to document all approved substitutions. Where deviations or other changes occur in plant list, identify both the original specified plant item and the new plant item. Maintain and re-submit updated "Plant Procurement List and Nursery Source Identification Log" as deviations and other changes occur until the Final Completion. Submit as a Record Document at the Final Completion.

8-02.3(1)B LANDSCAPE CONTRACTOR QUALIFICATIONS (SP 03-07-16)

Supplement this Section with the following:

Landscape Contractor must have significant and demonstrated experience in the installation of soil on public works projects.

Landscape Contractor must exhibit and identify qualifications of persons who will be on-site for field supervision of work. Installation and maintenance supervisor(s) for the Project plant installation and maintenance work must be experienced in landscape construction of public works projects with emphasis on soil and street tree handling and installation.

Landscape Contractor must provide adequate staff to meet the project schedule for the landscape installation component of the project.

Landscape Contractor Supervisor(s): Must be present full-time on the Project site to oversee all landscape construction or maintenance activities and must have a minimum of 2 years' experience as a full-time supervisor responsible for landscape installations comparable in scope.

Landscape Contractor must submit qualification data for nursery and/or plant Supplier specified under Section 9-14.6(2).

8-02.3(2) TOPSOIL, PLANTING SOIL, AND TURF AREA SOIL

8-02.3(2)A GENERAL (SP 08-22-17)

Supplement this Section with the following:

The Contractor is responsible for meeting Contract requirements including but not limited to responsibility to provide all labor, equipment and materials for preparation of subsoil, transport, storage, delivery, placement and incorporation of compost amendment, approvals of soils in a timely manner consistent with the project schedule to avoid delay of other work included in the Contract.

8-02.3(3) PESTICIDES

Amend the first paragraph this Section with the following:

1. All pesticide use within the City of Seattle must be in accordance with the City of Seattle pesticide reduction strategy as documented under the keyword "pesticide reduction" on the City of Seattle website: <http://www.seattle.gov/parks/about-us/policies-and-plans/pesticide-reduction>

Supplement this Section with the following:

Prior to acceptance to commence the Landscape Establishment Period under the Contract, the Contractor must submit written certifications for the following materials with statement of product identification and total quantities of each by weight actually used on the Project, together with work and materials specified in other Sections:

Quantity, area and date of application documentation for each type pesticide.

8-02.3(4) PLANTING AREA PREPARATION (SP 03-07-16)

Replace the fifth paragraph with the following:

Five working days prior to the commencement of work to prepare areas to be planted, the Contractor must notify the Engineer to conduct a joint inspection of the site conditions with the Landscape Subcontractor to confirm corrections necessary prior to soil work. The Contractor must not scarify subsoil or place any imported material until corrections are inspected and approved to clean up and subgrade depth by the Engineer and all areas excluded for irrigation or underground drainage installation are clearly field marked.

The Contractor must be responsible to verify the presence of underground infrastructure prior to excavation or soil work to construct tree pits and planting areas planting areas.

Take proper precautions so as not to disturb or damage sub-surface elements, The Contractor, failing to take these precautions, must be responsible for making requisite repairs to damaged utilities or subsurface element at the Contractor's own expense and no modification to schedule.

If subsurface elements are discovered to be in conflict with a tree or plant, notify the Engineer immediately for direction to resolve the conflict.

Mark the locations of all subsurface infrastructure or utilities to be avoided in the planting operation.

Soil Moisture: Soil must not be handled, spread, compacted, or planted when saturated beyond field capacity. Field capacity may be determined by the Engineer by squeezing a handful of soil tightly in a fist, then poking the resulting soil ball with a finger; if moisture drips out of the squeezed soil or the ball does not easily crumble when poked, then it is too wet to handle, spread, rake, compact, or walk on for planting or mulching operations.

Machinery: All equipment used to install or grade soil or mulch, move plants or other material on planting area must have balloon tires with rated ground pressure no greater than 4 p.s.i.

Subgrade: The Subgrade must be inspected by the Engineer to ensure condition free of construction debris and/or material detrimental to tree or plant growth and to confirm accurate field marking to define areas to be excluded from scarification. Scarify subsoil 4 to 6 inches deep. Equipment and extent of scarification subject to approval by the Engineer based on subsoil condition. Subgrade must be inspected after scarification for uniformity and correction to remove exposed material detrimental to tree or plant growth.

Drainage of Planting Area: For planting areas receiving sub-drainage systems, the Contractor must be responsible to notify the Engineer 48 hours in advance to be present for testing sub-drainage system to confirm and document proper function in planting area prior to planting. Refer to the Drawings for extent, layout and design of sub-drainage system.

The Contractor must apply and shape the lifts in such a manner that the planting area has a continuously sloped final surface allowing for drainage from higher elevations to lower outer edges of the planting area. Where possible, ridges and ridge lines must be the approximate center-point, or centerline(s), of the planting area.

Place soil to depths, elevations, and profiles indicated in the Drawings

Place soil so that after settlement surface of soil will be at finished grade level indicated in the Drawings.

The Contractor must be responsible for accurate final grades as required in the Drawings.

Swale Flow Lines, Bottom of Slopes, Top of Slopes and Grade Breaks: Install grade stakes at maximum 10 feet on center.

High Points and Low Point: Provide grade stakes at high points and low points including top of berms, catch basin rims and area drain rims.

Finished Grade Operations:

General:

Grade soil surface with smooth uniform slope between points where elevations are given, and between points where elevations are given and existing grades.

Slope finish grades to drain surface water away from buildings, walks, paving, and other structures unless indicated otherwise.

Slope finish grades to drain surface water to catch basins, area drains, or trench drains as shown in the Drawings.

Grade soil surface smooth to be free of high and low areas which will inhibit surface drainage.

Grade the edges of soil surfaces to an elevation that will provide a 1.5 to 2-inch clearance below curb and sidewalk height where mulch placement at 1.5 to 2 inches will provide a surface flush with adjacent infrastructure after soil settlement.

Hand-rake soil surface using screed boards, string lines and laser levels to achieve smooth surfaces acceptable to the Engineer.

Add the following to Section 8-02.3(4):

8-02.3(4)A FIELD SAMPLES (SP 03-07-16)

Testing / Verifying Drainage: Test the drainage of planting areas by filling with water and allowing water to percolate twice in succession after excavation of planting holes in locations identified by the Engineer. If water does not percolate or drain more than 1 inch per hour after second filling, notify the Engineer and request additional instructions prior to planting.

Fill/Backfill and Compaction Sample(s): For placement condition of fill/backfills proposed in tree planting areas, identify an area on site, to verify and establish understanding of fill/backfill and compaction methods for the soil conditions and density specified. Area must be of size to suit method for typical planting conditions. Planting Soil (Modified) placement in each area must be reviewed by the Engineer for approval of process and required configuration and layouts.

Planted Areas: See Section 8-02.3(5), Layout of Planting.

Approved mock-ups may be incorporated into the finished work.**8-02.3(5) LAYOUT OF PLANTING**

Replace this Section with the following:

8-02.3(5) LAYOUT AND SEQUENCE OF PLANTING (SP 03-07-16)

Plants must be placed at spacings and locations as indicated on the Planting Plan. Plant layout must be approved by the Engineer prior to installation of any plants. Unapproved plantings must be removed and replanted at the Contractors expense.

1. **Layout**

Field staking must be marked to identify location and species of trees and shrubs with a mature height of 2 feet or greater. Field staking must be provided by the Contractor with 3 working days' notice for approval by the Engineer before installation.

Shrubs: Field stake shrubs at locations shown on Drawings with 2 working days' notice for approval by the Engineer before installation. Adjustments to plant locations must be approved by the Engineer. Complete staked layout of planting beds and pits before seeking layout approval from the Engineer. Plant layouts must be approved before installation. Installation of trees and shrubs in staked locations approved by the Engineer must be completed prior to delivery of groundcovers, grasses, vines, and perennials.

Understory Planting: Layout areas for grasses, perennials, ferns, and bulbs where shown on Drawings. Where adjustments are necessary, notify the Engineer to request inspection and approval on the day of planting.

If obstructions are encountered that are not shown in the Drawings, do not proceed until the Engineer has approved the locations or selected alternate locations for field staked trees, shrubs and understory planting.

Planting within roadway medians (defined as central reservation that separates opposing lanes of traffic), must begin 12-inches away from the inner edge of the curb enclosing the median.

2. **Approval:** All plant Material must be inspected and determined by the Engineer to be acceptable for planting prior to planting. All plants must be furnished disease and pest free, in good health and condition, true to form, and must be vigorous growers.
3. **Notification:** The Contractor must notify the Engineer at least 5 Working Days in advance of projected completion of staking and allow 2 Working Days after the projected completion date for review and any adjustments of the layout by the Engineer. Contracts requiring plant placement based on field layout by the Engineer require 5 Working Days' notice for field layout prior to the Contractor's scheduled plant installation.

4. **Sequence:** The Contractor must sequence the planting to minimize disturbance to new plantings and existing landscaping, and to comply with the Trees and Soils, Planting and Soil Protection Plans (TVSPP), see Section 8-01.
5. Unless otherwise approved in writing by the Engineer, trees and shrubs must be delivered and planted at Project site prior to delivery and planting of ground covers, vines, grasses, and perennials.
6. Install herbaceous material after coordinating with installation of the irrigation system piping and watering heads.
7. The Contractor is solely responsible for supplying and watering all installed plant materials in the event that the irrigation system has not yet been installed and/or is not yet functional.

All water must come from a non-potable source.

Provide as needed water from sources free from impurities injurious to vegetation.

Provide all hoses and equipment as needed to distribute water to area of landscape work and areas needing watering. Provide water tank trucks as needed, at no additional cost, if water service is interrupted.
8. Apply mulch to planted areas within 24 hours of planting.

8-02.3(6) PLANTING

8-02.3(6)A GENERAL

Replace this Section with the following:

8-02.3(6)A PLANT INSTALLATION – GENERAL (SP 03-07-16)

Plants brought to the planting site must be bare root, balled and burlapped, or in containers, depending on how specified in the planting schedule in the Contract for the particular type of planting Material.

1. **Conditions:** Plants must not be planted during freezing weather or when the ground is frozen. Plants must not be planted when soils are saturated beyond field capacity, as determined by the hand squeeze method described in 8-02.3(4) "Soil Moisture Testing / Verifying Drainage". Plants must not be placed when temperatures exceed 90 degrees or fall below 35 degrees. All plant materials on site must be stored for protection during extreme temperature or wind velocity exceeds 30 mph.
2. **Dates to plant:** Trees, shrubs, groundcovers, grasses, perennials, ferns, and vines can be planted throughout the year. Plant bulbs during the period between August and November. Planting at other times must be approved by the Engineer.
3. **Drainage:** If groundwater is encountered upon excavation of planting holes, the Contractor must promptly notify the Engineer and must not plant unless approved by the Engineer.
4. **Root-bound Container:** Plant material must not be root-bound.
5. **Excessive Compaction / Soil Protection:** Perform planting work using means and methods that will not impact the structure or alter the compaction of soil placed by the Contractor and approved by the Engineer for planting.

Planting areas within the Roadway:

8-02.3(6)C SHRUBS AND GROUNDCOVERS

Supplement this Section with the following:

8-02.3(6)C PERENNIALS, GRASSES, FERNS, VINES AND BULBS (SP 03-07-16)

Shrubs:

For shrubs with mature heights of 3 feet or more, follow Section 8-02.3(6)B Trees.

For shrubs with mature heights of less than 3 feet, follow Section 8-02.3(6)C Perennials, Grasses, Ferns, Vines and Bulbs.

Perennial, Grass, and Fern Planting: Unless otherwise directed, plant perennials, grasses, and ferns in strict compliance with the Drawings.

Set out and space perennials, grasses, and ferns.

Dig holes large enough to allow spreading of roots and backfill with planting soil.

Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

Set plants plumb with crown of properly exposed root ball flush with the specified finished grade.

Mulch as indicated.

Dig holes large enough to allow spreading of roots and backfill with planting soil.

Plant vines so that they are aligned with steel slats and cables or centered evenly between them.

Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

The Contractor must train the long vine runners that were attached to the inbuilt container trellis to the cables and steel slats. Attach with horticulture tape at points approved by the Engineer

Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

Mulch as indicated.

Bulb Planting: Unless otherwise directed, plant bulbs in strict compliance with the Drawings.

Set out and space bulbs in naturalized drifts for approval by the Engineer.

Dig holes large enough to allow spreading of roots and backfill with planting soil.

Firmly set bulb with roots down and the top of the bulb at a depth equal to three times the bulb's diameter

Work soil around bulb to eliminate air pockets.

Water thoroughly after planting.

Protect plants from hot sun and wind.

Mulch as indicated.

8-02.3(8) FERTILIZER (SP 11-17-17)

Add the following:

Prior to acceptance to commence the Landscape Establishment Period under the Contract, the Contractor must submit written certifications for the following materials with statement of product identification and total quantities of each by weight actually used on the Project, together with work and materials specified in other Sections:

Quantity, area and date of application documentation for each type fertilizer.

Commercial Fertilizer: TURFGRO, "GROPACS" Fertilizer Packets, or approved equal. Place fertilizer packets in the planting pits at the rate of one packet per gallon-sized plant container.

Organic Fertilizer: 'Rainy Pacific NW Blend' or approved equal. Broadcast at a rate of 20 pounds per 1000 square feet. Apply once a month for the first 4 months of the growing season

Recommended sources for Commercial and Organic Fertilizers:

Wilco, 922 Valley Avenue East, Suite 103, Puyallup, WA 98371, Ph. (253) 841-3378, Fax. (253) 841-8549.

Horizon Distribution, Bellevue, WA, Ph. 425-828-4554, Fax 425- 822-0419.

Wilbur-Ellis, 16300 Christensen Road, Tukwila, WA 98188-3418, Ph. (206) 439-9950.

Or approved equal.

8-02.3(9) MULCH (SP 11-17-17)

Replace the first paragraph with the following:

Mulch: Planting mulch for topdressing must consist of Bark Mulch as specified in Section 9-14.4(3) unless otherwise specified in the Contract or specified under Section 8-02.2 Materials.

8-02.3(11) CLEANUP

Replace this Section with the following:

8-02.3(11) ADJUSTING, CLEANING, AND PROTECTION (SP 03-07-16)

Protect newly graded and planted areas from traffic, freezing and erosion. Keep free of trash, debris, or construction materials from other work.

Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace material to a depth as directed by the Engineer; reshape and re-compact at optimum moisture content to the required density.

Where settling occurs, before final acceptance or during the warranty period, remove finish surfacing, backfill with additional approved material, compact to specified rates, and restore any disturbed areas to a condition acceptable to the Engineer.

Reconstruct subgrades or finished grades damaged by frost, rain, accumulated water, or construction activities, as directed by the Engineer.

Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

The Contractor is strictly prohibited from tracking or driving over newly developed planted areas.

Excess Planting Materials: The Bid Item quantities in the Contract for Trees and Plants not used on site are the property of the City. The Contractor must properly store, transport and offload trees and other plants at no additional cost to the City, at a location directed by the Engineer.

Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials and keep paved areas, planted areas, stairs, walks and decking clear. Store materials and equipment where approved by the Engineer.

Promptly remove soil and debris created by planting work from paved areas. Clean wheels of vehicles before leaving soil areas of site to avoid tracking soil onto surfaces of adjacent deck areas, adjoining roads, walks, or other paved areas.

Protect plants from damage due to landscape operations and operations of other contractors and trades. The Contractor must be responsible for protection and for correction of any damage to planted areas

including mulch topdressing, soil, trees, plants, and irrigation at no cost to the contract up to acceptance of all planting and start of the Landscape Establishment Period.

After installation and before Final Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project Site.

Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of the Work. Leave the site in a neat, orderly condition, "broom clean".

Disposal: Legally dispose of waste material off the Project Site.

8-02.3(12) LANDSCAPE ESTABLISHMENT (SP 03-07-16)

Add the following:

Saucer. Restore planting saucer if needed.

Fertilizer. Apply according to Specification Section 8-02.3(8).

8-02.3(13) PLANT REPLACEMENT (SP 03-07-16)

Add the following:

Replace unacceptable plant material within 72 hours of identification, unless accepted otherwise by the Engineer.

The guarantee of all replacement plants must extend for an additional period of 1 year from the date of their acceptance after replacement.

Supplement Section 8-02.3 with the following: **Add 1-N**

8-02.4 MEASUREMENT (SP 03-07-16)

Replace the first sentence with the following:

Add the following: **Measurement for "Bulb, Bare Root", will be per each type of and size of plant Material accepted by the Engineer.**

Measurement for "Vine, 3 gallon", "Bulb, bare root", will be per each type of and size of plant Material accepted by the Engineer. See Section 9-14.6(1) for typical Bid Item plant descriptions.

Measurement for "Bioretention Soil" will be per cubic yard.

Measurement for "Mulch" will be per cubic yard.

8-02.5 PAYMENT (SP 03-07-16)

Add the following:

26. **"Bulb, Bare Root"**, per each.

The Bid Item price for "Shrub, (Type), (Size)", "Groundcover, (Size)", "Groundcover, (Size)", "Bulb, bare root", must include all costs for the Work required, and not otherwise provided for in other Bid Items in this Section, to furnish, plant, fertilize, cultivate, mulch, stake, including the use of geotextiles and geotextile staking where necessary, and maintain the size and type of planting until the initial acceptance of the planting.

28. **"Bioretention Soil"**, per cubic yard.

The Bid Item price for "Bioretention Soil" and must include all costs for the work required to furnish, mix, place and grade the specified soil, including the use of geotextiles and geotextile staking.

30. **"Mulch"**, per cubic yard.

The Bid Item price for "Mulch" must include all costs for the work required to furnish, install and rototill the specified mulch type.

8-03 IRRIGATION SYSTEM

8-03.1 DESCRIPTION (GSP 07-24-15)

Replace this section with the following:

Section 8-03 describes work consisting of furnishing and installing a complete and functional sprinkler irrigation system in accordance with the Contract.

The Contractor or Subcontractor must be a Washington State licensed irrigation contractor. The irrigation system must be installed by an irrigation sprinkler installer and must be installed according to the local plumbing codes. A plumbing permit will not be required for irrigation work in the street Right of sdf. At least 3 Working Days before backfilling, the Contractor must provide notice to the Engineer for Seattle Public Utilities' Customer Service Division to inspect and approve the piping and back flow prevention devices.

Electrical Work must be performed by a licensed electrical contractor. The Contractor must obtain a class 2 electrical permit from the Seattle Department of Construction and Inspections, when required in the Contract. See Section 1-07.6(1). For information regarding notification requirements related to scheduling Seattle City Light inspections and services, and SDCI inspections see Sections 1-07.28(8) and 1-07.28(21). The Contractor must become thoroughly familiar with the electrical environment within the Project Site and with the relevant work.

Excavations over 4 feet deep are subject to the provisions of Section 7-17.3(1)A7a, Trench Safety Systems.

8-03.3 CONSTRUCTION REQUIREMENTS

8-03.3(1) GENERAL (GSP 07-24-15)

Replace this section with the following:

The Contractor must coordinate installation and operation of the irrigation system with landscaping construction.

The Contractor must check and verify all pertinent dimensions at the Project Site before proceeding with the Work. Before installing the irrigation system, the Contractor must carefully note all finish grades. Finish grades changed in the course of the Work must be restored so that the terrain conforms to the finished grade.

The Contractor must furnish the necessary equipment for proper execution and completion of all irrigation Work and must make the connections to the water and electrical services. After payment for the new service has been received, Seattle Public Utilities' Water Operations will furnish and install the water service, water meter and meter box. The Contractor must be responsible to request service coordination with the Engineer and must allow 8 weeks for installation by Seattle Public Utilities' Water Operations.

Where indicated on the Drawings, piping and wiring must be installed within plastic pipe sleeves of sufficient inside diameter to permit easy withdrawal and reinserting of the piping or wire. Pipe sleeves and piping must have a minimum of 12 inches soil cover for water pipes, and electrical conduit including conduit sleeves must have a depth of soil cover of 18 inches or depth of soil cover conforming to the applicable electrical code for electrical wire or conduit with electrical wire, whichever is greater. The detect-a-tape must be installed 6 inches above the piping or conduit, and 4 inches above the sleeve as indicated on Standard Plan no. 128.

8-03.3(2) LAYOUT OF IRRIGATION SYSTEM

Supplement this Section with the following:

Staked layout must be inspected and approved by Engineer prior to installation.

8-03.3(6) INSTALLATION (SP 03-11-16)

Supplement this Section with the following:

Subsurface drip tubing and components must be installed in accordance with the manufacturer's recommendations.

8-03.3(7) ELECTRICAL WIRE AND CONTROLLER INSTALLATION

Delete this Section and replace it with the following:

8-03.3(7) TWO WIRE CABLE, DECODERS, SENSORS AND CONTROLLER INSTALLATION (SP 03-11-16)

Wiring between the controller and valves must be along a two-wire path. Primary two-wire cable must have black and red conductor cable cover. Spare two-wire cable must have blue and red conductor cable cover. The two-wire path may be looped, spliced, or branched permitting extensions of the path in multiple directions. Provide a 24-inch loop at all valves and direction changes.

The distance from the controller to the end of any one-wire run must not exceed the maximum distance specified for the gauge of wire. The distance from the controllers to the farthest device must not exceed a distance of 5,000 feet using 14-gauge wire or 8,000 feet using 12-gauge wire. The total length of wire connected to any one controller must not exceed 15,000 feet on 14-gauge or 16,000 feet on 12-gauge.

The two-wire must be laid with the pressurized irrigation line between valve boxes and installed without damage, including nicks, cuts, or abrasions to the outer jackets. There must be a 24-inch slack loop at every valve box for making connections.

The two-wire must be tested before decoders are installed.

All splices must be made in a valve box. All connectors must be installed in accordance with manufacturer's specifications. Splice insulation must consist of electrical conductors twisted in a clockwise direction and then placed in a fully submersion proof DBR/Y tube over the top making sure the connector is fully seated at the top of the tube. Snap the cover completely closed.

Verify that no loose, unshielded wiring must touch the ground, water, or other copper conductor causing a leakage of current to the ground or a short circuit across wires. All connections must be fully submersion proof and mounted in a vertical orientation to eliminate standing water inside the connector. An additional 24-inch length must be left at each junction box and automatic control valve to facilitate splicing and inspection.

The valve decoder must be 1 inch by 4 inches by 2 inches with two mounting tabs for attaching the decoder to the side of a valve box. The valve decoder must be installed in accordance with the manufacturer's published instructions. It must be connected to the two-wire path and must be mounted to the side of the valve box with the serial number face up. All splices between the valve decoder and valve wire must use submersion proof DBR/Y splices. Valve common wires must be attached to the white common wire of the valve decoder. The maximum wire run between the valve decoder and the solenoid must be 150 feet using standard 14-gauge irrigation wire.

A diagram of the decoder schedule and valve numbers must be provided at controller enclosures as shown in the Drawings.

The Baseline soil moisture sensor must be connected to the two-wire as indicated in this Section. The maximum wire run between soil moisture sensor and the controller must be the same as stated in the two-wire specifications. The soil moisture sensor must be buried in an area of average water distribution between two sprinkler heads and placed off the centerline that the sprinklers create. The soil moisture sensor must be installed in a location representative of the zones that the sensor is controlling and installed 2 to 3 inches below the plant or in the top one-third of the root zone. The soil moisture sensor must be buried with no air pockets around the sensor. The soil moisture sensor must be marked to avoid damage during aeration. All splices must be made inside the valve box with a DBR/Y or equivalent direct-burial waterproof connection.

8-03.3(9) FLUSHING AND TESTING (GSP 08-15-18)

Delete item 2. From the list in this Section and replace with the following:

2. All main supply lines must be purged of air and tested with a minimum static water pressure of 150 psi for 60 minutes without introduction of additional service or pumping pressure. Testing must be done with 1 pressure gauge installed on the line at a location specified by the Engineer. The Contractor must provide a back-up pressure gage on site during pressure testing. Lines which show loss of pressure exceeding 5 psi at the ends of test periods specified in the Contract will be rejected. The Contractor must correct rejected installations and must retest them for acceptance.

8-14 CEMENT CONCRETE SIDEWALK

8-14.3 CONSTRUCTION REQUIREMENTS

8-14.3(7) CURB RAMP (GSP 3-10-15)

Replace the third paragraph with the following:

Concrete for curb ramps must not be overlaid or topped. The adjacent sidewalk "V" groove scoring pattern must not extend into the ramp or flared side surfaces. The subgrade for curb ramps must be graded and formed to provide a minimum concrete depth of 6 inches adjacent to the curb and tapering to a minimum depth of 3 1/2 inches at the back terminus. Curb ramp surfaces and surfaces of curb ramp landing areas must have straight and consistent line and grade. Surfaces must not vary more than 1/4-inch from a 4-foot straight edge placed on the surface.

Add the following Section:

8-14.3(7)E FINAL INSPECTION AND AS-BUILTS (GSP 06-18-18)

As soon as practicably possible, the Contractor must notify the Engineer when Work for a curb ramp is determined to be substantially complete per Section 1-05.11. Upon a curb ramp becoming considered substantially complete, the Contractor must also submit to the Engineer, as built drawings indicating the constructed slopes and dimensions of the curb ramp. Where curb ramp slopes and dimensions depicted in the as built drawing do not conform to the Drawings, and changes were not approved or directed by the Engineer, the curb ramp may be deemed defective and subject to removal and replacement per Section 1-05.7.

All equipment for the measurement of curb ramp slopes for as built purposes must be submitted and approved by the Engineer prior to use. Slope measuring devices must be 24-inches in length, be calibrated before each use according to the manufacturer's instructions and be in good working condition per the requirements of Section 1-05.9. Measurements and curb ramps measured with non-working, uncalibrated, or unapproved equipment may not be accepted by the Engineer.

Submittals for as built drawings and equipment must be in accordance with Sections 1-05.3.

8-22 PAVEMENT MARKING

8-22.1 DESCRIPTION

8-22.1(2) PAVEMENT MARKING DESIGNATIONS (SP 07-15-19)

Add the following to Table I:

Item Designation	Description	Usage
L-41	24-inch green marking with 6-inch white stripe	Crossbike

8-22.3 CONSTRUCTION REQUIREMENTS

8-22.3(3) MARKING APPLICATION

8-22.3(3)E INSTALLATION (GSP 08-15-18)

Delete the last paragraph in this Section.

8-22.4 MEASUREMENT (SP 07-15-19)

Delete the last paragraph in this Section.

Supplement this section with the following:

Measurement for "Pavement Marking, MMA, Crossbike" will be per square foot of area covered with green marking and white edge marking for L-41

8-22.5 PAYMENT (SP 07-15-19)

Delete payment item 8. and the last paragraph in this Section and replace with the following:

Sharrows to be installed as shown on the Drawings will be measured and paid as "Pavement Marking, Thermoplastic, Legend/Symbol", per each.

Supplement this section with the following:

9. "Pavement Marking, MMA, Crossbike", per square foot

The Bid Item price for "Pavement Marking, MMA, Crossbike" must include all costs for the work required to furnish and install the specified pavement marking.

8-30 ILLUMINATION AND ELECTRICAL SYSTEMS

8-30.1 DESCRIPTION

8-30.1(1) GENERAL (SP 02-14-20)

Replace this section with the following:

Section 8-30 describes the work consisting of furnishing and installing a complete and functional illumination and electrical system as specified in the Contract and in accordance with these Standard Specifications and the Standard Plans.

All existing service disconnections, temporary and final service connections and energizing of illumination and electrical street lighting systems to overhead secondary or to secondaries in vaults or handholes will be made by Seattle City Light. For notification requirements related to obtaining Seattle City Light electrical inspections and services see 1-07.28.

Illumination and electrical street lighting systems must not be used to serve other electrical services.

Seattle Department of Construction and Inspections electrical permits are required for electrical Work related to infrastructure in the Public Right of Way, other than street lighting. Seattle Department of Construction and Inspections permits must be obtained by the Contractor in accordance with Section 1-07.6. For notification requirements related to SDCI inspections see 1-07.28(21).

The Contractor must become thoroughly familiar with the electrical environment within the Project Site and with the relevant Work.

Section 8-30 describes the work consisting of furnishing and installing complete and functional illumination and electrical systems as specified in the Contract documents and in accordance with the Standard Specifications, the COS Standard Plans, and SCL Construction and Material Standards.

Provide all related electrical work and components specified herein, for complete and operational street lighting, promenade illumination and miscellaneous electrical systems. Electrical/lighting/illumination drawings are diagrammatic in nature and do not show all required connections, terminations, and required electrical fittings.

All electrical materials and equipment must be new and must bear the UL label.

Obtain and pay for all permits and fees required for electrical installations including SDCI electrical permits/fees and SCL fees for street lighting and electrical service installations.

The Contractor must become thoroughly familiar with the Project Site and with the relevant Work

Coordination

Coordinate installation of all foundations, poles, handholes, conduits, wiring, and luminaires with other construction trades including civil, structural, traffic, utilities, landscaping, irrigation, and site furnishings. Field verify all dimensions to avoid conflicts. Coordinate communications needs for fire alarm and elevator with fire alarm system contractor and elevator contractor to ensure all required phone service and network connections are provided. Special note and coordination is required for installation of underground electrical conduits, handholes, and foundations with the existing and proposed utilities, , drainage structures, underdrains. Every reasonable effort must be made to prevent conflicts as to space requirements, dimensions, final locations, code required working clearance, and access openings. All changes caused by failure to coordinate must be made at the Contractor's expense.

Delivery, Handling, and Storage

Receive, handle, and store products in accordance to NECA/IESNA 502 Industrial Lighting, and manufacturers' written instructions.

Retain factory-applied pole wrappings until just before pole installation. Handle poles with web fabric straps.

Handle and transport products in a manner that prevents damage.

Store products in a clean, dry, and secure storage area pending installation.

8-30.1(2) APPLICABLE ELECTRICAL CODES AND STANDARDS (SP 06-21-16)

Supplement this Section with the following:

7. National Electrical Contractors Association NECA 1, Standard for Good Workmanship in Electrical Construction.
8. Washington Administrative Code (WAC) Chapter 296-46B Electrical safety standards, administration, and installation
9. AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 2013 edition
10. NECA/IESNA 502 Recommended Practice for Installing Industrial Lighting Systems
11. NECA 501 Recommended Practice for Installing Exterior Lighting Systems

8-30.1(3) ELECTRICAL SHOP DRAWINGS (SP 06-21-16)

Replace this Section with the following:

The Contractor must provide the following design submittals, product data submittals, and shop drawings in accordance with Section 1-05.3.

Design Submittals

Product data submittals for each type of lighting fixture, lighting pole, bracket arm must be arranged in order of the fixture/luminaire/pole/bracket arm designations identified in the Contract. Include data on all features, finishes, and accessories including and not limited to product catalog cut sheet, listings including UL and IP ratings as installed, ballast/driver information, LED information, Rated LED life (L80), luminaire lumens, color temperature, input watts, operating voltage, finishes including housing color, accessories, conduit entry, installation instructions, all accessories, and IES formatted photometric file (submitted electronically on a CD-ROM).

Lighting and Electrical Product Data - Submittal must include but is not limited to, all handrail, screen wall and associated lighting fixtures, underdeck, elevator lobby and hoistway and art lighting installations, conduits, handholes, conductors, connectors, fuses, fuse holders, ground rods, submersible connectors, 24VDC power supplies/enclosure, lighting control panel, junction boxes, expansion/deflection fittings, electrical power, communication system, fire alarm system, and other miscellaneous electrical materials that make up the lighting and electrical installation.

The Contractor must provide the following shop drawings in accordance with Section 1-05.3:

Illuminated Handrail – Include all illuminated handrail layout and dimensions showing sections of illuminated handrail and connections to the bridge railing. Include conduit stub up locations at curb and wiring connections to junction boxes embedded in curb and handrail internal wiring. All lighting, and electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

Illuminated Screen Wall – Include all illuminated screen wall layout and dimensions showing sections of illuminated screen wall and connections to the bridge railing, mounting of luminaire fixtures and associated conduit and wiring. Include conduit stub up locations at curb and wiring connections to junction boxes embedded in curb and light fixture wiring. All lighting, and electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

Art Lighting – For luminaires specifically designated to illuminate art, provide shop drawings showing details of the luminaire installation and associated conduit, wiring, junction boxes as they relate to the art installation, foundations, and support systems. All lighting, and electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

Illuminated Elevator Hoistway – Include elevator hoistway luminaire layout including pit lighting, receptacle and exhaust fan connection at top of hoistway, including dimensions showing sections of luminaire connections to hoistway structure. Include conduit route and connections to elevator hoistway structure. All lighting, and electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

Underdeck Area Lighting - Include underdeck area lighting layout and dimensions showing sections of embedded conduit and light fixture boxes and luminaire support connections to bridge structure. All lighting, and electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

Elevator Lobby Area Lighting – Include elevator lobby luminaire layout and dimensions showing sections of fixture mounting and conduit routing and attachments to elevator lobby canopies. All lighting, and electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

Electrical Equipment – Include electrical equipment layout, elevations and attachment details for all electrical equipment including panelboards, fire alarm cabinets, communications cabinets, lighting control cabinets, disconnect switches and 24V power supplies. Include conduit and junction box attachment details. Include elevations and attachments for utility meter, and fire alarm remote annunciator at screen wall enclosing elevator machine room and electrical room. All lighting, and

electrical installations must be coordinated with all other disciplines and shop drawings must demonstrate this coordination.

8-30.3 CONSTRUCTION REQUIREMENTS

8-30.3(1) GENERAL (SP 06-21-16)

Replace this Section with the following:

A pre-construction meeting will be scheduled by the Engineer and held prior to the start of electrical construction. The Contractor, and electrical contractor must attend the meeting. The pre-construction meeting will be conducted to clarify the construction requirements for the work, to coordinate the construction schedule and activities, identify issues surrounding conduit routing and in-field luminaire placement, luminaire aiming, and to identify contractual relationships and delineation of responsibilities amongst the Contractor and the various Subcontractors.

All electrical installations must be in accordance with the NEC, NECA 1 Standard Practices for Good Workmanship in Electrical Construction and manufacturer's recommendations.

Make electrical connections in accordance with manufacturers' written instructions and recognized industry practices.

All electrical equipment installed in outdoor areas must be suitable for use in wet locations as documented by the manufacturer. Provide weatherproof enclosures and corrosion protection for all ferrous metal portions of the electrical work including enclosures, cabinets, conduits, clamps, supports, and hardware. The project site is a "Wet" location and is subject to a corrosive salt air. All electrical connections must be weathertight and rated for wet location.

Verify, before any excavations, the location of existing utilities and coordinate with the installation of new utilities. Review the Drawings and notify the Engineer of all conflicts. The Contractor is responsible for all damage done to existing and new utilities at no additional cost to the City.

Refer to the civil, structural, utilities, traffic, landscaping, irrigation, and furnishing Drawings and coordinate the installation of all luminaires, foundations, poles, and handholes with the other work areas. Note location of the, catch basins, vaults, duct banks and all other underground utilities within work area.

Provide all required structural attachments and seismic bracing required by the building codes for electrical equipment and raceways.

Refer to structural Drawings for locations of expansion/seismic joints. Provide raceway expansion/deflection fittings or liquid tight flexible metal conduit for all raceways crossing expansion/seismic joints and transitions between structures.

Where exposed, surface-mounted conduits and junction boxes are located in public view areas, the Contractor must organize and route the conduits and junction boxes such they are hidden from public view as approved by the Engineer and must paint the conduits/junction boxes to match the supporting surface.

All junction boxes and pull boxes must be sized in accordance with NEC and must be accessible by maintenance. Provide pull boxes and/or conduit bodies when the total angle of conduit bends exceeds 270 degrees.

8-30.3(2) LUMINAIRES (SP 06-21-16)

Supplement this Section with the following:

Inspect surfaces and structures where luminaires and electrical equipment will be installed to ensure compatibility with electrical installations.

All luminaires must be installed in accordance with manufacturer's instructions and in accordance with NECA 1 and NECA 501.

Luminaires must be neatly and firmly mounted, using mounting hardware as directed in manufacturer's specifications and the Drawings and details.

Aim/adjust all uplight luminaires in the field as directed by the Engineer.

Luminaire Warranty

Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage. Special warranty period as follows;

Warranty Period for Luminaires: Five years from date of Physical Completion.

Warranty Period for Luminaire Metal Corrosion: Five years from date of Physical Completion.

Warranty Period for Luminaire Color Retention: Five years from date of Physical Completion.

Warranty Period for LED Lighting Systems: Five years from date of Physical Completion.

Luminaire Substitutions

Substitution requests for luminaires other than those outlined in the Contract must include all information required under Submittals and must be accompanied by a working luminaire sample including cord/plug. Substitutions must be submitted and approved by the Engineer. Substitutions for luminaires must meet photometric performance, electrical performance, industry listings, materials as well as for aesthetic requirements including dimensions, materials, finish, and shape.

8-30.3(7) GROUNDING AND BONDING (SP 08-21-17)

Supplement this Section with the following:

All electrical equipment must be effectively grounded in accordance with NFPA 70 National Electrical Code.

All SCL conduit runs for street lighting and electrical services must include a grounding electrode conductor (size as shown on Contract Drawings or SCL Construction Standards) installed under the conduits in accordance with SCL construction standards and as indicated on the Contract Drawings. The costs associated with the installation of the grounding electrode conductors and associated connectors must be incidental to street light and electrical service wiring.

8-30.3(10) AS-BUILT DRAWINGS (SP 08-21-17)

Supplement this Section with the following:

Street lighting as-built drawings must be submitted and approved by SCL.

Submit as-built record plans for all electrical installations. Show all equipment locations, conduits, junction boxes, wiring, and circuiting.

8-30.3(12) COMMISSIONING (SP 06-22-16)

Supplement this Section with the following:

Focus and adjust all Area, Elevator Hoistway and Art Lighting luminaire(s), after dark, at a time mutually agreeable to the Contractor and Engineer. Make adjustments under the observation of the Engineer. Notify Engineer at least 2 weeks prior to aiming. Aim and adjust the luminaire(s) after the complete installation of the project's amenities. Amenities include but are not limited to plantings, furnishings, artwork, graphics, and signage. Include in base Bid provisions for lifts, scaffolding, extension ladders, and all other materials required to complete adjustments. Allow a minimum of 15 minutes of labor per luminaire noted on Luminaire Schedule as requiring aiming in the field, to complete adjustments.

Clean all luminaires internally and externally after installation. Use methods and materials recommended by the manufacturer.

Inspect each luminaire for damage. Replace damaged luminaires and components at no additional cost to the City.

8-30.3(13) ACCEPTANCE (SP 06-22-16)

Supplement this Section with the following:

Non-street lighting electrical installations must be accepted by SDCI electrical inspectors.

8-30.4 MEASUREMENT (SP 03-28-18))

Supplement this Section with the following:

Measurement of "Electrical Systems" will be per lump sum.

Measurement of "Site Lighting" will be per lump sum.

Measurement of "Electrical and Communications Service Connections" will be per lump sum.

8-30.5 PAYMENT (SP 08-21-17)

Supplement this Section with the following:

"Electrical Systems", per lump sum

The bid item price for "Electrical Systems" must include costs for the work required to furnish and install complete and operable electrical distribution system, communications, lighting controls, 24V LED power supplies and all associated conduit, cabinets/ enclosures, junction boxes and necessary equipment and materials required for any interfaces between fire alarm, communications, and elevator controls. This also includes arch flash hazard analysis and labeling of the entire electrical system, shop drawings and all back of house lighting and any lighting and associated wiring and conduit within the envelope of the elevator machine room, hoistway, and electrical room.

"Site Lighting", per lump sum

The bid item price for "Site Lighting" must include costs for the work required to furnish and install all portions of the lighting system outside the envelope of the elevator machine room, hoistway, and electrical room. This includes all light fixtures, conduit, wiring, junction boxes and connections required for bridge handrail lighting, screen wall lighting, art lighting, elevator lobby lighting and underdeck lighting including any other materials required for installation of the lighting system and all required shop drawings.

"Electrical and Communications Service Connections", per lump sum

The bid item price for "Electrical and Communications Service Connections" must include all trenching, backfill and soil disposal, conduit, wiring, junction boxes, utility meters, permits, shop drawings and any required fees for the electrical service connections and communications service connections. This includes conduit and wiring from the SCL Termination Handhole up to and including the utility meter, and the conduits from the Communications handhole up into and including the communications cabinet and associated equipment located in the electrical room. Coordinate communications needs for fire alarm and elevator with fire alarm system contractor and elevator contractor to ensure all required phone service and network connections are provided.

Add the following Section to Division 8:

8-35 WESTERN AVENUE BENCH (SP 11-27-19)

8-35.1 DESCRIPTION

This work includes furnishing and installing the bench at Western Avenue that consists of two precast concrete units as shown on the Drawings.

8-35.1(1) DEFINITIONS

Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, pre-approved by the Engineer.

8-35.1(2) PERFORMANCE REQUIREMENTS

Delegated Design: Design pre-cast elements and reinforcement, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

Structural Performance: Provide architectural precast concrete capable of withstanding the following design loads within limits and under conditions indicated:

Dead Load: Self weight.

Horizontal Live Load: 2,000 lb single concentrated load in any direction at any point along the top of bench.

Seismic Load: $0.48 \times \text{Dead Load}$.

Concrete stresses during shipping, handling, and erection must meet the requirements of PCI MNL 120.

After installation, horizontal live load and seismic load must not result in uplift under base of precast bench unit.

8-35.2 MATERIALS

8-35.2(1) MOLD MATERIALS

Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

8-35.2(2) REINFORCING MATERIALS

Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, deformed bars, ASTM A 775 epoxy coated.

Epoxy-Coated-Steel Welded Wire Fabric: ASTM A 884, Class A coated, deformed, flat sheet, Type 1 bendable coating.

8-35.2(3) CONCRETE MATERIALS

Portland Cement: ASTM C 150, Type I or Type II, white as needed to match the Engineer's approved sample.

For surfaces exposed to view in finished structure, use white, same type, brand, and mill source throughout the precast concrete production.

Colors must match Engineer's Sample.

Supplementary Cementitious Materials:

Fly Ash Admixture will not be permitted.

Metakaolin Admixture: ASTM C 618, Class N.

Silica Fume Admixture will not be permitted.

Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse, non-reactive aggregates complying with Class 4M. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for entire Project.

Integral Fine Aggregates: Quantity and type of integral aggregates per Engineer's samples.

Face-Mixture-Fine Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

Gradation: To match design reference sample.

Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures. Air content must be between 4.5 and 7.5 percent.

Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture. Use as necessary to match Landscape Architect approved sample.

Color Admixtures: ASTM C979.

8-35.2(4) LIFTING EMBEDMENT MATERIALS

Provide as needed for lifting, handling, and erection of precast units.

8-35.2(5) CONCRETE MIXES

Prepare concrete mix design.

Limit use of metakaolin and silica fume to 10 percent of Portland cement by weight.

The use of fly ash admixture or silica fume admixture will not be permitted.

Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast concrete fabricator's option.

Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested in accordance with ASTM C 1218/C 1218M.

Normal-Weight Concrete Mix: Proportion mix by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

Compressive Strength (28 Days): minimum 5000 psi without inspection with a slump limit of four (4) inches plus or minus one (1) inch, unless otherwise Designer approved or directed.

Release Strength: as required by design.

Maximum Water-Cementitious Materials Ratio: 0.45.

Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.

Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

8-35.2(6) GROUT MATERIALS

Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

8-35.2(7) MOLD FABRICATION

Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed.

Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

Form joints are not permitted on faces exposed to view in the finished work.

Edge and Corner Treatment: Uniformly radiused as noted on the drawings.

8-35.2(9) FINISHES

Pre-Cast Elements must be free of joint marks, grain, bug holes and other obvious defects. Corners, including false joints must be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved sample of light colored concrete.

8-35.2(10) SOURCE QUALITY CONTROL

Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 requirements for concrete strength.

8-35.3 CONSTRUCTION REQUIREMENTS

8-35.3(1) DRAWINGS AND SPECIFICATIONS DESIGN INTENT

Specifications and scale drawings are intended to convey the salient features, function and character of the custom furniture only and do not undertake to illustrate or set forth every item or detail necessary for the Work. A CAD file will be provided to the Contractor of the geometry of the bench.

Minor details, not usually indicated in the Drawings nor specified, but that are necessary for the proper execution and completion must be included, the same as if they were herein specified or indicated in the Drawings.

Fabricator must be responsible for design, engineering, detailing, and fabricating Western Ave Bench based in the Drawings, details, quality of materials, and finishes indicated in this Section and in the Drawings. The Work indicated must be designed to withstand the applied design loads, to withstand normal pedestrian load stresses that would occur when people use the work as it is intended with a reasonable safety factor built in, to require minimal and reasonable maintenance, and to generally perform its function, without need for frequent repair while maintaining a good appearance free of corrosion and other visible degradation. Surfaces must be engineered to feel solid and stable when sat upon without noticeable deflection or movement of any kind. Fabrication must not commence until shop drawings are approved by the Engineer.

Omissions: The City must not be held responsible for the omission or absence of any detail or construction feature, which may be required in the production of the fixtures. The responsibility of accurately fabricating the custom furniture to the fulfillment of these Specification rests with the Contractor.

8-35.3(2) ACTION SUBMITTALS

Product Data: For each type of product indicated.

Design Mixtures: For each precast concrete mixture. Include compressive strength and water absorption tests.

Shop Drawings: Detail fabrication and installation of architectural precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish.

Include reinforcing details showing location and size of reinforcing bars and welded wire fabric.

Indicate locations and details of lifting, bracing, and erection inserts to be embedded in or attached to the precast units.

Include plans and elevations showing unit location and sequence of erection.

Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Samples: Submit three (3) reference samples for initial verification of design intent, approximately 12 by 12 by 2 inches, representative of finishes, colors, and textures of exposed surfaces of precast concrete work for selection by the Engineer, to use in the Mock-up (See 8-35.3(4)).

Reference samples must show a range of white, light gray, and gray colors. The finish must be smooth.

8-35.3(3) INFORMATIONAL SUBMITTALS

Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

Pozzolan Test Reports performed within 6 months of submittal date.

Concrete mix test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions.

Source quality-control test reports.

Field quality-control test reports.

Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.

Concrete materials.

Reinforcing materials.

Admixtures.

Other hardware / elements required for installation.

Quality control procedures and other data as established in accordance with PCI MNL-116.

Qualification Data: For manufacturer specified in "Quality Assurance" Article to demonstrate manufacturer's capabilities and experience. Include list of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

8-35.3(4) MOCK-UP

Provide representative mock-up of Western Bench seat that is a minimum of 4-feet long, 2-feet wide, and 3-feet high.

Mock-ups must verify selections made under sample submittals and to demonstrate aesthetic effects, workmanship, and meet quality standards for materials and execution. Mockup to be representative of the finished work in all respects as accepted on the final shop drawings.

Build mockups at fabrication facility for the Owner to inspect. The location must be approved by the Engineer. Pay costs for the Owner's travel for each inspection. Anticipate travel arrangements for at least two persons with the Owner unless otherwise advised.

Notify the Engineer in advance of dates and times when mockups will be constructed.

Obtain the Engineer's approval of mockups before starting fabrication.

Preserve mockups during construction in an undisturbed condition as a standard for judging the completed Work.

Approved mockups may become part of the completed Work if built to scale and approved by the Engineer.

8-35.3(5) QUALITY ASSURANCE

Manufacturer Qualifications:

A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. Including preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

Participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant.

Certified by PCI to be category A1 Architectural Precast at time of bidding and manufacturing of Project precast elements.

Minimum 10 years experience in manufacturing precast concrete site furniture with finishes and tolerance similar to those specified.

Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

Quality-Control Standard: For manufacturing procedures and testing requirements, quality control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast.

8-35.3(6) DELIVERY, STORAGE, AND HANDLING

Lift precast units only by suitable embedment devices at locations designated on the shop drawings. Temporary shoring or bracing must be provided, if necessary.

Precast units must not be shipped until the concrete has reached the specified design strength.

Loading and Shipment:

Carefully pack the precast concrete units for shipment free from stains, saw mud, and other deleterious material.

Ship materials at temperatures above freezing.

Support units during shipment on nonstaining shock-absorbing material.

Exercise precautions against damage in transit.

Place stored units so units can be inspected.

Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.

Lift and support units only at designated points shown on Shop Drawings.

Storage:

Store precast concrete units on non-staining wood skids or pallets at least 4 inches above grade.

Place and stack skids and precast concrete units to distribute weight evenly and to prevent breakage or cracking of precast concrete units.

Protect and store precast concrete units from weather and soiling with waterproof nonstaining covers or enclosure, but allow air to circulate around precast concrete units.

Store packaged materials in original containers with seals unbroken and labels, including grade seal intact, until time of use.

Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical

8-35.3(7) EXAMINATION

Examine areas to receive Western Ave Bench with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

Take field measurements; report variance between plan and field dimensions and, if necessary incorporate field measurements with shop drawings.

Notify the Engineer of conditions that would adversely affect installation or subsequent use.

Do not begin installation until unacceptable conditions are corrected.

8-35.3(8) FABRICATION

Lifting, Bracing, and Erection Hardware: Fabricate hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of reinforcement or concrete placement.

Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and to minimize shrinkage cracking using epoxy-coated reinforcing bars and welded wire fabric. Provide a minimum of 2 inches of cover to reinforcement .

Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.

Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.

Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.

Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. For moist curing, exposed surfaces must be kept continually moist by fogging, spraying, or covering with moist burlap or

cotton mats. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

Do not remove forms until the concrete has attained a minimum compressive strength of 75 percent of the specified design strength. The concrete strength must be determined by testing cylinders made from the same concrete as the precast units.

Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Engineer's approval.

8-35.3(9) FABRICATION TOLERANCES

Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

Sizing Tolerances:

All units to conform to shop drawings, with plus or minus 1/8" tolerance in dimension.

Precast Surfaces and Edges:

All exposed edges to have minimum 1/4" radius to prevent chipping, except where indicated as larger on the drawings.

Finished surfaces to match approved control sample.

All precast concrete finished surfaces to be sealed with a sealer approved by manufacturer.

8-35.3(10) INSTALLATION

Install site furnishings parallel to sidewalk grade, plumb, true, and inset into concrete sidewalk as shown in the Drawings and at locations indicated in the Drawings.

Lifting hardware embedments locations:

When located on unexposed faces of the pre-cast concrete lifting hardware embedments must be recessed so that no hardware is protruding.

When located on exposed faces of the pre-cast concrete lifting hardware embedments must be recessed and filled with grout to match the color and finish of adjacent concrete surfaces.

8-35.3(11) PROTECTION

Protect materials of this Section before, during and after installation and to protect the installed work until Final Completion.

8-35.3(12) CLEANING AND TOUCH-UP

Clean the installed work after installation in accordance with manufacturer's instructions.

Do not use harsh cleaning materials or methods that could damage finish.

8-35.4 MEASUREMENT

Measurement for "Western Ave Bench" will be per lump sum.

8-35.5 PAYMENT

1. **"Western Avenue Bench"**, per lump sum.

The lump sum price for "Western Avenue Bench" must include all costs for the work required to design, furnish, and install the items of the type specified as shown in the Drawings and as specified in this Section, including Mock-ups.

Add the following Section to Division 8:

8-36 BOULDERS (SP 02-17-16)

Add 1-O

8-36.1 DESCRIPTION

Replace the second sentence with the following:

Boulder - Type 1 - Small Boulders in Planting

This work includes furnishing and installing the following:

~~Boulder - Type 1 - Small Boulders in Pavement~~

Boulder - Type 2 – Medium Boulders in Planting

8-36.2 MATERIALS

8-36.2(1) BOULDERS

Provide boulders from a single quarry from a single bed of quarry stratum unless the stones from randomly selected blocks are acceptable to the Engineer for aesthetic effects.

Boulders must be a mix of blue, red, green and brown colors, typical of the Pacific Northwest.

Boulders must generally match the sizes and shapes as indicated in the Drawings and in the table below:

BOULDERS				
BOULDER TYPE	QUANTITY (EACH)	WIDTH (FEET)	LENGTH (FEET)	HEIGHT (FEET)
1	SEE BID ITEM	2'	4'	3'
2	SEE BID ITEM	3'	6'	4'

Boulders must be smooth and round, free from sharp edges, cracks, flaking, checks, spalls, stains, unusual pattern, discoloration, deterioration, or other imperfections.

8-36.3 CONSTRUCTION REQUIREMENTS

8-36.3(1) SUBMITTALS

Boulder List and Quarry Source Identification: Submit a complete list of all boulders for the Project with quarry source identification.

Include in boulder list the size of each boulder.

Include color digital photographs of plant material. Take photographs from an angle depicting true size and condition of the typical boulder to be furnished. Include a scale rod or other measuring device in each photograph. Images must be at least 3" x 5" at 300 dpi and must be .jpg format.

Shop Drawings: Submit shop drawings of specifically identified and approved boulders that show approximate layout plan, elevations indicating approximate elevation heights, details of any required boulder setting including, but not limited to, concrete slab.

8-36.3(2) QUALITY ASSURANCE

Single-Source Responsibility for Boulder: Obtain boulder from a single quarry with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish the material without delaying the progress of the Work.

Boulder Sourcing, Selections, and Inspections: Once Boulder List and Quarry Source Identification and Shop Drawings are approved by the Engineer, the Contractor must arrange boulder tagging by the Engineer.

Contractor's Preparation for Boulder Selection.

1. Make all pre-selection arrangements with and at boulder supply source(s) to ensure a ready supply of materials, equipment, and manpower required for an efficient selection and tagging procedure.
2. Request visit of the Engineer at least 14 days in advance of the Contractor's desired inspection date.
3. Pay costs for the Engineer's travel for each inspection/tagging trip. Anticipate travel arrangements for at least two persons with the Engineer unless otherwise advised.
4. Be present, together with boulder supply source's supervisor for inspection and tagging at a quarry.

Boulder Inspection and Selection at Quarry.

1. All boulders must be inspected, selected, and tagged at a quarry by the Engineer for conformity to the specification requirements.

Installer Qualifications: Installer must be an experienced equipment operator and landscape boulder placement technician, with at least 3 years' experience placing landscape boulders.

8-36.3(4) DELIVERY, STORAGE, AND HANDLING

Deliver materials to the project site in undamaged condition.

Store and handle the boulders to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes.

Do not use pinch or wrecking bars.

Lift with wide-belt-type slings where possible; do not use wire rope or ropes containing tar or other substances that might cause staining.

8-36.3(5) EXAMINATION

Examine the areas to receive the boulder placement and the conditions under which the boulders will be installed, with the Installer present, for compliance with the requirements for installation and other conditions affecting the performance of the placement. Do not proceed with installation until unsatisfactory conditions have been corrected.

8-36.3(6) PREPARATION

Use all means necessary to protect materials of this Section before, during, and after installation and to protect the installed work and materials of all other trades.

Prevent staining of the stone from caulking or paving materials. Immediately remove such materials from the stone without damage to the latter.

Protect boulders from damage from construction machines and materials.

Clean boulder surfaces that have become dirty and stained prior to setting. Remove soil, stains, and foreign materials. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.

8-36.3(7) SETTING BOULDERS

Set the boulders to comply with the requirements indicated in the Drawings and the approved Shop Drawings. Shim and adjust supports and accessories to set the boulders accurately and plumb in the locations as per the Drawings as well as the approved Shop Drawings and as directed by the Engineer on site. Do not place any boulder with the use zone of any play element. Complete layout of all boulders before seeking layout approval from the Engineer. Layouts must be approved by the Engineer before installation.

8-36.3(8) REPAIR AND CLEANUP

Broken, chipped, stained, or otherwise damaged boulders must be replaced until the methods and results are acceptable to the Engineer.

Remove all metal, wood, and concrete debris, protective wrappings and coverings, and shipping materials from the project site. Remove all residue, repair all stains, scuffs, abrasions, and marks from the work under this Section.

Fully restore all areas of the site including planting area that were impacted by the installation activities in accordance with Seattle Parks and Recreation Standard Specifications for landscape planting.

Clean the boulders not less than 2 days after completion of the Work, using clean water and stiff-bristle, fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage the work under this Section.

8-36.3(9) PROTECTION

Provide final protection and maintain conditions to ensure that no damage occurs to the work under this Section until Substantial Completion is approved.

8-36.4 MEASUREMENT

Measurement for "Boulder - (Type)" will be by each.

8-36.5 PAYMENT

1. "Boulder - (Type)", per each.

The Bid Item price for "Boulder - (Type)" must include all costs for the work required to furnishing and install boulders as specified in the Contract Documents including the earthwork required to excavate, subgrade preparation, foundations, and furnishing and installing all materials.

Add the following Section to Division 8:

8-37 RAILINGS (SP 07-25-19)

8-37.1 DESCRIPTION

This work includes furnishing and installing Bridge and Metal Railings.

8-37.2 MATERIALS

8-37.2(1) METALS, GENERAL

Provide materials, which have been selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Exposed to view surfaces, which exhibit pitting, seam marks, roller marks, "oil-canning" stains, discolorations, burns, burrs, rough-ground ends, or other imperfections on the finished units, will not be acceptable.

8-37.2(2) STEEL

Unless shown otherwise in the Drawings, steel materials must meet the following requirements:

- A. Plates, Shapes, and Bars: ASTM A-554 Grade 316*
- B. Tubing: Cold-formed steel tubing complying with ASTM A-554 Grade 316*
- C. Bars: Hot-rolled, carbon steel complying with ASTM A-554 Grade 316L**
- D. Hollow Steel Sections (HSS): Cold-formed steel tubing complying with ASTM A-554 Grade 316L**

*For elements that require welding, Grade 316L stainless steel must be used.

**For elements that do not require welding, Grade 316 stainless steel may be used.

8-37.2(3) STAINLESS STEEL FLEXIBLE MESH INFILL

- A. Stainless Steel Flexible Mesh Infill and Anchoring Clamp:
1. Material: ASTM A 492 Type 316 stainless steel wire rope with stainless steel frame
 2. Frame dimensions: 30mm x 30mm Square.
 3. Anchoring Clamp: One-way clamp for 30mm x 30mm Square Frame.
 4. Cable Diameter: 1.5 mm.
 5. Mesh Aperture Dimensions: 40 x 75 mm.
 6. Direction (Grain) of Mesh: Long dimension of grain must be oriented parallel to finished surface, as indicated in the Drawings.
 7. Net Finish: Stainless Steel.
 8. Manufacturer:
 - i. Jakob Inc.
955 NW 17th Ave, Suite B Delray Beach, FL 33445
(561) 330-6502
www.jakob-usa.com
Model: Jakob Webnet Invis C
 - ii. Or approved equal

8-37.2(5) WOOD LEAN RAIL

Material: FSC Certified Cumaru (Dipteryx odorata).

8-37.2(6) FASTENERS

Fastener Materials: Unless otherwise indicated, provide the following:

Stainless-Steel Components: Type 316 stainless-steel fasteners.

Dissimilar Metals: Type 316 stainless-steel fasteners.

Wood Lean Rail: #12 x 1" Flat Head Square Drive Stainless Steel Wood Screws

Security Fasteners at Railing and Fence: One-Way Round Head Stainless Steel Machine Screws – Coarse with matching nuts and washers. Size as required.

UV Rated Rubber Gaskets: Use Rubber/PVC separation gaskets to separate dissimilar metals, as indicated in Drawings, and as necessary to prevent corrosion.

Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.

Provide tamper resistant flat-head screws for exposed fasteners, unless otherwise indicated.

8-37.2(9) MISCELLANEOUS MATERIALS

Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

8-37.2(10) FABRICATION

General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

Top Rail Spacers and Base Plate Spaces: Attach all Top Rail Spacers and Base Plate Spacers to frame as indicated in the contract drawings prior to arrival on site.

Holes in Steel: Provide holes required for securing other work to steel and for passage of other work through steel members. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

Stainless Steel Flexible Mesh Infill: Flexible Mesh Infill and frame to be assembled in shop as part of the railing module.

Install mesh infill system in accordance with manufacturer's instructions and the approved Shop Drawings. Install mesh panel infill system plumb, level, square, and taut.

Ensure mesh is clean, and without waves, kinks, or sags.

Adjust frame support cable tension and connecting hardware.

The installation tension must be provided from manufacturer.

Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces. For handrail, refer to Para. 505.8 Handrail – Surfaces in 2010 ADA Standards for Accessible Design issued on September 15, 2010 by Department of Justice.

Form Work true to line and level with accurate angles and surfaces.

Fabricate work to be truly straight, plumb, level and square and to sizes, shapes and profiles indicated on Drawings and approved shop drawings. Ease exposed edges.

Fabricate all miscellaneous metal supports, brackets, braces, and the like to fully complete the work under this Section.

Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

Connections: Fabricate railings with welded connections unless otherwise indicated.

Welded Connections (Shop Connections): Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, Section 10 "Architecturally Exposed Structural Steel" of the AISC manual, and comply with the following.

Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.

Use weld sizes, fabrication sequence, and equipment that limit distortions to allowable tolerances.

Provide continuous welds of uniform size and profile.

Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch (plus 1.5 mm, minus zero mm). Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.

Where necessary, grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch (plus 1.5 mm, minus zero mm).

At locations where welding on the far side of an exposed connection occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Make fillet welds of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

Welds must be performed in the shop to the greatest extent possible.

Bolted connections must allow for field adjustment.

Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

Use full length pieces. Minimize all splices. Locate splices at locations as approved by Engineer.

Form changes in direction as follows:

As detailed.

By bending to smallest radius that will not result in distortion of railing member.

Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

Close exposed ends of hollow railing members with prefabricated end fittings.

Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

8-37.2(11) FINISHES

General Finish Requirements

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of

approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

8-37.3 CONSTRUCTION REQUIREMENTS

8-37.3(1) DRAWINGS AND SPECIFICATIONS DESIGN INTENT

Specifications and scale drawings are intended to convey the salient features, function and character of the custom furniture only and do not undertake to illustrate or set forth every item or detail necessary for the Work.

Minor details, not usually indicated in the Drawings nor specified, but that are necessary for the proper execution and completion of the railings must be included, the same as if they were herein specified or indicated in the Drawings.

Omissions: The City must not be held responsible for the omission or absence of any detail or construction feature, which may be required in the production of the fixtures. The responsibility of accurately fabricating the custom furniture to the fulfillment of this specification rests with the Contractor.

8-37.3(2) QUALITY ASSURANCE

General: Work of this section must be fabricated and installed by an experienced fabricator or manufacturer, who has been engaged in work of equivalent scope and fabrication standards for at least 5 years. Materials, methods of fabrication, fitting, assembly bracing, supporting, fastening, operating devices and erection must be in accordance with drawings and specifications, approved shop drawings, and be of highest quality practices of the industry, using new and clean materials as specified in the Contract Documents, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected. All work must be accurately and neatly fabricated, assembled and erected.

Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant. Fabricator must be experienced in preparation of shop drawings using integrated three-dimensional modeling software linking all major structural piece marks and overall framing model.

Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program.

Engineer Qualifications: Professional engineer legally authorized to practice in the State of Washington and experienced in providing engineering services of the kind indicated for handrails and railing systems similar to this Project in material, design, and extent, and that have a record of successful in-service performance.

Welding: Quality procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel".

Single-Source Responsibility: Obtain handrails and railing systems of each type and material from a single manufacturer.

Preassemble handrails and railings to greatest extent possible to minimize field splicing. Disassemble units as required for shipping and handling. Clearly mark units for reassembling in field.

Contractor must assign a qualified staff member to perform quality control on the Contractor's own work in the field on a daily basis, for each day work is performed. The Contractor's quality control staff must review their own work for compliance with the contract documents before the Contractor notifies the Engineer, of readiness for required inspections, tests and observations to be provided by the Engineer and/or the City.

Preinstallation Conference: Conduct conference at Project site.

8-37.3(3) PERFORMANCE REQUIREMENTS

General: The drawings and specifications indicate design intent, criteria and performance requirements of the work. The requirements shown by the details are intended to establish basic dimensions of the module and the sightlines, jointing and profiles of members. Within these parameters, the contractor is responsible for the final design and engineering of the system, including whatever modifications and/or additions may be required to meet the specified requirements and maintain the visual design concept of the entire project.

For all elements requiring engineering, engineering plans and design calculations submitted to Engineer must be prepared by or under the direct supervision of a Professional Engineer, licensed under Title 18 RCW, State of Washington, in the branch of Civil or Structural Engineering. Design calculations and design plans must comply with the Shop Drawing and Professional Engineer submittal requirements of Section 1-05.3.

Structural Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to withstand the structural loads indicated in the latest Seattle Building Code without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each of the respective components of each metal fabrication.

Performance Requirements for Stainless Steel Flexible Mesh Infill: Engineer, fabricate, and install infill panel of a dimension and span so that the installation is rigid and able to withstand the live loads of a typical person standing on them without permanently deflecting or warping the material.

Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing handrails and railing systems to prevent buckling, opening of joints, overstressing of components and connections, damage to adjoining construction, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 degrees F ambient, 180 degrees F material surfaces.

Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

8-37.3(4) PROJECT CONDITIONS

Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

8-37.3(5) SUBMITTALS

8-37.3(5)A ACTION SUBMITTALS

Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

Shop Drawings: Provide large scale shop drawings for fabrication, installation, and erection of parts of Work. Provide plans, elevations, and details of anchorages, connections, and accessory items and all calculations as required. Provide installation templates for Work installed by others.

Engineering design and calculations the work under this Section 8-37.3(3)

For flexible mesh infill, show layout, sizes, dimensions, details, and installation of railing frame components. Include mesh aperture and rope dimensions, cable and mesh attachment hardware, tensioning devices, and mounting methodology.

Where welded connections are called for indicate welds in accordance with AWS Standards.

For Historic Balustrade assembly and installation, show layout, dimensions, details of all Historic Balustrade members, method of assembly and installation details, including all anchoring and footings.

Samples:

Provide a minimum 12-inch long sample of handrail top rail and post.

Provide a minimum 12-inch long sample of Railing frames.

Provide a minimum 12-inch long sample of Railing hand holds.

Provide a minimum 18-inch by 24-inch sample of Railing stainless steel flexible mesh infill with a frame.

Provide samples of exposed fittings and brackets.

8-37.3(5)B INFORMATIONAL SUBMITTALS

Qualification Data: For qualified professional engineer, if required.

Welding Certificates

Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing

8-37.3(6) MOCK-UPS

Mockups: Build full scale mockups of Guardrail Type A and Type B to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

Build mockups in the location and of the size indicated or, if not indicated, as directed by the Engineer, including:

Railing – Min. 8-foot long segment with End Panel.

Notify the Engineer 7 days in advance of dates and times when mockups will be constructed.

Demonstrate the proposed range of aesthetic effects and workmanship.

Obtain the Engineer's approval of mockups before starting railing installation.

Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

Demolish and remove mockups when directed.

Approved mockups may become part of the completed Work.

8-37.3(7) DELIVERY, STORAGE, AND HANDLING

Deliver railings and posts wrapped in protective coverings or protective wrapping. Deliver brackets, fittings, sleeves, fasteners, and other miscellaneous materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from possible damage.

Sequence deliveries to avoid delays, but minimize on-site storage.

8-37.3(8) COORDINATION AND SCHEDULING

Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

8-37.3(9) EXAMINATION

Measurements: Take field measurements; report variance between Drawings and field dimensions and, if necessary, incorporate field measurements with Shop Drawings.

Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

Proceed with installation only after unsatisfactory conditions have been corrected.

8-37.3(10) PREPARATION

Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

Installation, General: Provide anchorage devices and fasteners necessary for fastening handrail and railing systems to in-place construction using manufacturer's standard connections. Coordinate and furnish anchorages, templates, setting drawings, instructions and recommendations for installation of items embedded in concrete or masonry construction.

Corrosion Protection: Thoroughly separate dissimilar materials from each other using approved protective barrier coating, membrane, or other acceptable method. Do not provide barrier coat on surfaces which are to be exposed to view or on surfaces which will require a sealant at joints so as not to interfere with adhesion of sealants.

8-37.3(11) INSTALLATION, GENERAL

Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

8-37.3(12) RAILING CONNECTIONS

Exposed Connections: Fit exposed connections together to form tight, hairline joints

Welded Connections (Field Connections): Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Contractor must remove all weld slag using pick and brush to expose bright steel for self-verification of workmanship by the contractor and for Quality Assurance access by testing agency. This must be done on a daily basis as welding proceeds.

Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

Fill weld access holes and grind smooth.

Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

1. Grind butt welds flush.
2. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on each side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

8-37.3(13) ANCHORING

Adjust railings before anchoring to ensure matching alignment at abutting joints.

Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction

Form or core-drill holes for anchoring plates in concrete as shown on Drawings. Clean holes of loose material, place plates, place railing module and fill annular space between anchor bolt and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

Leave anchorage joint exposed with anchoring material flush with adjacent surface.

For spacing of anchor bolts, refer to the Drawings.

8-37.3(14) ERECTION

Set steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings", as indicated in the Drawings.

1. Erect to the tolerances specified in AISC 303.

Align and adjust various members forming part of complete frame before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members within a tolerance of plus or minus 1/8 inch in 20 feet.

Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1.

Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

No trades may field cut or alter structural members without specific approval of the Engineer. Submit dimensioned plan and detail sketch of proposed modification under cover of an RFI or cloud proposed changes on shop drawings

Bolted Base Plate Connections: Clean concrete surfaces of bond-reducing materials and roughen surfaces prior to setting base plates. Clean bottom surface of base and bearing plates.

1. Set base plates for structural members on wedges, shims, or setting nuts as required.
2. Snug-tighten or pretension anchor rods, as indicated in the Drawings, after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and base and bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

8-37.3(16) FIELD QUALITY CONTROL

Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Engineer and will comply with specified requirements.

Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

8-37.4 MEASUREMENT

Measurement for "Bridge Railing, Guardrail Type A" and "Metal Railing, Guardrail Type B" will be per linear foot along the line and slope at the base of the completed railing.

8-37.5 PAYMENT

1. "Bridge Railing, Guardrail Type A", per linear foot.
2. "Metal Railing, Guardrail Type B", per linear foot.

The bid item price for "Bridge Railing, Guardrail Type A" and "Metal Railing, Guardrail, Type B" must include all costs for fabricating and installing the guardrails including mock-ups.

Add the following Section to Division 8:

8-38 UNDERSLAB VAPOR BARRIER (SP 12-19-19)

8-38.1 GENERAL

- A. Specification section based on CSI Specification Section 03 05 16 Underslab Vapor Barrier

8-38.1(1) SECTION INCLUDES

- A. Sheet vapor barrier under concrete slabs on grade at Elevator Machine Room.

8-38.1(2) REFERENCE STANDARDS

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

8-38.1(3) SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products.
- B. Samples: Submit samples of underslab vapor barrier to be used.
- C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

8-38.2 PRODUCTS

8-38.2(1) MATERIALS

- A. Underslab Vapor Barrier:
 1. Water Vapor Permeance: Not more than 0.010 perms (0.6 ng/(s m² Pa)), maximum.
 2. Complying with ASTM E1745 Class A.
 3. Thickness: 15 mils (0.4 mm).
 4. Basis of Design:
 - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil):
www.stegoindustries.com/#sle.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

8-38.3 EXECUTION

8-38.3(1) EXAMINATION

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

8-38.3(2) INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Lap joints minimum 6 inches (150 mm).
- D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- F. Repair damaged vapor retarder before covering with other materials.

8-38.4 MEASUREMENT

- A. Measurement of "Union Elevator Structure" will be per lump sum.

8-38.5 PAYMENT

- A. "Union Elevator Structure" must include all costs for the work to furnish and construct the elevator hoistway structure, elevator mechanical and electrical room structure, and elevator waiting platform depicted on the structural plans and described in Sections 8-38, 8-39, 8-40, and 8-41.

Add the following Section to Division 8:

8-39 STRUCTURAL STEEL FRAMING (SP 12-19-19)

8-39.1 GENERAL

- A. Specification section based on CSI Specification Section 05 12 00 Structural Steel Framing

8-39.1(1) SUMMARY

- A. These specifications apply to the steel framing of the elevator shaft and auxiliary space.
- B. Provide labor, materials and equipment for the supply, detailing, fabrication, field touch-up of high-performance coatings, and erection of structural steel framing and miscellaneous steel as indicated with accessories for a complete installation.
- C. Refer to Special Provisions for bridge package regarding grouting of column base plates, sleeves and inserts, anchor pockets, recesses and related openings.
- D. Deliver uncoated steel to high performance coating facility, and once coated, deliver coated steel to Project Site. Coordinate with provider of high-performance coatings to ensure delivery of coated steel to Project Site to meet Project Schedule. Refer to Section 8-60.

8-39.1(2) RELATED SECTIONS

- A. Section 8-60 High-Performance Coatings.

8-39.1(3) REQUIREMENTS

- A. The requirements of this specification must be coordinated and integrated into the construction drawings and construction specifications by the design professional of record.

8-39.1(4) REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents:
 - 1. American Institute of Steel Construction (AISC)
 - a. ANSI/AISC 303 Code of Standard Practice for Steel Buildings and Bridges
 - b. AISC 341 Seismic Provisions for Structural Steel Buildings
 - c. AISC 360 Specification for Structural Steel Buildings
 - d. Specification for Structural Joints Using High-Strength Bolts
 - 2. American Society for Testing and Materials International (ASTM)
 - a. ASTM A6 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, Sheet Piling
 - b. ASTM A36 Standard Specification for Carbon Structural Steel
 - c. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - d. ASTM A153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - e. ASTM A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - f. ASTM A992 Specification for Structural Steel Shapes
 - g. ASTM A1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
 - h. ASTM F3125 Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength
 - 3. American Welding Society (ANSI/AWS):
 - a. ANSI/AWS D1.1 Structural Welding Code-Steel
 - b. ANSI/AWS D1.8 Structural Welding Code – Seismic Supplement
 - c. ANSI/AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination.

8-39.1(5) DEFINITIONS

- A. Structural Steel: elements of structural steel framing that support design loads.
- B. Seismic Force Resisting System (SFRS): assembly of structural steel elements that resist seismic loads, as indicated on the Drawings.
- C. Demand-Critical Welds: welds in the SFRS including:
 - 1. Complete penetration welds in beam-to-column connections
 - 2. Complete penetration welds of column splices and column-to-base plate connections.
 - 3. Other welds noted as “Demand-Critical” on the Drawings.

8-39.1(6) SUBMITTALS

- A. Schedule: Provide proposed schedule for fabrication and delivery of steelwork items. Include coordination with high performance coating process.
- B. Shop Drawings:
 - 1. Submit detailed shop drawings of structural steel work, showing sizes, details of fabrication and construction, methods of assembly, locations of hardware, anchors, and accessories, and erection sequence and details. Identify required penetrations for and coordination with any systems pathways. Include procedures for heavy lifts and rigging.
 - 2. Include in shop drawings member identity, welding technique, cuts, copes, gussets, connections, holes, fasteners, camber, fabrication and erection tolerances, type of finish, paint system, weights of members, and critical clearances.
 - 3. Welding Procedures: submit in conformance with AWS D1.1.
 - 4. Indicate welds, both shop and field, using standard welding symbols of ANSI/AWS A2.4. Show the size, length, and type of each weld on drawings.
 - 5. Indicate individual welders' identification on Contract record drawing.
 - 6. Working drawings for steel erection:
 - a. Investigate stresses caused by the proposed erection procedure.
 - b. Submit the construction sequence for erection and disassembly of the shoring system. Indicate how sequence is coordinated with interim grading and drainage and the construction of the permanent structure.
 - c. Submit erection drawings sealed by a Professional Engineer. Show details of required temporary supports, staying, and bracing. Include descriptive data to illustrate the erection, transportation, and handling procedures, including sequence of erecting and transfer of loads if applicable.
 - d. Submit calculations sealed by a Professional Engineer supporting the drawings and other descriptive data as applicable.
 - e. Furnish setting diagrams, templates, and directions for the erection of structural framing, anchor bolts, and other embedded items.
- C. Product Data: Primers with demonstrated compatibility with High Performance Coatings where applicable.
- D. Qualification Data: Include names and qualifications of fabricators, fabricator's welding engineer, welding supervisor and shop inspector to be employed on the Work. Submit copies of steel fabricator and steel erector's AISC Certifications.

8-39.1(7) QUALITY CONTROL AND ASSURANCE

- A. Fabricator and Erector Qualifications:
 - 1. Companies specializing in performing work of the type specified in this section with not less than five years of documented experience.
 - 2. Certification of Erectors: Erectors must be AISC-Certified Steel Erectors (CSE).
 - 3. Certification of Fabricators: Fabricators must be AISC-Certified Steel Fabricators.
- B. Certification of Welders and Welding Procedures: Conform to Project Requirements.
- C. Provide and fabricate structural steel members in accordance with "AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" except where specified otherwise in this Section.

- D. Comply with the provisions of “AISC Code of Standard Practice for Steel Buildings and Bridges” and “AISC Seismic Provisions for Structural Steel Buildings” except where specified otherwise in this Section.
 - 1. For complete joint penetration groove welds at beam-to-column connections, ultrasonic testing (UT) must be performed for 100% of welds and magnetic particle testing must be performed for at least 25% of welds.

8-39.2 PRODUCTS

8-39.2(1) MATERIALS

- B. Materials must be new and free from rust, scale, discoloration and other defects which would reduce the strength or general serviceability.
- C. Wide Flange Shapes: ASTM A992
- D. Channels, Angles, Pipes, Plates and Bars: ASTM A36
- E. Hollow Structural Sections
 - 1. Rectangular: ASTM A500, Grade B, $F_y = 46$ ksi.
 - 2. Round, diameter equal to or less than 20 inches: ASTM A500, Grade B, $F_y = 42$ ksi.
- F. Fasteners
 - 10. High Strength Bolts
 - r. Bolts: ASTM F3125, Grade A325, Type 1, heavy hex
 - s. Nuts: ASTM A563 heavy hex
 - t. Washers: ASTM F436
 - u. Finish: Hot-dip zinc coating in accordance with ASTM A153, Class C
- G. Anchor bolts: ASTM F1554, Grade 105, hot dip galvanized.
- H. Shear Connectors: ASTM A108, Type B, $F_u = 60$ ksi
- I. Primers: refer to 09 96 00 High Performance Coatings.
- J. Welding Filler Material: Arc welding electrodes must be E70 series for all materials unless noted otherwise. Electrodes must be as recommended by their manufacturers for the positions and conditions of actual use.
 - 1. Weld metal toughness must be reported on the filler metal manufacturer's certificate of compliance. All filler metal must be capable of welds with a minimum Charpy V-notch value of 20 ft-lbs at 0°F, with the exception of welding at steel decks (see Section 8-40 Steel Decking).
 - 2. Welds for field splices of SFRS must use filler metal with a minimum Charpy V-notch value of 20 ft-lbs at -20°F per requirements of AISC 341.
 - 3. Demand-Critical welds must use filler metal with minimum Charpy V-notch values of 20 ft-lbs at -20°F and 40 ft-lbs at 70°F per requirements of AISC 341.
- K. per contract drawings.

8-39.2(2) SOURCE QUALITY CONTROL

- A. Fabricator's Facility:

1. Select a fabricator certified by AISC. Submit certification in accordance with Section 8-39.1 herein.
2. Provide the Engineer access to inspect the AISC-Certified Fabricator's shop or facility before the start of fabrication work. Notify the Engineer in writing at least ten (10) days before the scheduled start of fabrication work.

8-39.3 EXECUTION

8-39.3(1) DELIVERY, STORAGE, AND HANDLING

- A. Suitably secure and protect materials during fabrication, shipping, storage and erection.
- B. Make good materials bent, broken, deformed or otherwise damaged during shipping. Make good paint damaged due to exposure or shipping.
- C. Mark structural steel components clearly for identification in accordance with fabrication and erection drawings.
- D. Prominently mark location of lifting points. Handle steel members to avoid deformation or excessive stresses. Keep handling of members to a minimum.
- E. Protect high performance coatings from damage during handling, storage and erection procedures.
- F. Mask off areas for field welding a minimum of 1" each side of splice. Top coat must be set back from edge of primer by a minimum of 2".
- G. Repair damaged coatings in accordance with Section on High Performance Coatings at the expense of the Contractor.

8-39.3(2) FABRICATION

- A. Conform to the applicable requirements of the AISC Code of Standard Practice for Steel Buildings and Bridges and additional requirements provide herein.
- B. Prefabricate and preassemble steel members and metal fabrications in the factory or shop as far as practicable.
- C. Form and fabricate the work to meet installation conditions. Include accessories to adequately secure the work in place.
- D. Straighten rolled material, if necessary, before it is laid out for fabrication, in a manner conforming to the mill tolerances specified in ASTM A6, and by a process and in a manner which does not injure the material. Sharp kinks and bends are cause for material rejection. Do not use heat shrunk low-alloy structural steel.
- E. Perform shearing, flame cutting, and chipping carefully and accurately so as not to induce residual stress in the metal being cut. Hold the radii of re-entrant gas-cut fillets not less than 3/4 inch and as much larger as practicable. Perform flame cutting in such manner that metal being cut is not carrying stress.
- F. Steel Exposed to Public View:
 1. Exposed steel to have reasonably smooth and uniform welding, free of unsightly bulges and variations in size.
 2. Remove mill scale prior to fabrication and clean and prime immediately after fabrication
 3. Make symmetrical uniform connections.

4. All welds that are exposed to view must be visually acceptable if they meet the requirements in AWS D1.1, except all groove and plug welds that are exposed to view must not project more than 1/16 inch above the exposed surface.
 5. With the exception of neatly-formed fillet welds, grind exposed joints flush and smooth with adjacent surface. Remaining welds in ground connections to comply with design sizes.
 6. Seal continuous welds to close any open gaps.
 7. Make exposed butt joints tight, flush, and hairline. Ease exposed sheared edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 8. Remove erection tabs and fill, grind and finish unsightly holes or abrasions.
 9. Stamped or raised manufacturer's identification marks must be filled, ground, or otherwise removed.
 10. Exterior Edges to Receive High Performance Coatings: Grind edges to a smooth finish to remove sharp edges. Edges must have a consistent 1/8" to 1/4" radius.
 11. Field welded connections for hollow sections must be by qualified welders to a suitable architectural finish. Erection seats and clips for field welded connection must be detailed to ensure preservation of the external steel finish.
- G. Exposed ends of hollow structural sections must be closed with end plates sealed airtight with welds. Intermittent welds must not be permitted. Joints must be continuously sealed with weld.
- H. Provide drainage holes in structural components where water may accumulate without escape.
1. Fabricate joints which will be exposed to weather in a manner to exclude and or shed water or provide weep holes where water may accumulate.
 2. Add 1/4" diameter weep holes at each end of the horizontal HSS members 4" from the columns.
 3. Add 1/4" diameter weep holes at bottoms of columns 1" above base plates.
- I. All penetrations to be coordinated and shop fabrication and shop primed to extent feasible.
- J. Fabricate bearing stiffeners and stiffeners intended as supports for concentrated loads as indicated. Mill or grind bearing surfaces of these stiffeners.
- K. Bend load-carrying cold-rolled steel plates cold at right angles to the direction of rolling. Bend such that the radius of bend, measured to the concave face of the metal, is not less than indicated in the following table, in which T is the thickness of the plate.
- | ANGLE THROUGH WHICH PLATE IS BENT | MINIMUM RADIUS |
|-----------------------------------|----------------|
| 61 to 120 degrees | 1.0 T |
| 121 to 150 degrees | 2.0 T |
- If a shorter radius is indicated, bend the plate hot. Before bending, round plate edges where bending occurs to a radius of 1/16 inch.
- L. All erection aids to be removed and steel repaired so repairs are not visible. Promptly prime any resulting exposed steel.
- M. Seams of hollow structural sections must be acceptable as produced. Seams must be oriented away from view or as directed in the Contract Documents.

- N. All steel must be shop prepared and primed with High Performance Coating. Refer to the Section on High Performance Coatings.
- O. Any areas of damaged or removed primer must be promptly prepared and re-primed to prevent formation of rust and staining of adjacent materials.

8-39.3(3) ERECTION AND INSTALLATION

- A. Field splices and welds to be as indicated on the Plans.
- B. Reference Standards: Erect and install structural steel in conformance with the applicable requirements of AISC Code of Standard Practice for Steel Buildings and Bridges. Hold a readiness review meeting held by the Engineer after shop drawings and erection plans are approved.
- C. Special Care: Use special care in unloading, handling, and erecting the structural steel materials to avoid marking or distorting the structural steel. Care must also be taken to minimize damage to any shop paint. If temporary braces or erection clips are used, care must be taken to avoid the creation of unsightly surfaces upon removal. Plan and execute all operations in such a manner that the close fit and neat appearance of the structure will not be impaired.
- D. Lines and Levels: Install structural steel accurately at established lines and levels. Install steel plumb and level before bolting is commenced. Install in accordance with accepted shop drawings and actual conditions, true and horizontal or perpendicular as the case may be, level and square, with angles and edges parallel with related lines of the building.
- E. Erection and Assembly: After erection and field assembly, align the various members forming parts of the completed structure and adjust accurately before fastening. Conform tolerances to the applicable requirements of AISC Code of Standard Practice for Steel Buildings and Bridges.

8-39.3(4) GROUTING

- A. Remove organic matter, oil soaked or unsound concrete from the concrete surface. Clean edges, sides and bottom of the exposed steel section and brush to remove dust, chips, dirt, loose paint and oil.
- B. Saturate top of the prepared concrete base with water for 24 hours prior to grouting.
- C. Provide forms to suit chamfer requirements of pad shown on the Drawings and prevent leakage and movement of grout.
- D. Mix and place grout in accordance with manufacturer's specifications.
- E. Pre-mix Grouts: Mix and apply in accordance with the manufacturer's printed instructions.
- F. Ensure flowable grout is of a consistency permitting grout to flow under plate from one side to the other by gravity. Do not vibrate grout.
- G. Cover grouted surfaces with wet rags to prevent rapid water loss by evaporation.
- H. After grout in exposed shoulders has set and hardened so that a pointed masons trowel cannot be inserted in it, remove forms and cut back and remove excess grout.
- I. Align and shim framing prior to grouting.
- J. Ensure baseplate grouting is solid. If found hollow, remove and replace grout.

8-39.3(5) PROTECTION AND REPAIR

- K. Report any errors in location or inaccuracies in setting anchor bolts, base plates, bearing plates, or other items of attachment or support for steel work to the Engineer immediately. Correct as directed by the Engineer.

- L. Report any fit-up errors due to misfabrication to the Engineer immediately, along with a proposed corrective measure. Do not proceed with corrective measures until approved by the Engineer.

Correct bolted or welded connections, joints, or fastenings considered defective by the Engineer as approved by the Engineer.

8-39.3(5) FIELD QUALITY CONTROL

- A. Allow Engineer access to observe steelwork erection and installation as required.

8-39.4 MEASUREMENT

- A. Refer to 8-38.4

8-39.5 PAYMENT

- A. Refer to 8-38.5.

Add the following Section to Division 8:

8-40 STEEL DECKING (SP 12-19-19)

8-40.1 GENERAL

- A. Specification Section based on CSI Specification Section 05 31 00 Steel Decking

8-40.1(1) SECTION INCLUDES

- A. Extent of steel deck and shear connectors is indicated on the Drawings, including basic layout and type of steel deck units required.
- B. Provide all labor, materials, equipment and services, and perform all operations required for complete furnishing, fabrication and installation of all steel deck and shear connectors and related work as indicated on the Drawings, specified in this Section and required by job conditions.
- C. The work must include, but not be limited to the following:
 - 1. Steel roof, floor, and form deck.
 - 2. Pour stops around the building perimeter and at all openings, end closures, closure plates around all columns and work of other trades and any other accessories required.
 - 3. Saddles, valley plates and sump pans.
 - 4. Deck supports not shown or specified under other Sections, but necessary for the proper support of deck and applied loads.
 - 5. Shoring of deck where shown in the Drawings and where required to properly support applied loads and/or maintain uniform concrete slab thickness and maintain specified floor finish tolerances.
 - 6. Cutting and forming of holes and openings through steel deck, including the reinforcing of deck to safely support both temporary and permanent construction.
 - 7. Hanger tabs and other vertical supports for ceilings and other lightweight devices.
 - 8. Field-applied shear connectors.
 - 9. Touch-up painting in the field.

10. Erection drawings, shop drawings and samples.
11. Protection of work of this Section.
12. Protection of other work from other activities under this Section.
13. Submittals.
14. Provisions for other work.

8-40.1(2) CODES AND STANDARDS:

Work of this Section must conform to all applicable federal, state and local laws, regulations and building codes. The following codes, specifications and standards, where more severe, must apply to the work. Where conflicts among codes, standards and specifications exist, the one having the most stringent requirements must govern.

A. American Society for Testing and Materials (ASTM):

1. ASTM A611 - Steel, Cold Rolled Sheet, Carbon, Structural.
2. ASTM A653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. ASTM A36 – Standard Specification for Structural Steel

B. American Institute of Steel and Iron (AISI):

1. North American Specification for the Design of Cold-Formed Steel Structural Members

C. American Institute of Steel Construction (AISC)

1. Steel Construction Manual
2. AISC Code of Standard Practice for Steel Buildings and Bridges

D. Steel Deck Institute (SDI):

1. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks, SDI No. 30
2. SDI Diaphragm Design Manual, 3rd Edition, SDI No. DDM03 and Appendix VI, VII and VIII.
3. SDI Composite Steel Deck Design Handbook, SDI No. CDD2
4. SDI Standard Practice Details, SDI No. SPD2

E. American Welding Society (AWS)

1. Structural Welding Code-Steel: D1.1
2. Structural Welding Code – Sheet Steel: D1.3
3. Standard Symbols for Welding, Brazing, and Nondestructive Examination: A2.4

8-40.1(3) SUBMITTALS:

- A. Product Data and Samples: Submit manufacturer's specifications, catalogs and installation instructions. Include laboratory test reports, manufacturer's certifications and other data to show compliance with the Drawings, Specifications and standard specifications.
- B. Certifications: Submit certifications for mill tests, shear connectors, and galvanizing.
- C. Deviations: Requests for deviations from the Drawings or Specifications must be submitted on Contractor's letterhead. Acceptance of shop drawings including deviations not detected during shop drawing review will not relieve Contractor from responsibility to conform strictly to the Contract Documents. Deviations will be allowed only where permitted by the Engineer in

writing. Proposed deviations must be accompanied by documented and physical evidence that will establish that quality of proposed deviation equals or exceeds the quality specified.

- D. Shop Drawings: Submit structural shop drawings to the Engineer for acceptance in accordance with the requirements of the Contract Documents.
1. Shop drawings must include:
 - (i) Steel deck layout and orientation, supporting steel framing and supports with dimensions and section details.
 - (ii) Deck type and profile, galvanization, grade of steel, dimensions, supports, projections, openings and reinforcement.
 - (iii) Welds and mechanical fastener types, sizes and patterns.
 - (iv) Sidelap connector types, sizes and patterns.
 - (v) Shear connector type, size, spacing, location, and details.
 - (vi) Accessory details.
 2. All steel deck work must be accurately dimensioned. Detail to accommodate Contractor's field measurements of supporting and adjoining construction.
 3. Prepare erection details of steel deck and for field applied shear connectors. The Contractor must address erection procedures, incremental construction loads and service loads. Special methods and provisions may be required to avoid overstress and excessive deformations caused by these forces.
 4. Submit for review and acceptance fieldwork drawings depicting all fieldwork required to accommodate field conditions.
 5. Contractor must coordinate and cross check for accuracy, completeness and correct relationship of the work of other Sections, each shop drawing prepared for the work of this Section, including each shop drawing prepared by accepted subcontractors. Engineer's review of shop drawings does not relieve Contractor of these responsibilities.
 6. Indicate welds and nondestructive tests by using symbols conforming to AWS A2.4.
 7. Show and dimension holes through deck and other work required for work of other Sections. Provide fieldwork drawings for holes not shown in shop drawings.

8-40.1(4) INSPECTION AND TESTING:

- A. General: Owner will engage and pay for the services of an independent Testing Agency acceptable to the Engineer.
1. Contractor must be responsible for providing the Testing Agency and Engineer with proper notice of the initiation of each phase and portion of work requiring testing or inspection. Written notice of commencement date must be provided at least 5 working days prior to the start of work. Subsequently, Contractor must give a minimum of 24 hours verbal notice of work, or completion of work as applicable, requiring inspection and/or testing. Provide Testing Agency personnel with convenient and safe access to the work and all reasonable assistance necessary to permit effective inspection and testing work.
 2. Contractor must furnish Testing Agency with one copy of each accepted shop drawing bearing the Engineer's review stamp.
 3. Testing Agency may inspect and test materials and work at any time before, during or after installation. Deficient or incomplete work or materials must be corrected or

replaced, as determined by the Engineer, without additional costs or delays to the Owner.

4. The Testing Agency must report directly to the Owner and Engineer the results of all testing and inspection by means of daily written reports. When any test or inspection reveals deficient or non-conforming work, Testing Agency must notify Owner and Engineer immediately by means of a written report specially and clearly marked and identified to show deficient areas or work.
 5. Performance or waiving of inspection, testing or surveillance by Testing Agency for a given portion of the work will not relieve Contractor from responsibility to conform strictly to the requirements of the Contract Documents.
 6. Where additional tests are deemed necessary by Engineer due to failure to pass tests, the cost of additional testing will be deducted from payments to Contractor.
 7. If, due to errors by the Contractor or failure to perform his work in accordance with the Contract Documents, the Engineer must perform additional design or drafting work or review proposed solutions, the Contractor must, through the Owner, reimburse the Engineer in accordance with the Engineer's current fee schedule, plus out of pocket expenses incurred.
- B. Deck: Field inspection of deck must include verification of correct size, type and gauge, inspection of welds, fasteners, and sidalap connectors, and verification of correct installation in accordance with Contract Documents and manufacturer instructions.
- C. Shear Connectors: Field inspection of shear connectors must include verification of correct number, size, length, spacing, arrangement and welding or fastening technique. Inspection of stud welding must be in accordance with AWS D1.1 Section 7.8.

8-40.1(5) QUALITY ASSURANCE:

- A. General: Contractor must examine all Contract Documents and note any discrepancies and special construction problems requiring close coordination and exact time schedules; assume responsibility of same and administer action such that construction may proceed properly without delay.
1. Contractor must perform quality control functions required to achieve, and to document that, work conforms to the Contract Documents. Provide access to Contractor's quality control documents and reports upon request of Owner, Engineer or Testing Agency.
 2. Contractor must maintain sufficient office, field engineering, and field supervision staff to assure that all data and layout drawings for work of other Sections is transmitted to detailers to allow proper detailing and to assure proper execution of the work in the field. Provide sufficient qualified supervision, field and shop verification, and cross-checking efforts to assure that all work conforms to the Contract Documents. Coordinate and schedule the work of this Section with the work of other Sections of this Specification.
 3. Contractor and Construction Manager must coordinate and schedule the work of this Section with the work of other Sections of this Specification in order to optimize quality and to avoid delay in overall job progress.
 4. Prior to starting applicable phases of the work of this Section, Contractor must cooperate and coordinate with each trade affected by the work of this Section, including areas where work of other Specification Sections joins or relates to work of this Section. Contractor must report unsatisfactory or nonconforming conditions to Engineer in writing prior to the start of work.
- B. Qualifications:
1. Steel deck manufacturer qualification: Member producer of SDI.

2. Erector must have experience in the erection of composite steel deck for at least three similar structures of the type of this work.
 3. Shear connector installers must have experience in stud welding through composite metal deck for at least three similar structures of the type of this work.
 4. Welders and welding operators must be qualified in accordance with the governing Building Code and with applicable AWS requirements for each specific welding procedure and process which the welder will use in the work. When requested by the Engineer, Contractor must require welders to be re-tested.
- C. Contractor's Responsibilities: The Contractor must be solely responsible for the items listed below. While the following list is not intended to be a complete listing of all responsibilities, it is provided to bring these items to the specific attention of the Contractor. Engineer's review of shop drawings or other submittals, presence or observation at the project site, or performance or waiving of inspection or testing, does not relieve Contractor from these responsibilities.
1. Design, engineering, construction, safety and adequacy of all steel deck work acting as a concrete form. Design and construct deck as a form to withstand all imposed forces, including all construction dead and live loads, horizontal loads from equipment and wind and forces due to vibration of plastic concrete. Provide inspection of all steel deck as a form for conformance with this Specification.
 2. Safety and stability of the work. Construction sequences, whether stated or implied, are intended only to assist the Contractor in coordinating the work of the project.
 3. Fabrication procedures and the means, methods, techniques, sequences and procedures of construction.
 4. Correctness of dimensions and quantities, for the fitting to other or existing elements, for conditions to be confirmed and correlated at the site, and for the verification of the physical interrelationships of elements of the work.
 5. The amount, method of distribution, and proposed supplemental support of loads during construction. Construction loads must not exceed the superimposed load that the member, with necessary supplemental support, is capable of carrying safely without damage.
 6. Obtain all field measurements required for proper fabrication and installation of work covered by this Section. Precise measurements are the responsibility of Contractor.
 7. Report unsatisfactory or non-conforming conditions to the Engineer in writing prior to the start of work.

8-40.1(6) DELIVERIES, STORAGE AND HANDLING:

A. Steel Deck:

1. Do not rack, bend or mar steel deck sheets.
2. Store steel deck sheets and accessories above ground and protected from free weathering with one end elevated.

B. Steel Deck Fasteners

1. Store weld studs, welding electrodes, mechanical fasteners and powder-actuated cartridges in original packages in a cool, dry location until final installation.
 - a. Comply with all project and national safety regulations regarding handling of welding equipment and powder-actuated fastening systems.

8-40.1(7) DEFICIENT WORK:

- A. Deficient work or any work failing to strictly conform to the Contract Documents must be removed and replaced, or repaired if accepted by Engineer, at no cost to the Owner.
 - 1. Contractor must prepare appropriate details and procedures to bring such work into conformance with the Contract Documents and submit to Engineer for review and acceptance. All drawings and details of proposed corrective work must be neatly and clearly drafted in scale clearly identifying location and extend of such work. Contractor must, through the Owner, reimburse the Engineer for time and expense incurred reviewing proposal procedures and details in accordance with the Engineer's current fee schedule.
 - 2. Non-conforming work may be rejected by Engineer at any time, regardless of prior acceptance in shop drawings, prior inspection, inclusions in certificates of payment.
- B. Deficient work must include, but not be limited to:
 - 1. Bent or warped pieces.
 - 2. Weld damage to include:
 - a. Deck burn through.
 - b. Undersized welds.
 - c. Damage to structural components.
 - d. Damage to deck coating or paint.
 - 3. Unauthorized cutting.
 - 4. Surface defects.
 - 5. Surfaces not sufficiently clean to receive stud shear connector or spray fireproofing.
 - 6. Workmanship not in accordance with the Drawings, with this Specification, with accepted samples, or with referenced codes or standards.
 - 7. Exceeding tolerances.

8-40.2 PRODUCTS

8-40.2(1) ACCEPTABLE STEEL DECK MANUFACTURERS:

- A. The following are acceptable manufacturers for steel deck:
 - 1. Vulcraft-Nucor
 - 2. Verco
 - 3. ASC
 - 4. Canam
 - 5. Other approved alternative.

8-40.2(2) DECK MATERIALS:

- A. Steel Roof Deck:
 - 1. Galvanized steel: ASTM A653 – SS Designation, Grade 50 with minimum yield strength of 50 ksi with a minimum zinc coating class of G60.

2. Provide deck configuration as follows:

- a. Deck Type B Roof
- b. Gauge 18
- c. Depth 1.5 in.
- d. Width 36 in.
- e. Effective Moment of Inertia $I_+ =$ 0.302 $\text{in}^4/\text{ft.}$
- f. Effective Moment of Inertia $I_- =$ 0.306 $\text{in}^4/\text{ft.}$
- g. Effective Section Modulus $S_+ =$ 0.314 $\text{in}^3/\text{ft.}$
- h. Effective Section Modulus $S_- =$ 0.331 $\text{in}^3/\text{ft.}$

B. Steel Roof Deck at Canopies:

1. Galvanized steel: ASTM A653 – SS Designation, Grade 50 with minimum yield strength of 50 ksi with a minimum zinc coating class of G60.

2. Provide deck configuration as follows:

- a. Deck Type N Roof
- b. Gauge 20
- c. Depth 3 in.
- d. Width 32 in.
- e. Effective Moment of Inertia $I_+ =$ 0.890 $\text{in}^4/\text{ft.}$
- f. Effective Moment of Inertia $I_- =$ 0.953 $\text{in}^4/\text{ft.}$
- g. Effective Section Modulus $S_+ =$ 0.452 $\text{in}^3/\text{ft.}$
- h. Effective Section Modulus $S_- =$ 0.509 $\text{in}^3/\text{ft.}$

C. Steel Composite Floor Deck:

1. Galvanized steel: ASTM A653 – SS Designation, Grade 50 with minimum yield strength of 50 ksi with a minimum zinc coating class of G60.

2. Provide deck configuration as follows:

- a. Deck Type B Composite
- b. Gauge 18
- c. Depth 1.5 in.
- d. Width 36 in.
- e. Effective Moment of Inertia $I_+ =$ 0.302 $\text{in}^4/\text{ft.}$
- f. Effective Moment of Inertia $I_- =$ 0.306 $\text{in}^4/\text{ft.}$
- g. Effective Section Modulus $S_+ =$ 0.314 $\text{in}^3/\text{ft.}$
- h. Effective Section Modulus $S_- =$ 0.331 $\text{in}^3/\text{ft.}$

8-40.2(3) GALVANIZING REPAIR PAINT:

- A. Paint for field touch-up of galvanized deck must be high zinc-dust content complying with ASTM A780.

8-40.2(4) WELDING MATERIALS:

- A. Material: Electric shielded arc process using minimum E60XX electrodes in accordance with AWS D1.3 procedures
- B. Weld Quality: All welds uniform size and appearance and free of pinholes, porosity, undercutting or other defects
- C. Welding materials must conform to AWS A5.1 or A5.5. Use E6010 for welding steel deck to structural steel and for steel deck side laps.

8-40.2(5) SHEAR CONNECTORS:

- A. Shear stud connectors must conform to ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel. Dimensions must conform to requirements given the AISC Specification. Welding equipment used for installation must conform to the requirements of AWS D1.1.

8-40.3 EXECUTION

8-40.3(1) GENERAL:

- A. Examination of Field Conditions: Contractor must examine all surfaces and features to which work must be attached or applied, abut or clear and must verify, by measurements at the project site, all dimensions affecting the work of this Section. Starting of work must represent acceptance by Contractor of surfaces, dimensions and conditions as suitable and correct for performing the work as specified.
- B. Field Measurements: Contractor must verify, by measurements at the site, all existing dimensions that affect the work of this Section. Field dimensions varying from those on the design drawings or accepted shop drawings must be brought to the Engineer's attention in writing.

8-40.3(2) FABRICATION:

- A. Decking: Deck units must be factory cut to length and, to the maximum practical extent, must be continuous over two or more spans. Provide flush abutting ends for floor decks and 2 inch end laps for roof and form decks. Interlocking side laps must be provided for floor decks and must be tight fitting with a horizontal return on the female side. Provide 2 inch minimum end bearing on supports for all decks.
- B. Pour Stops: Fabricate pour stops, ridge plates and saddles from sheet steel, bent plates or rolled steel shapes as required to withstand loads and maintain true lines and tolerances, but not less than 18 gauge thickness. Fabricate edge members to accommodate facade support system members and fittings. Galvanize as specified herein.
- C. Closures: Fabricate metal closure strips of not less than 20 gauge galvanized sheet steel. Provide closures at columns, openings, perimeters, changes in deck direction, and wherever else required to safely and completely contain and support fresh concrete and construction loads. Form to achieve tight fitting closures as to avoid loss of concrete fines.
- D. Sumps: Fabricate roof sump pans from not less than 14 gauge galvanized sheet steel of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide.

Recess pans a minimum of 1-1/2 inches below top of deck. Holes for drains may be field cut, reinforce deck prior to cutting.

8-40.3(3) ERECTION:

- A. General: Steel deck units, accessories, and shear connectors must be installed in accordance with manufacturer's recommendations, accepted shop drawings, and as specified herein.
1. Clean surfaces of supporting steel members. Remove grease, oil, and other deleterious material that may interfere with sound fastening of shear connectors through steel deck and of other fastening of deck units to supports.
 2. Steel deck units must bear two inches minimum on supporting framework. Laps of roof decks and centering must be a minimum of 2 inches and must occur over supports.
 3. Adjust deck units and accessories to final position and accurate alignment. Units must be free from excessive deflection, local distortions and damage when permanently joined into the structure. Permanently secure deck units prior to their use as storage or working platforms.
 4. Install pour stops and closure strips to form true and straight perimeter and interior edge conditions. Prevent loss of concrete through gaps and openings at columns and changes in deck direction. Provide tight fitting closures at open ends of flutes. Closures must not reduce concrete volume around shear connectors and must permit placing of reinforcing bars in the deck flutes. Upon completion of installation of floor or form deck system, work must be ready to receive concrete as a suitable form without leaking or loss of concrete fines.
 5. Perimeter edge conditions must meet required tolerances to accommodate curtain wall support systems and fittings.
 6. Provide metal or tape joint covers at abutting ends of deck.
 7. Locate deck bundles so as to prevent overloading of structure.
 8. Systems shown in the Drawings are based on unshored construction for strength considerations. Use shores where required for safety to meet specified tolerances or at option of Contractor.
 9. Upon completion steel deck must be clean, with no rusted or scarred areas on either top or bottom of surfaces. Dispose of all stud welding ferrules and other debris. Decking must be ready to receive concrete without leakage. Touch-up paint where galvanizing has been scratched or damaged.
- B. Deck Welding: Welding of steel deck must be in accordance with AWS D1.3 including appearance, quality of welding and corrective methods. Use only certified welders.
1. Bring steel deck units into direct contact with steel supporting members prior to and during welding. Flatten embossments as necessary to provide uniform contact between the steel deck and the face of the supporting steel members prior to stud welding. Remove moisture prior to welding.
 2. Deck units must be fastened to the steel supports at the ends of the units and at intermediate supports at 12 inches on center with minimum 7/8-inch-diameter arc spot welds. Where two units abut, each unit must be so fastened to the steel supports. Welds must be thoroughly fused to the steel deck around the weld perimeter as well as to the supporting steel member. Shear stud connectors placed on required fusion weld locations may be considered to replace fusion welds. Where necessary, use welding washers to obtain sound fusion welds.

3. Sump pans must be welded to the top of deck with welds in each corner and at 12 inch maximum spacing along sides.
- C. Side Lap Connectors: The side laps of adjacent floor and roof deck units must be fastened between supports by 1-1/2-inch long top seam welds at 2'-0" on center, or button punched at 2'-0" on center.
- D. Stud Welding: Welding of all stud shear connectors and deformed anchor bars must be done by means of automatically timing stud welding equipment in accordance with AWS D1.1.
- E. F. Reinforcement of Openings in Deck: Provide reinforcement around openings as shown in the Drawings and in accepted shop drawings. Unframed openings larger than 6 inches must be reinforced as shown on the Drawings or as necessary, but not less than:
 1. Openings 6 to 12 inches - 16 gauge flat sheet, extending 6 inches beyond hole in all directions, welded to top of deck.
 2. Openings 12 to 18 inches - 1-3/4 x 1-3/4 x 3/16 inch angle perpendicular to ribs of deck at each end of hole extending 16 inches beyond hole and welded to top side of deck.

8-40.4 MEASUREMENT

- A. Refer to 8-38.4.

8-40.5 PAYMENT

- A. Refer to 8-38.5.

Add the following Section to Division 8:

8-41 COLD-FORMED METAL FRAMING (SP 12-19-19)

8-41.1 GENERAL

- A. Specification Section based on CSI Specification Section 05 40 00 Cold-Formed Metal Framing

8-41.1(1) SECTION INCLUDES

- B. Cold-formed steel stud non-load bearing exterior wall framing.
- C. Cold-formed steel stud interior wall framing.

8-41.1(2) REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members.

- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
- F. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").

8-41.1(3) SUBMITTALS

- A. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, and limitations .
- B. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

8-41.2 PRODUCTS

8-41.2(1) FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

8-41.2(2) FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.
- B. Framing Connectors: Factory-made, formed steel sheet.
 - 2. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch (3.42 mm), and factory punched holes and slots.
 - 3. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

8-41.2(3) FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

8-41.2(4) ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

8-41.3 EXECUTION

8-41.3(1) EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

8-41.3(2) INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Place studs at 16 inches (400 mm) on center; not more than 2 inches (50 mm) from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- D. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- E. Touch-up field welds and damaged galvanized surfaces with primer.

8-41.4 MEASUREMENT

- A. Refer to 8-38.4.

8-41.5 PAYMENT

- A. Refer to 8-38.5.

Add the following Section to Division 8:

8-42 METAL FABRICATIONS (SP 12-19-19)

8-42.1 GENERAL

- A. Specification Section based on CSI Specification Section 05 50 00 Metal Fabrications

8-42.1(1) SECTION INCLUDES

Shop fabricated steel items, including: Trench drain, security screens, steel access ladders and steel guardrail.

8-42.1(2) REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A276/276M -- Standard Specification for Stainless Steel Bars and Shapes; 2017.
- F. ASTM A276/276M -- Standard Specification for Stainless Steel Bars and Shapes; 2017.
- G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- H. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.
- I. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric); 2014.

- J. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- K. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- L. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- M. ASTM F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- N. ASTM F594, Standard Specification for Stainless Steel Nuts.
- O. ASTM F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- P. ASTM F594, Standard Specification for Stainless Steel Nuts.
- Q. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- R. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- S. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.
- T. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

8-42.1(3) SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include in shop drawings member identity, welding technique, cuts, copes, gussets, connections, holes, fasteners, camber, fabrication and erection tolerances, type of finish, paint system, weights of members, and critical clearances.
- B. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
- C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

8-42.2 PRODUCTS

8-42.2(1) MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M. Stainless Steel grades 304 or 316*.
*For stainless steel elements that require welding, Grade 304L or 316L stainless steel must be used.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, hot-dip galvanized finish.
- E. Perforated Metal: McNichols Perforated Metal; Item: 1651711141
 - 3. 11-gauge (.1196" thick) carbon steel, with 5/16" round perforations on 7/16" staggered centers.

4. Open Area: 46%
5. Size: 48" x 120"
- F. Security Screen Base Plates: ASTM A36/A36M
- G. Bolts, Nuts, and Washers: .
 1. ASTM F3125/F3125M, Type 1, plain.
 2. Stainless steel: regular hexagonal-head bolts, nuts, and washers to ASTM F593 and ASTM F594.
 3. Cap Nuts: Steel low crown cap nuts with plain finish for painting.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

8-42.2(2) FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

8-42.2(3) FABRICATED ITEMS

- A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; galvanized finish.
 1. Side Rails: 1/2 x 2-1/2 inches (12 x 62 mm) members spaced at 18 inches (450 mm).
 2. Rungs: 3/4 inch (18 mm) diameter solid round bar spaced 12 inches (300 mm) on center.
 3. Space rungs 7 inches (175 mm) from wall surface.
- B. Steel Guardrail:
 1. Steel Pipe: ASTM A53/A53M, Grade B Schedule 40, galvanized finish
 - a. Posts, Top Rail, and Intermediate Rail: 1-1/2 inches (38 mm) diameter, round.
 2. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
 3. Exposed Fasteners: No exposed bolts or screws.
 4. Galvanizing: In accordance with requirements of ASTM A123/A123M.
- C. Security Screens:
 5. Screens must be shop fabricated to sizes as shown on the Drawings.
 6. Frames: HSS 2-1/2 x 2-1/2 x 3/16 steel framing. All corners mitered.
 7. Perforated Metal Panels: Cut to fit frame size and tack welded to frame.
 8. Weldable Hardware Box: ASTM A501/A501M, 3/16" plate.

9. Welding Fittings: Factory- or shop-welded from matching materials; seams continuously welded; joints and seams ground smooth
10. Frames and panels shop primed and painted after fabrication. (Refer to High Performance Coating section for surface preparation and finish.)

D. Trench Drain:

1. Trench drain must be fabricated from stainless steel plate as shown on the Drawings.
2. Grates: must be ADA-compliant and limit passage of maximum ½" diameter sphere through openings.

8-42.2(4) FINISHES - STEEL

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Galvanizing of All Items: Galvanize after fabrication to ASTM A123/A123M G-90 requirements.

8-42.2(5) FABRICATION TOLERANCES

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

8-42.3 EXECUTION

8-42.3(1) EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Confirm that the ladder structure to which the ladder safety system is installed is capable of withstanding the loads applied by the system in the event of a fall.

8-42.3(2) PREPARATION

- A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.
- B. Coordinate sizing and placement of operable security screen weldable hardware box with specified hardware.

8-42.3(3) INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. Coordinate installation of shop fabricated security screens with threaded connections for base plate, and concrete footing placement.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

8-42.3(4) TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

8-42.4 MEASUREMENT

- A. Measurement of "Union Elevator Hoistway and Mechanical Room Finishes" will be per lump sum.

8-42.5 PAYMENT

- A. "Union Elevator Hoistway and Mechanical Room Finishes" must include all costs for the work to furnish and install architectural finishes depicted on the Drawings and described in Sections 8-42, 8-43, 8-44, 8-45, 8-46, 8-47, 8-48, 8-49, 8-50, 8-51, 8-52, 8-53, 8-54, 8-55, 8-56, 8-57, 8-58, 8-59, 8-60, 8-61, and 8-72.

Add the following Section to Division 8:

8-43 ROUGH CARPENTRY (SP 12-19-19)

8-43.1 GENERAL

- A. Specification Section based on CSI Specification Section 06 10 00 Rough Carpentry

8-43.1(1) SECTION INCLUDES

- A. Fire retardant treated wood materials.
- B. Elevator Machine Room mounting boards.

8-43.1(2) REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- E. PS 1 - Structural Plywood; 2009.
- F. PS 20 - American Softwood Lumber Standard; 2015.

8-43.1(3) DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

8-43.1(4) WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.

8-43.2 PRODUCTS

8-43.2(1) GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Hem-Fir, unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

8-43.2(2) CONSTRUCTION PANELS

- A. Elevator Machine Room Mounting Boards: PS 1 A-D plywood, 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

8-43.2(3) ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

8-43.2(4) FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
- B. Fire Retardant Treatment:
 - 1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Do not use treated wood in direct contact with the ground.

8-43.3 EXECUTION

8-43.3(1) INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

8-43.3(2) INSTALLATION OF CONSTRUCTION PANELS

- A. Elevator Machine Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.

8-43.3(3) CLEANING

- A. Waste Disposal:
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

8-43.4 MEASUREMENT

- A. Refer to 8-42.4.

8-43.5 PAYMENT

- A. Refer to 8-42.5.

Add the following Section to Division 8:

8-44 BITUMINOUS DAMPPROOFING (SP 12-19-19)

8-44.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 11 13 Bituminous Dampproofing

8-44.1(1) SECTION INCLUDES

- A. Bituminous dampproofing.
- B. Protection boards.
- C. Drainage panels.

8-44.1(2) REFERENCE STANDARDS

- A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2016).
- B. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).

- C. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.
- D. ASTM D3747 - Standard Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation; 1979 (Reapproved 2007).
- E. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

8-44.1(3) SUBMITTALS

- A. Product Data: Provide properties of primer, bitumen, and mastics.
- B. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

8-44.1(4) QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

8-44.1(5) FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application until dampproofing has cured.

8-44.2 PRODUCTS

8-44.2(1) BITUMINOUS DAMPPROOFING

- A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187/D1187M Type I.
 - 2. VOC Content: Not more than permitted by local, State, and federal regulations.
 - 3. Applied Thickness: 1/16 inch (1.5 mm), minimum, wet film.
- B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

8-44.2(2) BITUMEN MATERIALS

- A. Cold Asphaltic Type:
 - 1. Bitumen: Asphalt emulsion, ASTM D3747.
 - 2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.
 - 3. Sealing Mastic: Asphalt roof cement, ASTM D2822, Type I.

8-44.2(3) ACCESSORIES

- A. Drainage Panel: 1/4 inch (6 mm) thick formed plastic, hollowed sandwich.
- B. Protection Board: 1/4 inch (6 mm) thick biodegradable hardboard.

8-44.3 EXECUTION

8-44.3(1) EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

8-44.3(2) APPLICATION

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- D. Apply bitumen with mop.
- E. Seal items watertight with mastic, that project through dampproofing surface.
- F. Place drainage panel directly over dampproofing, butt joints, place to encourage drainage downward.
- G. Place protection board over drainage panel, butt joints, and adhere with mastic.
- H. Scribe and cut boards around projections, penetrations, and interruptions.

8-44.4 MEASUREMENT

- A. Refer to 8-42.4.

8-44.5 PAYMENT

- A. Refer to 8-42.5.

Add the following Section to Division 8:

8-45 BENTONITE PANEL WATERPROOFING (SP 12-19-19)

8-45.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 17 13 Bentonite Panel Waterproofing

8-45.1(1) SECTION INCLUDES

- A. Bentonite clay waterproofing panels and accessories.

8-45.1(2) REFERENCE STANDARDS

- A. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

8-45.1(3) SUBMITTALS

- A. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- B. Shop Drawings: Indicate required flashings, sealing at openings, projections, and penetrations.
- C. Manufacturer's Installation Instructions: Indicate special preparation of substrate, panel attachment methods, and perimeter conditions requiring special attention.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

8-45.1(4) QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

8-45.1(5) DELIVERY, STORAGE, AND HANDLING

- A. Maintain bentonite products dry. Protect with waterproof cover.

8-45.1(6) FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application.

8-45.1(7) WARRANTY

- A. Contractor must correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.

8-45.2 PRODUCTS

8-45.2(1) MANUFACTURERS

- A. Basis of Design: Carlisle CCW MiraCLAY supplied by Carlisle Coatings & Waterproofing Incorporated, 900 Hensley Lane, Wylie, Texas 75098, Phone (800) 527-7092 Fax: (972) 442-0076.

8-45.2(2) MATERIALS

- A. Bentonite: Granulated pure, dry, bentonite clay comprised of 90 percent minimum sodium montmorillonite; 90 percent minimum passing No. 20 (850 micro m) mesh sieve and 10 percent maximum passing No. 200 (75 micro m) mesh sieve.
- B. Three-ply, Geotextile-Faced Panels: One layer of non-woven polypropylene geotextile fabric laminated to center core filled with self healing, self expanding bentonite clay granules and one layer of high density polyethylene film laminated to outside of bentonite.
 - 1. Minimum Bentonite Fill: 1.0 psf (5 kg/sq m).

8-45.2(3) ACCESSORIES

- A. Adhesive: Manufacturer's recommended type.
- B. Drainage Panel: 1/4 inch (6.4 mm) thick formed plastic, hollowed sandwich.
- C. Protection Board: 1/8 inch (3.2 mm) thick biodegradable hardboard.

8-45.3 EXECUTION

8-45.3(1) EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are smooth and durable; free of matter detrimental to application of waterproofing system.
- C. Verify that items that penetrate surfaces to receive waterproofing are securely installed.

8-45.3(2) PREPARATION

- A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- B. Remove concrete fins, projections, and form ties.

- C. Fill holes, cracks, honeycombs, and voids with bentonite gel seal, at least 1/8 inch (3 mm) thick, extending 3 inches (76 mm), minimum, beyond defect.

8-45.3(3) INSTALLATION - GENERAL

- D. Install panels in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- E. Cut panels parallel to corrugations to prevent bentonite loss.
- F. Seal construction joints with joint seal.

8-45.3(4) INSTALLATION - VERTICAL SURFACES

- A. Install three-ply panels with masonry nails, starting at base of foundation.
- B. Fold panels around corners with corrugations vertical, and install unfolded panels with corrugations horizontal.
- C. Lap adjoining panels 1-1/2 inches (38 mm).
- D. Stagger vertical joints minimum 16 inches (406 mm) on succeeding courses.
- E. Place joint packing continuous along junction of wall and footing; secure properly to prevent movement.

8-45.3(5) INSTALLATION - BELOW SLABS UNDER HYDROSTATIC CONDITIONS

- A. Install polyethylene sheet over subgrade; lap joints 4 inches (100 mm).
- B. Lay single-ply panels in slab form, and align panels with edge of slab; do not lay panels over pile caps or footings supporting slab edges, and stagger joints of adjoining panel rows.
- C. Lap joints 4 inch (100 mm), minimum, and secure laps to prevent displacement.
- D. Install joint seal in 1 inch (25 mm) high beads around penetrations through panels and 1/2 inch (13 mm) high beads around chair legs not placed on pads; cover beads with polyethylene sheet collars, cut to size.
- E. Lay joint seal continuously along and around protrusions, penetrations, and at abutting walls; secure to prevent movement.

8-45.3(6) INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

- A. Install drainage panel directly over waterproofing, butt joints, and position to ensure downward drainage.
- B. Install protection board over drainage panel; butt joints.
- C. Scribe and cut boards around projections, penetrations, and interruptions.

8-45.3(7) PROTECTION

- A. Do not permit traffic over unprotected or uncovered waterproofing.
- B. Cover installed waterproofing with temporary polyethylene sheeting; remove sheeting just before backfilling begins.

8-45.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-45.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-46 TRAFFIC COATINGS (SP 12-19-19)

8-46.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 18 00 Traffic Coatings

8-46.1(1) SECTION INCLUDES

- A. Coatings for waterproofing Electrical Room concrete floor.

8-46.1(2) REFERENCE STANDARDS

- A. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2017.
 - a. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
 - b. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
 - c. ICC-ES AC308 - Acceptance Criteria for Walking Decks; 2000 (Reapproved 2011).

8-46.1(3) SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
 - a. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

8-46.2 PRODUCTS

8-46.2(1) TRAFFIC COATING

- A. Polycoat Products; Polydeck 355 Pedestrian Traffic Deck Waterproof Coating System. <www.polycoatusa.com>.
- B. Fire-rated, fluid-applied polyurethane membrane with fiberglass fabric reinforcement and slip-reducing aggregate surface.
 - a. Fluid applied polyurethane; waterproof; Engineer selected color; conforming to the following:
 1. Membrane Single-component, fast curing, low-odor polyurethane basecoat.
 2. Topping: Polyurethane compound, conforming to the following: Two-component, high solids, low-odor aliphatic, polyurethane topcoat.
 3. Surfacing: Clean sand.
 4. Filler and Primer: As recommended by membrane manufacturer.
 5. Sealant: As recommended by membrane manufacturer, and compatible with system and adjacent materials.
 - a. Fire Rating: Class B minimum on concrete.

8-46.3 EXECUTION

8-46.3(1) EXAMINATION

- A. Verify that substrate and adjacent materials are ready to receive work, surfaces are clean, dry and free of substances that could adversely affect bond.

8-46.3(2) PREPARATION

- A. Mask and protect adjacent surfaces.
 - a. Clean substrate surface free of foreign matter.
 - b. Patch substrate with latex filler to produce surface conducive to bond. Prime all joints, cracks flashings with approved primers as specified by manufacturer.
 - c. . Apply primer in accordance with manufacturer's instructions

8-46.3(3) INSTALLATION

- A. Apply system materials in accordance with manufacturer's instructions.
 - a. Apply surfacing to topcoat before set.
 - b. Apply sealant to junction of horizontal and intersecting surfaces to achieve watertight seal.

8-46.3(4) PROTECTION

- A. Do not permit traffic over unprotected surfaces.

8-46.4 MEASUREMENT

- A. Refer to Section 8-42.4

8-46.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-47 THERMAL INSULATION (SP 12-19-19)

8-47.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 21 00 Thermal Insulation

8-47.1(1) SECTION INCLUDES

- A. Board insulation at perimeter foundation wall, underside of floor slabs, and over roof deck.
- B. Batt insulation in exterior wall construction.

8-47.1(2) REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2018.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2018a.

- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016a.

8-47.1(3) SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

8-47.2 PRODUCTS

8-47.2(1) APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.
- D. Insulation Over Roof Deck: Polyisocyanurate board.

8-47.2(2) FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with natural skin surfaces.
 - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88) per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 - 5. Board Edges: Square.
- B. Polyisocyanurate (ISO) Board Insulation with Facers Both Sides: Rigid cellular foam, complying with ASTM C1289.
 - 1. Compressive Strength: 25 psi (172 kPa)
 - 2. Facers: Glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
 - 3. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 4. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 5. Thermal Resistance: R-value to meet Seattle Energy Code..
 - 6. Board Edges: Square.
- C. Polyisocyanurate (ISO) Tapered Board Insulation with Facers Both Sides: Rigid cellular foam, complying with ASTM C1289.
 - 1. Compressive Strength: 25 psi (172 kPa).

2. Facers: Glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
3. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
4. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
5. Board Thickness: Tapered at 1/2 inch (6.35 mm) per foot
6. Manufacturers:
 - a. Atlas Roofing Corporation; Tapered ACFoam-III: www.atlasroofing.com/#sle.

8-47.2(3) BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 2. Facing: Unfaced.

8-47.2(4) ACCESSORIES

- A. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- B. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
 1. Length as required for thickness of insulation material and penetration of deck substrate.
- C. Adhesive: Type recommended by insulation manufacturer for application.

8-47.2(5) SPRAY FOAM INSULATION

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 1. Thermal Resistance: R-value (RSI-value) of 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature when tested in accordance with ASTM C518.
 2. Water Vapor Permeance: Vapor retarder; 2 perms (115 ng/(Pa s sqm)), maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
 3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842
 4. . Air Permeance: 0.04 cfm/sq ft (0.2 L/second sq meter), maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.57 psf (75 Pa).
 5. Closed Cell Content: At least 90 percent.
 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
 7. Manufacturers:
 - a. Icynene-Lapolla; Icynene ProSeal: www.icynene.com/#sle.
 - b. Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam: www.jm.com/#sle.

Primer: As required by insulation manufacturer.

8-47.3 EXECUTION

8-47.3(1) EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

8-47.3(2) PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

8-47.3(3) BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- B. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

8-47.3(4) BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

8-47.3(5) BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
 - 1. See applicable roofing specification section for specific board installation requirements.
 - 2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
 - 3. Do not apply more insulation than can be covered with roofing in same day.

8-47.3(6) BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

8-47.3(7) PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

8-47.4 MEASUREMENT

- A. Refer to Section 8-42.4

8-47.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-48 WEATHER BARRIERS (SP 12-19-19)

8-48.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 25 00 Weather Barriers

8-48.1(1) SECTION INCLUDES

- A. Air/Weather Barriers: Materials that form a system to stop passage of air and water through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

8-48.1(2) DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier (AB): Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder (VR): Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm.}$
- D. Water-Resistive Barrier (WRB): Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.
- E. Air/Weather Barrier (AWB): Air tight barrier made of material that is relatively air impermeable, is water vapor permeable, both to the degree specified, but sheds water and is moisture resistant, with sealed seams and with sealed joints to adjacent surfaces.
- F. Self-Adhered Flashing (SAF): Flexible self-adhesive sheet flashing installed to shed water with sealed seams, and with sealed joints to adjacent surfaces.

8-48.1(3) REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2018.
- B. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.

- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- F. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; 2016.
- G. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; 2017.
- H. ICC-ES AC212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing; 2015.
- I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

8-48.1(4) SUBMITTALS

- A. Product Data: Provide data on material characteristics.
- B. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

8-48.2 PRODUCTS

8-48.2(1) AIR/WEATHER BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air/Weather Barrier Sheet, Self-Adhered:
 - 1. Air Permeance: 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 10 perms (572 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
 - 3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 90 days of weather exposure.
 - 4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
 - 5. Complies with NFPA 285 wall assembly requirements.
 - 6. Water Resistance: Comply with applicable water-resistive requirements of ICC-ES AC38.
 - 7. Seam and Perimeter Tape: As recommended by sheet manufacturer.
- B. Insect Screen (At Coping): Cor-A-Vent SV-5: 3/4" thick by 3" high by 4-feet long extruded corrugated polypropylene plastic with vent openings that do not permit direct water or weather entry.

8-48.2(2) ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Air/Weather Barrier and Sealing Air/Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Self-Adhered Flashing (SAF): Flexible self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
 - 1. Composition: Butyl rubber sheet laminated to elasticized polyethylene sheet.

2. Thickness: 20 mil, 0.020 inch (0.51 mm), nominal; exception from ASTM D1970/D1970M.
- C. Liquid Flashing: One part, fast curing, non-sag, elastomeric, gun grade, trowelable liquid flashing.
- D. Stainless Steel Flashing: Flexible flashing with 8 mil, 0.008 inch (0.203 mm) thick sheet of Type 304 stainless steel, 8 mil, 0.008 inch (0.203 mm) of butyl adhesive and a siliconized release liner.
 1. Width: 6 inch (152 mm) wide.
 2. Overlap joints at least 2 inch (51 mm).
- E. Thinners and Cleaners: As recommended by material manufacturer.

8-48.3 EXECUTION

8-48.3(1) EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

8-48.3(2) PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

8-48.3(3) INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air/Weather: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Self-Adhered Sheets:
 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
 4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
 5. At wide joints, provide extra flexible membrane allowing joint movement.
- E. Openings and Penetrations in Exterior Weather Barriers:
 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto weather barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.

3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches (230 mm) wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

8-48.3(4) FIELD QUALITY CONTROL

- A. Do not cover installed weather barriers until required inspections have been completed.
- B. Take digital photographs of each portion of the installation prior to covering up.

8-48.3(5) PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Do not leave air/water barrier materials exposed to weather for longer than 60 days.

8-48.4 MEASUREMENT

- A. Refer to 8-42.4.

8-48.5 PAYMENT

- A. Refer to 8-42.5.

Add the following Section to Division 8:

8-49 METAL WALL PANELS (SP 12-19-19)

8-49.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 42 13 Metal Wall Panels

8-49.1(1) SECTION INCLUDES

- A. Manufactured metal panels for exterior wall panels and subgirt framing assembly, with related flashings and accessory components.

8-49.1(2) REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

8-49.1(3) SUBMITTALS

- A. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
- B. Samples: Submit two samples of wall panel, 12 inch by 12 inch (305 mm by 305 mm) in size illustrating finish color, sheen, and texture.
- C. Manufacturer's Qualification Statement.

- D. Installer's Qualification Statement.

8-49.1(4) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum 5 years of documented experience.

8-49.1(5) DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

8-49.1(6) WARRANTY

- A. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- B. Correct defective work within a 2 year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

8-49.2 PRODUCTS

8-49.2(1) MANUFACTURERS

- A. Metal Wall Panels - Concealed Fasteners:
 - 1. Basis of Design: Morin Z-12 Profile Concealed Fastener Metal Wall Panels:
 - a. Morin; a Kingspan Group Company; 685 Middle Street, Bristol, Connecticut 06010; 1-800-640-9501 (Toll Free); (www.morincorp.com).
- B. Metal Wall Panels – Flat Panel Exposed Fasteners:
 - 1. Basis of Design: Morin C-40/1/2" Profile Exposed Fastener Metal Wall Panels:
 - b. Morin; a Kingspan Group Company; 685 Middle Street, Bristol, Connecticut 06010; 1-800-640-9501 (Toll Free); (www.morincorp.com).

8-49.2(2) MANUFACTURED METAL PANELS

- A. Metal Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 - 1. Provide exterior wall panels.
 - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - 3. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
 - 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 - 5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.

7. Corners: Factory-fabricated in one continuous piece with minimum 2 inch (51 mm) returns.

B. Exterior Metal Wall Panels:

1. Concealed Wall Fastener Panels

- a. Profile: Vertical; Double-reveal profile with evenly spaced raised flat pan between reveals.
- b. Side Seams: Tongue and groove interlocked joint with reveal, sealed with continuous bead of sealant.
- c. Panel Width: 16 inches (406 mm).
- d. Panel Height: 1.5 inch (26 mm).
- e. Material: 22 GA (.76 mm) stainless steel.

2. Exposed Fastener Panels

- a. Profile: Vertical; C-wave profile with evenly spaced raised pans.
- b. Side Seams: Overlapping joint, sealed with continuous bead of sealant.
- c. Panel Cover Width: 40 inches (1016 mm).
- d. Panel Height: 0.5 inch (13 mm).
- e. Material: 22 GA (.76mm) stainless steel.

- C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- D. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- E. Anchors: Stainless steel.

8-49.2(3) MATERIALS

- A. Stainless-Steel Face Sheet: Type 304, ASTM A 666, marine grade alloy type as indicated.
1. Face Sheet: 0.031 inch/22 gage (79 mm), nominal thickness.
 2. Finish: #4 Polished directional satin.

8-49.2(4) ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, stainless steel. Fastener cap same color as exterior panel.
1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

8-49.3 EXECUTION

8-49.3(1) EXAMINATION

- A. Verify that building framing members are ready to receive panels.
- B. Verify that water-resistive barrier has been installed over substrate completely and correctly.

8-49.3(2) INSTALLATION

- A. Install panels on walls in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends minimum 2 inches (51 mm).
- F. Use concealed fasteners unless otherwise approved by Engineer.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

8-49.3(3) TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch (1.6 mm).

8-49.3(4) CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.
- D. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

8-49.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-49.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-50 SHEET METAL ROOFING (SP 12-19-19)

8-50.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 61 00 Sheet Metal Roofing

8-50.1(1) SECTION INCLUDES

- A. Sheet metal roofing, associated flashings, and underlayment.
- B. Counterflashings.

- C. Sealants for joints within sheet metal fabrications.

8-50.1(2) REFERENCE STANDARDS

- A. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2018.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2018.
- F. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012, with Editorial Revision (2015).
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

8-50.1(3) ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

8-50.1(4) SUBMITTALS

- A. Product Data: Provide data on metal types, finishes, and characteristics.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

8-50.1(5) QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise noted.
- B. Installer Qualifications: Company specializing in performing sheet metal roof installations with minimum 5 years of experience.

8-50.1(6) DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

8-50.1(7) WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion. Defective work includes degradation of metal finish and failure of watertightness or seals.

8-50.2 Products

8-50.2(1) SHEET MATERIALS

- A. Stainless Steel Sheet: ASTM A666, Type 304, soft temper, 20 gage, 0.0375 inch (0.95 mm) thick; smooth #4 brushed finish.

8-50.2(2) FABRICATION

- A. Form stainless steel roof pan in single piece with upturned perimeter and integral scupper true to shape, accurate in size, square, and free from distortion or defects.

- B. Fabricate cleats of same material as sheet, thickness greater than roofing sheet, and at least 2 inch (52 mm) wide, interlockable with sheet.
- C. Form coping pieces in single length sheets with standing seams at corners.
- D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

8-50.2(3) ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Protection Board: Non-combustible, water resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M, and with the following additional characteristics:
 - 1. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 - a. Exception: Board to be attached using adhesive may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 - 2. Thickness: 1/2 inch (12 mm).
- C. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 3. Ultraviolet Resistance and Weatherability: Approved in writing by manufacturer for exposure to weather for minimum of 12 months.
 - 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 - 5. Fasteners: As specified by manufacturer and building code qualification report or approval, if any.
- D. Slip Sheet: Rosin sized building paper.
- E. Concealed Sealants: Non-curing butyl sealant.
- F. Exposed Sealants: ASTM C920 elastomeric sealant, with minimum movement capability as recommended by manufacturer for sealed substrates; color to match adjacent material.
- G. Solder: ASTM B32; Sn50 (50/50) type.

8-50.3 EXECUTION

8-50.3(1) EXAMINATION

- A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to valleys and scupper.
- B. Verify correct placement of wood nailers and insulation positioning between nailers.
- C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- D. Verify roofing termination and base flashings are in place, sealed, and secure.

8-50.3(2) INSTALLATION - ROOFING

- A. Install tapered insulation before starting roofing installation.
 - a. Installation of tapered insulation over low slope roof structure is specified in Section 8-47 .

- B. Install protection board over tapered insulation
- C. Apply underlayment over protection board over the entire roof area.
- D. Apply slip sheet in one layer, laid loose.
- E. Lay roof pan in place and fasten per details at perimeter.
- F. Use plastic cement for joints between metal and bitumen and for joints between metal and felts.
- G. Provide integral scupper as shown on drawings.
- H. Weld intersection joints watertight. After welding, grind welds smooth, wash metal clean with neutralizing solution, and rinse with water.

8-50.3(3) INSTALLATION - FLASHINGS

- A. Secure coping and flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- B. Cleat and seam all joints.
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place, and make corners square, surfaces true and straight in planes, and lines accurate to profiles.

8-50.3(4) PROTECTION

- A. Do not permit traffic over unprotected roof surface.

8-50.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-50.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-51 SHEET METAL FLASHING AND TRIM (SP 12-19-19)

8-51.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 62 00 Sheet Metal Flashing And Trim

8-51.1(1) SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, cover plates, closure plates, and conductor head.
- B. Sealants for joints within sheet metal fabrications.

8-51.1(2) REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. CDA A4050 - Copper in Architecture - Handbook; current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

8-51.1(3) ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

8-51.1(4) SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

8-51.1(5) QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

8-51.1(6) DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

8-51.2 PRODUCTS

8-51.2(1) SHEET MATERIALS

- A. Stainless Steel Flashings, Counterflashings, Cover Plates, Closure Plates, and Conductor Head: ASTM A666, Type 304 alloy, soft temper, 20 gage, 0.0375 inch (0.95 mm) thick; smooth 2D - Dull finish.
- B. Stainless Steel Floor Edge Angle: ASTM A666, Type 304 alloy, soft temper, 11 gage, 0.0125 inch (3.18 mm) thick; smooth 2D - Dull finish

8-51.2(2) FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, minimum 2 inches (50.8 mm) wide, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- E. Form coping with standing seams, except where otherwise indicated.
- F. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.

8-51.2(3) SCUPPER AND DOWNSPOUT FABRICATION

- A. Scupper: Form from stainless steel as part of stainless steel roof pan, Weld all seams. Profile as indicated.
- B. Conductor Head: Profile and size as indicated on drawings.
- C. Downspout: Profile as indicated.
- D. Accessories: Profiled to suit conductor head and downspout.

1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
 2. Downspout Supports: Brackets as shown on drawings.
- E. Downspout Boots: Refer to Civil drawings and specifications.
- F. Seal metal joints.

8-51.2(4) ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Plastic Cement: ASTM D4586/D4586M, Type I.

8-51.3 EXECUTION

8-51.3(1) EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

8-51.3(2) INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- C. Seal metal joints watertight.
- D. Secure conductor head and downspout in place using concealed fasteners.
- E. Connect downspout to downspout boots, and grout connection watertight.

8-51.3(3) FIELD QUALITY CONTROL

- A. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

8-51.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-51.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-52 JOINT SEALANTS (SP 12-19-19)

8-52.1 GENERAL

- A. Specification Section based on CSI Specification Section 07 92 00 Joint Sealants

8-52.1(1) SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

8-52.1(2) REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C834 - Standard Specification for Latex Sealants; 2017.
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- F. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.
- H. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

8-52.1(3) SUBMITTALS

- A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
- B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

8-52.1(4) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

8-52.1(5) WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

8-52.2 PRODUCTS

8-52.2(1) JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints unless specifically indicated not to be sealed, whether or not the joint is indicated on drawings. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - c. Other joints indicated below.
3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

1. Type 1 - Joints in Glass and Glazing Fabrications: Non-sag non-staining silicone.
2. Type 7 - Lap Joints in Sheet Metal Fabrications and Manufactured Metal Panels: Butyl rubber, non-curing.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.

1. Type 6 - Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Type 3 - Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag tamper-resistant silyl-terminated polyurethane sealant.
3. Type 2 - Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
4. Type 8 - Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

D. Areas Where Tamper-Resistance is Required: As indicated on drawings.

8-52.2(2) JOINT SEALANTS - GENERAL

- #### **A. Sealants and Primers:** Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

8-52.2(3) NONSAG JOINT SEALANTS

- A. Type 1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: 50%, minimum.
 - 2. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 3. Color: To be selected by Engineer from manufacturer's standard range.
 - 4. Cure Type: Single-component, neutral moisture curing
 - 5. Service Temperature Range: Minus 20 to 180 degrees F (Minus 29 to 82 degrees C).
- B. Type 2 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White.
- C. Type 3 - Tamper-Resistant, Silyl-Terminated Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum
 - 2. Hardness Range: 25 to 30, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: To be selected by Engineer from manufacturer's standard range.
- D. Type 6 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
- E. Type 7 - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

8-52.2(4) SELF-LEVELING SEALANTS

- A. Type 8 - Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.

8-52.2(5) ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 - 3. Open Cell: 40 to 50 percent larger in diameter than joint width.
 - 4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

8-52.3 EXECUTION

8-52.3(1) EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

8-52.3(2) PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

8-52.3(3) INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

8-52.3(4) CLEANING

- A. Clean adjacent soiled surfaces.

8-52.3(5) PROTECTION

- A. Protect sealants until cured.

8-52.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-52.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-53 HOLLOW METAL DOORS AND FRAMES (SP 12-19-19)

8-53.1 GENERAL

- A. Specification Section based on CSI Specification Section 08 11 13 Hollow Metal Doors And Frames

8-53.1(1) SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.
- C. Accessories, including glazing, louvers, and matching panels.

8-53.1(2) REFERENCE STANDARDS

- A. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2011).
- B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- G. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

8-53.1(3) SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- C. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- D. Manufacturer's Qualification Statement.

8-53.1(4) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

8-53.1(5) DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

8-53.2 PRODUCTS

8-53.2(1) PERFORMANCE REQUIREMENTS

- A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the

requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

8-53.2(2) HOLLOW METAL DOORS

- A. Exterior Doors
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
 - 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 - 3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 - 4. Door Face Sheets: Flush.
 - 5. Insulating Value: U-value of 0.37, when tested in accordance with ASTM C1363.
 - 6. Weatherstripping: Integral, recessed into door edge or frame.
 - 7. Door Finish: Factory primed and field finished.

8-53.2(3) HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. General:
 - 1. Comply with the requirements of grade specified for corresponding door.

- a. ANSI A250.8 Level 3 Doors: 14 gage frames.
- 2. Finish: Same as for door.
- 3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- C. Exterior Door Frames: Knock-down type.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 - 2. Weatherstripping: Separate, see Section 8-56.

8-53.2(4) ACCESSORIES

- A. Grout for Frames: Portland cement grout with maximum 4 inch (102 mm) slump for hand troweling; thinner pumpable grout is prohibited.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

8-53.2(5) FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, zinc molybdate type.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

8-53.3 EXECUTION

8-53.3(1) EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

8-53.3(2) PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

8-53.3(3) INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Install door hardware as specified in Section 8-56.
- E. Touch up damaged factory finishes.

8-53.3(4) TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

8-53.3(5) ADJUSTING

- A. Adjust for smooth and balanced door movement.

- B. Adjust sound control doors so that seals are fully engaged when door is closed.

8-53.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-53.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-54 OVERHEAD COILING DOORS (SP 12-19-19)

8-54.1 GENERAL

- A. Specification Section based on CSI Specification Section 08 33 23 Overhead Coiling Doors

8-54.1(1) SECTION INCLUDES

- A. Overhead coiling doors, operating hardware, fire-rated and exterior; electrically operated.
- B. Wiring from electric circuit disconnect to operator to control station.

8-54.1(2) REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ITS (DIR) - Directory of Listed Products; current edition.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).
- G. NEMA MG 1 - Motors and Generators; 2017.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- J. UL (DIR) - Online Certifications Directory; Current Edition.
- K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

8-54.1(3) SUBMITTALS

- A. Product Data: Provide general construction, electrical equipment, and component connections and details.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- C. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

- D. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

8-54.1(4) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience and approved by manufacturer.
- C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

8-54.2 PRODUCTS

8-54.2(1) MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. Basis of Design: The Cookson Company; Model ESD10 Service Door: Cookson: 1901 S. Litchfield Road Goodyear, AZ 85338, (800) 294-4358, www.cooksondoor.com/#sle.

8-54.2(2) COILING DOORS

- A. Exterior Coiling Doors: Stainless steel slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf (940 Pa), without undue deflection or damage to components.
 - 2. Single thickness perforated slats.
 - 3. Nominal Slat Size: 2-5/8 inches (65 mm) wide x required length.
 - 4. Finish: No. 4 - Brushed.
 - 5. Guide, Angles: Stainless steel.
 - 6. Hood Enclosure: Minimum 20 gauge stainless steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets..
 - a. Finish: No. 4 - Brushed.
 - 7. Electric operation.
 - 8. Mounting: Within framed opening.
 - 9. Locking Devices: Lock and latch handle on outside.

8-54.2(3) MATERIALS AND COMPONENTS

- A. Curtain Construction: Interlocking slats.
 - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 - 2. Curtain Bottom: Fitted with neoprene astragal extending full width of door bottom bar to provide reinforcement and positive contact in closed position.
 - 3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

- B. Stainless Steel Slats: Minimum thickness, 20 gage, 2-5/8 inch (65 mm), complying with ASTM A 666, Type 304, rollable temper.
 - 1. Perforated with 0.062 inch (1.6 mm) diameter openings at 0.094 inch (2.4 mm) staggered centers, approximately 22 percent free area.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
 - 1. Stainless Steel: ASTM A 666, Type 304, rollable temper.
- E. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
- F. Lock Hardware:
 - 1. For motor operated units, additional lock or latching mechanisms are not required.
 - 2. Latch Handle: Manufacturer's standard.
- G. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb (10 kg) nominal force to operate.

8-54.2(4) ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
 - 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 - 1. Mounting: Center mounted, horizontal, front of coil.
 - 2. Motor Enclosure:
 - a. Exterior Coiling Doors: NEMA MG 1, Type 4; open drip proof.
 - 3. Motor Rating: 1/3 hp (250 W); continuous duty.
 - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 6. Controller Enclosure: NEMA 250, Type 1.
 - 7. Opening Speed: 12 inches per second (300 mm/sec).
 - 8. Brake: Adjustable friction clutch type, activated by motor controller.
 - 9. Manual override in case of power failure.
- C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.
 - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.

- a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

8-54.3 EXECUTION

8-54.3(1) EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

8-54.3(2) INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Complete wiring from disconnect to unit components.
- F. Install enclosure and perimeter trim.

8-54.3(3) ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

8-54.3(4) CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

8-54.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-54.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-55 CHANNEL GLASS CURTAIN WALL (SP 12-19-19)

8-55.1 GENERAL

- A. Specification Section based on CSI Specification Section 08 43 27 Channel Glass Curtain Wall

8-55.1(1) SECTION INCLUDES

- A. Translucent exterior channel glass wall assemblies, including translucent exterior linear glass units, and glazing accessories.

8-55.1(2) REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 303 - Voluntary Specification for Rigid Polyvinyl Chloride (PVC) Exterior Profiles; 2018.
- D. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
- E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- G. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.
- H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- I. ASTM A492 - Standard Specification for Stainless Steel Rope Wire; 1995 (Reapproved 2013).
- J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- K. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- N. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- O. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- P. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- Q. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- R. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

8-55.1(3) ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

8-55.1(4) SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass, internal drainage details, and submit manufacturer's printed installation instructions.
- B. Shop Drawings: Indicate system dimensions, plan, elevations, connection details, framed opening requirements and tolerances, affected related work, expansion and contraction joint locations and details.
- C. Samples: Submit two full-channel width samples, 8 inches by 10-1/2 inches (204 mm by 268 mm) minimum size; illustrate full range of color and appearance of finished aluminum surface, glass and glazing materials.
- D. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

8-55.1(5) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

8-55.1(6) DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Deliver materials in manufacturer packaging, undamaged, complete, and with installation instructions.
- C. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.
- D. Store off ground, level, under cover, and protected from weather and other construction activities.

8-55.1(7) FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

8-55.1(8) WARRANTY

- A. Material and Workmanship: Provide ten year manufacturer warranty against defects in material and workmanship.
- B. Installation Warranty: Provide ten year installer warranty against failure of installed glass channel storefront system.

8-55.2 PRODUCTS

8-55.2(1) MANUFACTURERS

- A. Channel Glass Curtain Wall:
 - 1. Basis-of-Design Product: Bendheim Frame System SF60 with Lamberts LINIT channel glass; Bendheim Wall Systems Inc. 61 Willet St, Passaic, NJ 07055, 800-221-7379, email – limit@bendheim.com; www.bendheimwall.com.
 - 2. Technical Glass Products; Pilkington Profilit: www.tgpamerica.com/#sle.

A. Channel Glass Curtain Wall: System of site built, factory finished, unitized aluminum framing members with channel glass infill; related flashings, anchorage, and attachment devices; shop assembled into panels

8-55.2(2) CHANNEL GLASS CURTAIN WALL

A. ~~Channel Glass Curtain Wall: System of factory fabricated, factory finished, unitized aluminum framing members with channel glass infill; related flashings, anchorage, and attachment devices; shop assembled into panels.~~

1. Framing: Extruded aluminum profile.
2. Frame Liner: Extruded vinyl, snap-in; spacer and support for glass units.
3. Translucent Linear Glass Units: Single glazed (non-thermally broken).
 - a. Glass: Tempered and laminated glass; comply with 16 CFR 1201, Category 2 and ANSI Z97.1.
4. Frame Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
6. Construction: Eliminate noises caused by wind and thermal movement, and prevent vibration harmonics.
7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

8-55.2(3) COMPONENTS

A. Channel Glass: Laminated cast glass shapes with channel profile.

1. Face Width: 10-5/16 inches (262 mm).
2. Flange Depth: 2-3/8 inch (60 mm).
3. Channel Length: 120 inch (3.048 m) maximum.
4. ~~Color: OW (very light green, low iron glass).~~
5. ~~Surface Texture: "Standard" (lightly dimpled).~~
6. ~~Performance Coating: Low E coating; shop applied.~~

Replace items 4, 5 and 6 with the following:

4. Color: Low iron clear with very pale green cast
5. Surface Texture: 504 Rough Cast (lightly dimples or orange peel)

Add 2-N

8-55.2(4) MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy and temper 6063-T5.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), alloy and temper 5005-H16.
- C. Glass: ASTM C1036, Type 2, Class 1, Quality q3, rolled glass, channel shape, cast.
- D. Vinyl: Extruded polyvinyl chloride (PVC); AAMA 303, external grade.
- E. Stainless Steel Wire: ASTM A492, Type 316, .45mm +/- 0.05mm diameter, category Nr 1.4016, in accordance with DIN 17 440: X 6 Cr 17.

8-55.2(5) ACCESSORIES

- A. Anchoring Devices: Steel; ASTM A123/A123M, hot-dipped galvanized after fabrication.

- B. Fasteners: Non-magnetic stainless steel or Non-corrosive material approved by manufacturer.
 - 1. Provide concealed fasteners wherever possible.
 - 2. Exposed locations: Stainless steel screws with approved finish.
 - 3. Concealed locations: Stainless steel or approved fasteners in accordance with approved engineering calculations
- C. Sealant for Setting Channel Glass: Clear, 100 percent silicone, or as required by channel glass manufacturer.

8-55.2(6) FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: To be selected by Engineer from manufacturer's standard range.

8-55.3 EXECUTION

8-55.3(1) EXAMINATION

- A. Verify dimensions, tolerances, squareness, offsets, minimum clearances and method of attachment to other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

8-55.3(2) INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Erect framing, vinyl spacer and glass according to manufacturer's published installation instructions.
- C. Seal glass units continuously on both sides of glass between frame and glass. Seal glass between individual glass channels.
- D. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- F. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

8-55.3(3) TOLERANCES

- A. Maximum Variation from Plumb and Level:
 - 1. Vertical: 1/8 inch in 10 feet (3 mm in 3000 mm).
 - 2. Horizontal: 1/8 inch in 20 feet (3 mm in 6000 mm).

8-55.3(4) FIELD QUALITY CONTROL

- A. Provide services of channel glass storefront manufacturer's field representative to observe for proper installation of system and submit report.
- B. Water-Spray Test: Provide water spray quality test of installed channel glass storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.

1. Perform a minimum of two tests in each designated area as indicated on drawings.
 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
- C. Repair or replace channel glass components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

8-55.3(5) CLEANING

- A. Clean as recommended in writing by manufacturer, and do not use materials or methods that will damage finish or adjacent construction.

8-55.3(6) PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

8-55.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-55.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-56 DOOR HARDWARE (SP 12-19-19)

8-56.1 GENERAL

- A. Specification Section based on CSI Specification Section 08 71 00 Door Hardware

8-56.1(1) SECTION INCLUDES

- A. Hardware for hollow steel doors.
- B. Hardware for metal gates.
- C. Electrically operated and controlled hardware.
- D. Thresholds.
- E. Weatherstripping, seals and door gaskets.

8-56.1(2) REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.
- C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2017.
- D. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- E. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- F. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2016.
- G. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- H. BHMA A156.18 - American National Standard for Materials and Finishes; 2016.
- I. BHMA A156.21 - American National Standard for Thresholds; 2014.

- J. BHMA A156.23 - American National Standard for Electromagnetic Locks; 2010.
- K. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- L. UL (DIR) - Online Certifications Directory; Current Edition.

8-56.1(3) ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Convey Owner's keying requirements to manufacturers.
- D. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by all affected installers.

8-56.1(4) SUBMITTALS

- A. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
- B. Keying Schedule: Submit for approval of Owner.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- F. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- G. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- H. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. Tools: One set of all special wrenches or tools applicable to each different or special hardware component, whether supplied by the hardware component manufacturer or not.

8-56.1(5) DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

8-56.2 PRODUCTS

8-56.2(1) DOOR HARDWARE - GENERAL

- A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide all items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
 - 1. Applicable provisions of federal, state, and local codes.

2. Fire-Rated Doors: NFPA 80.
3. All Hardware on Fire-Rated Doors : Listed and classified by UL as suitable for the purpose specified and indicated.
4. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- D. Function: Lock and latch function numbers and descriptions of manufactures series as listed in hardware schedule.
- E. Electrically Operated and/or Controlled Hardware: Provide all power supplies, power transfer hinges, relays, and interfaces required for proper operation; provide wiring between hardware and control components and to building power connection.
- F. Finishes: All door hardware the same finish unless otherwise indicated.
 1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 2. Finish Definitions: BHMA A156.18.
 3. Exceptions:
 - a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
- G. Fasteners:
 1. Concrete and Masonry Substrates: Stainless steel machine screws and lead expansion shields.

8-56.2(2) HINGES

- A. Hinges: Provide hinges on every swinging door.
 1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 2. Provide hinges in the quantities indicated.
 3. Provide non-removable pins on exterior outswinging doors.
 4. Provide continuous hinge at metal gate.
 5. Where electrified hardware is mounted in door leaf, provide power transfer hinges.
- B. Butt Hinges: Comply with BHMA A156.1 and A156.7; heavy weight, unless otherwise indicated.
- C. Quantity of Hinges Per Door:
 1. Doors 90 inches (2.3 m) High up to 120 inches (3 m) High: Four hinges.
 2. Security Screen Gate: Single 8'-0" long continuous stainless steel hinge.
- D. Manufacturers - Hinges:
 1. Assa Abloy McKinney: www.assaabloydss.com/#sle.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Stanley Black & Decker: www.stanleyblackanddecker.com/#sle.

8-56.2(3) LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
 1. Hardware Sets indicate locking functions required for each door.

2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
1. Provide cams and/or tailpieces as required for locking devices required.
- C. Keying: Grand master keyed.
- D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".
- E. Security Screen Gate Deadbolt: Provide ANSI A156.36, grade 1 double cylinder bored deadbolt lock. Schlage B662P deadbolt lock, with 619 satin nickel finish or approved equal.

8-56.2(4) CYLINDRICAL LOCKSETS

- A. Locking Functions: As defined in BHMA A156.2, and as follows:
1. Exit Only: F89, may not be left unlocked.
- B. Manufacturers - Cylindrical Locksets:
1. Assa Abloy Corbin Russwin, Sargent, or Yale: www.assaabloydss.com/#sle.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Schlage, an Allegion brand: www.allegion.com/us.
 4. Or approved equal.

8-56.2(5) EXIT DEVICES

- A. Locking Functions: Functions as defined in BHMA A156.3, and as follows:
1. Entry/Exit, Always-Locked: Key outside retracts latchbolt but does not unlock lever, no latch holdback.
- B. Manufacturers:
1. Assa Abloy Corbin Russwin, Sargent, or Yale: www.assaabloydss.com/#sle.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Von Duprin, an Allegion brand: www.allegion.com/us.
 4. Or approved equal.

8-56.2(6) CLOSERS

- A. Closers: Complying with BHMA A156.4.
1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
 2. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
 3. At outswinging exterior doors, mount closer in inside of door.
- B. Manufacturers - Closers:
1. Assa Abloy Corbin Russwin, Norton, Rixson, Sargent, or Yale: www.assaabloydss.com/#sle.
 2. Hager Companies: www.hagerco.com/#sle.

3. LCN, an Allegion brand: www.allegion.com/us.

8-56.2(7) THRESHOLDS

- A. Thresholds:
 1. At each exterior door, provide a threshold unless otherwise indicated.
 2. Field cut threshold to frame for tight fit.
- B. Fasteners At Exterior Locations: Non-corroding.
- C. Manufacturers - Thresholds:
 1. Assa Abloy McKinney: www.assaabloydss.com/#sle.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Pemko Manufacturing Co: www.pemko.com/#sle.

8-56.2(8) KEY CONTROLS

- A. Fire Department Lock Box: Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
 1. Capacity: Holds 10 keys.
 2. Finish: Manufacturer's standard dark bronze.
 3. Products:
 - a. Knox Company; Knox-Box Rapid Entry System: www.knoxbox.com/#sle.

8-56.3 EXECUTION

8-56.3(1) EXAMINATION

- A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of the correct characteristics.

8-56.3(2) INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- D. Mounting heights for hardware from finished floor to center line of hardware item: As listed in Schedule, unless otherwise noted:

8-56.3(3) ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

8-56.3(4) CLEANING

- A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

8-56.3(5) PROTECTION

- A. Do not permit adjacent work to damage hardware or finish.

8-56.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-56.5 PAYMENT

- A. Refer to Section 8-42.5.

Add 3-B

Add the following Section to Division 8:

Delete the entire Section.

8-57 GLAZING (SP 12-19-19)

8-57.1 GENERAL

- A. Specification Section based on CSI Specification Section 08 80 00 Glazing

8-57.1(1) SECTION INCLUDES

- A. Translucent Exterior Linear Glass Wall Assemblies.
- B. Glazing compounds and accessories.

8-57.1(2) REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- D. GANA (GM) - GANA Glazing Manual; 2008.
- E. GANA (SM) - GANA Sealant Manual; 2008.
- F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SGCC – Safety Glazing Certification Council

8-57.1(3) ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

8-57.1(4) SUBMITTALS

- A. Product Data on Translucent Exterior Linear Glass Wall Assemblies: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- B. Shop Drawings: Submit plan view, elevation details, connection details, and installation details including interface with adjacent construction. Drawings will identify all gaskets, tapes, sealants, fasteners, shims, hardware and accessories used to install the system. They will clearly identify adjacent materials completely and label these materials as “by others”.
- C. Samples: Submit the following:

1. Glass: Submit two samples 24 inch (304.8 x 304.8 mm) in full-width size of glass units, showing, texture, coloration and design.
2. Frame: Submit one 15 inch (200mm) section of each frame element.
3. Components: submit samples of all glazing accessories (tapes, shims, gaskets, sealants, screws, etc.).

D. Certificates: Certify that products meet or exceed specified requirements.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Insulating Glass Units: One of each glass size and each glass type

8-57.1(5) QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

8-57.1(6) MOCK-UP

- A. Provide 3-panel mock-up of Exterior Linear Glass Wall Assembly including glass, wind clips, framing channels, and sealant.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

8-57.1(7) FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F (10 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

8-57.1(8) WARRANTY

- A. Exterior Linear Glass Wall Assembly: Provide a fifteen (15) year warranty to include coverage for breakage, coating failure, abrasion resistance, including replacement of failed units.

8-57.2 PRODUCTS

8-57.2(1) TRANSLUCENT EXTERIOR LINEAR GLASS WALL ASSEMBLIES

- A. Acceptable Products and Manufacturers:
 1. Lamberts LINIT channel glass by Glasfabrik Lamberts.
 2. Bendheim LINIT Frame System by Bendheim Wall Systems Inc.
 3. Substitutions: Refer to Section 1-06.
- B. Translucent Linear Glass: Translucent, channel shaped linear glass unit. ASTM C 1036, Type 2, Class 1, Quality q3 finish F1, cast or rolled glass, channel shape, surface texture as specified herein.
- C. Basic System: Aluminum frame with tempered, laminated,, translucent, vertical linear glass with 2-3/8 inch (60mm) deep channel flange.
 1. Stainless Steel Wire: .45mm +/- 0.05mm diameter, category Nr 1.4016, in accordance with DIN 17 440: X 6 Cr 17.

2. Aluminum: ASTM B 221, alloy 6063-T5 for extrusions; ASTM B 209, alloy 5005-H14 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified fabrication and/or finish.
3. Thermal Break: Poured and debridged Azon SU-311 polyurethane resin [or equal] with Azo braded aluminum frame.
4. Vinyl: In accordance with AAMA 303-01 external grade unplasticized PVC, testing at least 150 degrees.

8-57.2(2) COMPONENTS

- A. Translucent Linear Glass Units:
 1. Bendheim Wall Systems' Lamberts LINIT channel glass (P23/60/7).
- B. Surface Texture of glass to be [504 Rough Cast] [Klar/Clarissimo] [Piccolo] [Ice] [Solar] [Prismasolar].
 1. Surface Texture of glass to be [504 Rough Cast] [Klar/Clarissimo] [Piccolo] [Ice] [Solar] [Prismasolar].
 2. Tempered & laminated glass (all glass) to be SGCC certified to ANSI Z 97.1, 16 CFR 1201 category II, as required by ASME A17.1 including markings in the applicable standard must be on each separate piece of glass and must remain visible after installation
- C. Framing:
 1. Aluminum: Extruded units per the profiles shown or as required to suit conditions indicated.
 - a. Minimum wall thickness of 0.125 inch (3.18mm) for framing members and rails, 0.090inch (2.3 mm) for sheets.

8-57.2(3) ACCESSORIES

- A. Anchorage Devices: Standard fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
 1. Hot-dip galvanized steel assemblies after fabrication, ASTM A123, 2.0 ounce (0.05kg) minimum coating.
- B. Fasteners: Non-magnetic stainless steel or other Engineer approved non-corrosive materials compatible with items being fastened.
 1. Provide concealed fasteners wherever possible.
 2. Exposed locations: Stainless steel screws with approved finish.
 3. Concealed locations: Stainless steel or approved fasteners in accordance with approved engineering calculations.
- C. Expansion/Chemical Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt, or chemical/epoxy set anchors.
- D. Protective Coatings: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 30 mil (0.76 mm) thickness for each coat; or alkyd type zinc chromate primer, FS TT-P-645.
- E. Perimeter Joint Sealant and Backer Rod: Silicone-Glazing.
 1. Color: translucent [or manufacturer's standard color as selected by Engineer]
 2. Sealant Backing, Bond Breaker Rod and Tape: Closed cell unless otherwise required by sealant manufacturer. Translucent backer rod to be used if requested by the Engineer

8-57.3 EXECUTION

8-57.3(1) EXAMINATION

- A. Verification of Conditions: Do not commence work until field conditions conform adequately to architectural drawings.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

8-57.3(2) PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Prime surfaces scheduled to receive sealant.

8-57.3(3) INSTALLATION

- A. Install units in accordance with approved Shop Drawings, plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces.
- B. Erect framing, vinyl spacer, and glass in accordance with manufacturer's printed installation instructions. Clean glass immediately before installing. Protect or seal all installed glass units daily on both sides of glass, between frame and glass, and between linear glass units to prevent infiltration of airborne debris.
- C. Perimeter Joint Sealant: Ensure compatibility of joint components and adhesion of perimeter joint sealant to surfaces that receive sealant.
- D. Erection Tolerances – Framing Members:
 - 1. Limit variations of jambs from plumb and horizontal frame members from level:
 - a. 1/8 inch in 12 feet (3 mm in 3000 mm) vertically.
 - b. 1/8 inch in 20 feet (3 mm in 6000 mm) horizontally.
 - 2. Limit variations from Theoretical Locations: 1/4 inch (6 mm) for any member at any location.
 - 3. Limit Offsets in End-To-End and Edge-To-Edge Alignment: 1/32 inch (0.8 mm) maximum out of plane offset for horizontal and vertical glazing legs of framing members designed to be in the same plane.

8-57.3(4) CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces as recommended by manufacturer. Do not use materials or methods which may damage system components or surrounding construction.

8-57.3(5) PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.
- B. Protect finished surfaces from damage.

8-57.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-57.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-58 GYPSUM BOARD ASSEMBLIES (SP 12-19-19)

8-58.1 GENERAL

- A. Specification Section based on CSI Specification Section 09 21 16 Gypsum Board Assemblies

8-58.1(1) SECTION INCLUDES

- A. Gypsum sheathing.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.

8-58.1(2) RELATED REQUIREMENTS

- A. Section 8-48: Water-resistive barrier over sheathing.

8-58.1(3) REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2018b.
- C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- E. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- G. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2018.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- J. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
- K. GA-600 - Fire Resistance Design Manual; 2015.
- L. UL (FRD) - Fire Resistance Directory; Current Edition.

8-58.1(4) SUBMITTALS

- A. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

8-58.2 PRODUCTS

8-58.2(1) BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at all locations.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm).
 - b. Ceilings: 5/8 inch (16 mm).
- B. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 - 1. Application: Exterior sheathing, unless otherwise indicated.
 - 2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 4. Core Type: Regular and Type X, as indicated.
 - 5. Type X Thickness: 5/8 inch (16 mm).
 - 6. Edges: Square.

8-58.2(2) GYPSUM WALLBOARD ACCESSORIES

- A. Water-Resistive Barrier: As specified in Section 8-48.
- B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Joint Compound: Drying type, vinyl-based, ready-mixed.
- C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

8-58.3 EXECUTION

8-58.3(1) EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

8-58.3(2) BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- C. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.

1. Seal joints, cut edges, and holes with water-resistant sealant.

8-58.3(3) INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

8-58.3(4) JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).

8-58.3(5) TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

8-58.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-58.5 PAYMENT

- A. Refer to Section 8-43.5

Add the following Section to Division 8:

8-59 PAINTING AND COATING (SP 12-19-19)

8-59.1 GENERAL

- A. Specification Section based on CSI Specification Section 09 90 00 Paintings And Coating

8-59.1(1) SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including but not limited to entire interior of elevator hoistway enclosure, and the following:
 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 2. Elevator pit ladders.
 3. Exposed surfaces of steel lintels and ledge angles.
 4. Exposed surfaces of hollow metal doors, frames, and louvers.
 5. Mechanical and Electrical:

- a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. On the roof and outdoors, paint all equipment that is exposed to weather or to view, including that which is factory-finished.
 - d. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - e. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- D. Do Not Paint or Finish the Following Items:
1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 2. Items indicated to receive other finishes.
 3. Items indicated to remain unfinished.
 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 5. Floors, unless specifically so indicated.
 6. Glass.
 7. Concealed pipes, ducts, and conduits.

8-59.1(2) REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2016.
- C. GreenSeal GS-11 - Paints, Coatings, Stains, and Sealers; 2015.
- D. Architectural Painting Specification Manual, current edition, published by The Master Painters Institute (MPI) and the Master Painters & Decorators Association, 4090 Graveley Street, Burnaby, B.C. V5C 3T6. Phone (604) 298-3775 or 1 (888) 674-8937.
 1. The Architectural Painting Specification Manual must hereafter be referred to as the MPI Manual.
- E. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

8-59.1(3) SUBMITTALS

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 2. MPI product number (e.g. MPI #47).
 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

- B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
- C. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided must constitute acceptable certification.
- D. Maintenance Data: Submit data including care and cleaning instructions, touch-up procedures, and repair of painted and coated surfaces.

8-59.1(4) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 5 years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience.

8-59.1(5) DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

8-59.1(6) FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

8-59.2 PRODUCTS

8-59.2(1) MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

8-59.2(2) PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of the State of Washington.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Colors: As indicated on drawings
 - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

8-59.2(3) PAINT SYSTEMS - EXTERIOR

- A. Paint WE-OP-3A - Wood, Opaque, Latex, 3 Coat:
 - 1. One coat of Exterior alkyd Primer, Product No. 5.
 - 2. Semi-gloss: Two coats of Exterior Latex Semi-Gloss, Product No. 11.
- B. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
 - 1. One coat of Alkyd Rust-Inhibitive Metal Primer, Product No. 79.
 - 2. Gloss: Two coats of Exterior Alkyd Gloss Enamel, Product No. 9.
- C. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Gloss: Two coats of alkyd enamel; ____ Exterior Alkyd Gloss Enamel, Product No. 9.
- D. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
 - 1. One coat Cementitious Galvanized Metal Primer, Product No. 26.
 - 2. Gloss: Two coats of Exterior Alkyd Gloss Enamel, Product No. 9.

8-59.2(4) ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

8-59.3 EXECUTION

8-59.3(1) EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

- C. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 - 2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

8-59.3(2) PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- G. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- H. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- I. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- J. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

8-59.3(3) APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.

- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

8-59.3(4) CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

8-59.3(5) PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

8-59.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-59.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-60 HIGH PERFORMANCE COATINGS (SP 12-19-19)

8-60.1 GENERAL

- A. Specification Section based on CSI Specification Section 09 96 00 High Performance Coatings

8-60.1(1) SUMMARY

- A. This Section includes specifications for furnishing and applying high performance coating systems in the shop and field on certain items and types of work, as Scheduled; including surface preparation, primer coats, intermediate coats, finish coats, field touch-up, and related thinners and associated materials.
- B. The specifications below pertain to all steelwork associated with the elevator tower and auxiliary space except stainless steel components.

8-60.1(2) RELATED SECTIONS

- A. Section 8-40 Structural Steel Framing.

8-60.1(4) REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents:
 - 1. American Architectural Manufacturers Association (AAMA)
 - a. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
 - 2. American Society for Testing and Materials International (ASTM)
 - a. ASTM D523 – Standard Test Method for Specular Gloss

- b. ASTM D822 – Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
 - c. ASTM D968 – Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
 - d. ASTM D2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
 - e. ASTM D3359 – Standard Test Methods for Rating Adhesion by Tape Test
 - f. ASTM D3361 – Standard Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
 - g. ASTM D3363 – Standard Test Method for Film Hardness by Pencil Test
 - h. ASTM D4138 – Standard Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means
 - i. ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness by Notch Gages
 - j. ASTM D4417 – Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
 - k. ASTM D4940 – Standard Test Method for Conductimetric Analysis of Water-Soluble Ionic Contamination of Blast Cleaning Abrasives
 - l. ASTM D5894 – Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
- 3. MPI - Master Painters Institute Architectural Painting Specification Manual
 - 4. NAAMM (National Association of Architectural Metal Manufacturers) "Metal Finishes Manual for Architectural Metal Products"
 - 5. Society for Protective Coatings (SSPC) – SSPC Steel Structures Painting Manual

8-60.1(6) SUBMITTALS

- A. Submit complete high-performance coating system submittals for all iron and steel work prior to or in conjunction with the steel shop drawings to assure compatibility between steel shop primer and intermediate and finish high performance coatings.
- B. Product Data: Provide data indicating coating materials, standard color selections, performance test data and MSDS information.
- C. Samples: Submit four samples of each type of coating, each 8 inches x 10 inches in size illustrating colors, gloss and finishes selected.
- D. Manufacturer's Installation Instructions: Indicate special surface preparation procedures and perimeter conditions requiring special attention.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 1. Certification by manufacturer that all paints and coatings comply with VOC limits specified.
 - 2. Certification by manufacturer that all coatings do not contain any of the prohibited chemical specified; GreenSeal GS-11 must constitute acceptable certification.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- G. Applicators Quality Control procedures for shop and field painting and coating.

- H. Qualification Data: Include names and qualifications of manufacturers and applicators for all coating systems.
1. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
 2. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience, and acceptable to the manufacturer for all coating systems.

8-60.1(7) WARRANTY

- A. The warranty for each coating system must be countersigned by both the coatings manufacturer for materials, and by the applicator for workmanship.
- B. Correct Defective Work within a five-year period after Date of Substantial Completion.
- C. Warranty: Include coverage for bond to substrate.

8-60.2 PRODUCTS

8-60.2(1) MANUFACTURERS

- A. Subject to compliance with requirements, provide coating system by one of the following manufacturers:
 1. Sherwin Williams
 2. Wasser High-Tech Coatings
 3. ICI DeVoe
 4. International Paint
 5. Or approved alternative.

8-60.2(2) MATERIALS

- A. General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated. Number of coats specified does not include primer or filler coats.
- B. Maximum volatile organic compound (VOC) content: As limited by applicable regulations.
- C. Colors: As indicated in the Contract Documents.
- D. Sheen: Finish coats, where exposed to public view, must have semi-gloss sheen.
- E. Coatings: Numbers of Coats listed are minimums. Apply coats as required to achieve specified dry film thicknesses (dft).
- F. High-Performance Coating (HPC) for Exposed Primed Structural Steel:
 1. Type of coating system:
 - a. Prime coat: Zinc Rich Urethane Primer
 - b. Intermediate coat: High Build Epoxy
 - c. Finish coat: Aliphatic Acrylic Polyurethane
 2. Surface Preparation: SSPC-SP-10
 3. Minimum coats: 3

4. Primer Dry Film Thickness: 3 mils
5. Intermediate Dry Film Thickness: 4 mils
6. Finish Dry Film Thickness: 4 mils
7. Total Dry Film Thickness: 11-15 mils
8. Approved coating systems:
 - a. Prime coat:
 - (vii) Sherwin Williams Corothane 1 GalvaPac Zinc Primer
 - (viii) Wasser High-Tech Coatings MC - Zinc 2.8
 - (ix) DeVoe Cathacoat 313
 - (x) Tnemec Series 90-97 Tneme-Zinc
 - b. Intermediate coat:
 - (i) Sherwin Williams Corothane 1 IronOx B
 - (ii) Wasser High-Tech Coatings MC - Ferroxx B 2.8
 - (iii) DeVoe Devran 261QC
 - (iv) Tnemec Series N69 Hi-Build Epoxoline II
 - c. Finish coat:
 - (i) Sherwin Williams Corothane 1 HS Aliphatic Finish Coat
 - (ii) Wasser High-Tech Coatings MC - Luster 2.8
 - (iii) DeVoe Devthane 349QC
 - (iv) Tnemec Endura-Shield Series 750

8-60.3 EXECUTION

8-60.3(1) EXAMINATION

- A. Substrates to receive coatings must be sound, proper, and free of defects.
 1. Surface preparation and coating application facilities must be inspected and meet performance requirements of specification prior to proceeding.
 2. On a daily basis, submit quality control records detailing the work completed, surface preparation methods, ambient air temperature, relative humidity, structure surface temperature and dew point, coatings used with batch numbers, coating thickness, application method, etc.
 3. Conditions that would interfere with performance of coating system must be reported to Engineer in writing and corrected before continuing with specified work.
- B. Examine substrates and conditions, with Applicator present, for compliance with requirements affecting performance of the Work.
 1. Inspect substrates before shipment from fabricator's facilities to ensure that steel has been properly prepared to receive abrasive blast cleaning at the coating applicator's facility.
- C. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

8-60.3(2) PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If not removable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Ferrous Metal:
 - 1. Solvent clean.
 - 2. Remove loose rust, loose mill scale, and other foreign substances hand tools according to SSPC-SP 2 or power tools according to SSPC-SP 3.
 - 3. Protect adjacent surfaces and materials not receiving coating from overspray; if necessary, mask to provide adequate protection. Repair damage.

8-60.3(3) APPLICATION

- A. During application of each coating, remove all foreign material from applicators (brush, rollers or pads) and protect wet surfaces from contamination of air borne dust and debris.
- B. Priming:
 - 1. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.
 - 2. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.
- C. Intermediate Coats:
 - 1. Repair, and recoat any blisters, runs or sags in primer coat prior to application of intermediate coats.
 - 2. Intermediate coats must fully cover and hide primer coat.
- D. Finish Coats:
 - 1. Repair, and recoat any blisters, runs or sags in primer coat prior to application of finish coats.
 - 2. Finish coats must fully cover and hide intermediate coat. Prior to start of work, confirm to the Engineer, proposed number of finish coats will result in specified dry film thickness requirements.

8-60.3(4) REPAIR AND TOUCH-UP WORK

- A. Coats of paint that have peeled off, bubbled, cracked, failed an adhesion test conducted generally in accordance with ASTM D3359 or where visible (rust grade 10 per ASTM D610), must be considered a failure of the paint system.
- B. Repairs: Clean area back to bare clean substrate, and re-coat with specified coating system as specified.
- C. Repairs must be made at the expense of the Contractor.
- D. Repair of Pitted Surface & Weld Seams:

1. Mustow pits less than 3 mm (1/8 inch) deep, must be filled flush with the plate surface with approved surfer.
2. Clean pit repaired areas by power disc to SSPC-SP11. After power discing, the surface must have a roughened profile and definitely not be polished. Feather adjacent coated areas and roughen by power or hand sanding.
3. Welds and weld seams must be mechanically ground flush, abrasive blast per specification and then stripe coated with specified primer.

E. Field Touch-ups and Repairs:

1. At the completion of the work, remove from site tools, appliances, construction equipment and machinery, and surplus materials. Restore to original condition property not designated for alteration by contract documents. This includes, but is not limited to, surfaces inadvertently painted such as glass, masonry, etc.
2. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
3. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
4. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, and leave in an undamaged condition.
5. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

8-60.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-60.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-61 SIGNAGE (SP 12-19-19)

8-61.1 GENERAL

- A. Specification Section based on CSI Specification Section 10 14 00 Signage

8-61.1(1) SECTION INCLUDES

- A. Cash allowance for signs.
- B. Room and door signs.
- C. Elevator identification and operation signs.
- D. Plaque.

8-61.1(2) REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

8-61.1(3) SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When content of signs is indicated to be determined later, request such information from Owner through Engineer at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 2. Submit for approval by Owner through Engineer prior to fabrication.
- C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- D. Verification Samples: Submit samples showing colors specified.
- E. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

8-61.1(4) QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

8-61.1(5) DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

8-61.1(6) FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

8-61.2 PRODUCTS

8-61.2(1) SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and Seattle Building Code, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
 - 3. Character Height: 1 inch (25 mm).
 - 4. Sign Height: 2 inches (50 mm), unless otherwise indicated.

5. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.

8-61.2(2) SIGN TYPES

- A. Flat Signs: Signage media without frame.
 1. Edges: Square.
 2. Corners: Square.
 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 4. Character Font: Helvetica, Arial, or other sans serif font.
 5. Character Case: Upper case only.
 6. Background Color: Clear.
 7. Character Color: Contrasting color.

8-61.2(3) TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Stainless steel; engraved through face with engraving painted black:
 1. Total Thickness: 1/16 inch (1.6 mm).

8-61.2(4) PLAQUES

- A. Metal Plaques:
 1. Metal: Stainless steel.
 2. Metal Thickness: 1/16 inch (1.6 mm), minimum.

8-61.3 EXECUTION

8-61.3(1) EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

8-61.3(2) INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
 1. Building and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches (1525 mm) above finished floor.
 2. If no location is indicated obtain Owner's instructions.
- D. Protect from damage until Substantial Completion; repair or replace damaged items.

8-61.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-61.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-63 HYDRAULIC ELEVATORS (SP 12-19-19)

8-63.1 GENERAL

- A. Specification Section based on CSI Specification Section 14 24 00 Hydraulic Elevators

8-63.1(1) SCOPE

- A. Contractor must provide all services and materials to furnish and install one twin jack holeless hydraulic passenger elevators, as described by the contract documents.
1. Cartage and Hoisting: All required staging, hoisting and movement to, on, and from the site including new equipment, or dismantling and removal of existing equipment must be included.
- B. Reference Standards
1. ANSI A117.1 (2009), Accessible and usable Buildings
 2. ASME A17.1, Safety Code for Elevators and Escalators with applicable Washington amendments (WAC 296-96)
 3. ASME A17.2, Guide for Inspection of Elevators, Escalators and Moving Walks
 4. ASME A17.5, Elevator and Escalator electrical equipment
 5. ASME A17.6, Standard for elevator Suspension, and Compensation Means
 6. ADA (2010) Americans with Disabilities Act Standards for Accessible Design, and all state and local codes.
 7. NFPA 70, National Electric Code
 8. NFPA 72, National Fire Alarm and Signaling Code
 9. Codes, Ordinances and Laws applicable within the governing jurisdiction (City of Seattle; SBC, SMC, SFC, etc).
 10. ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
 11. ASTM A366, Standard Specification for Commercial Steel (CS) Sheet, Carbon (0.15 maximum percent) Cold Rolled
 12. AWS, American Welding Society
- C. Permits and codes
1. All equipment and installation work must comply with requirements of the Elevator Safety Code, and other applicable codes of the State of Washington, and local Jurisdiction.
 2. Give necessary notices, obtain licenses and permits, and pay fees and other costs, including making arrangements for all inspections and tests required by regulating agencies.
 3. File necessary plans, prepare documents, and obtain necessary approval of governmental departments having jurisdiction and required certificates of inspection for work and deliver these to the Engineer before requesting acceptance and final payment for work.
 4. Contractor is not relieved from furnishing and installing work shown or specified which may be beyond requirements of ordinances, laws, regulations and codes.
- D. General contractor must provide the following in accordance with the requirements of the ASME A17.1 and Building Code. State or local requirements must be used if more stringent.

1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
2. Supply in ample time for installation by other trades inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
4. Elevator hoistways must have barricades, as required.
5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" except for loading or unloading.
6. Provide rail bracket supports at pit, each floor and roof.
7. Pit floor must be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 48" minimum must be provided at the same height, above sill of access door or handgrips.
9. Machine room to be enclosed and protected.
10. Machine Room temperature must be maintained between 55° and 90° F.
11. Access to the machinery space and machine room must be in accordance with the governing authority or code.
12. Provide an 10" x 10" cutout through machine room wall, for oil line and wiring duct, coordinated with elevator contractor at the building site.
13. All wire and conduit should run remote from either the hoistway or the machine room.
14. When heat, smoke or combustion sensing devices are required, connect to elevator machine room terminals. Contacts on the sensors should be sided for 120 volt D.C. Coordinate terminal landing points with Contractor designed fire detection and alarm system – see Section 8-71.
15. Install and furnish finished flooring in elevator cab.
16. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor must supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
17. Where sheet rock or drywall construction is used for front walls, it must be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
18. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
19. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
20. The elevator wall must interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
21. General Contractor must fill and grout around entrances, as required.
22. Elevator sill supports must be provided at each opening.

23. All walls and sill supports must be plumb where openings occur.
24. Locate a light fixture and convenience outlet in pit with switch located adjacent to the access door.
25. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).
26. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway (or in the machine room).
27. For signal systems and power operated door: provide ground and branch wiring circuits, including main line switch. For car light and fan: provide a feeder and branch wiring circuits, including main line switch.
28. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.
29. Provide supports, patching and recesses to accommodate hall button boxes, signal fixtures, etc.
30. Locate telephone and convenience outlet on control panel.

8-63.1(2) CONSTRUCTION REQUIREMENTS

- A. Drawings are partly schematic in nature and do not attempt to show exact details.
 1. The Contractor must carefully check space requirements to ensure that equipment being provided can be installed in the spaces allotted.
 2. Differences between actual measurements and scaled measurements or stationing, must not affect the bid price or add any additional cost to the owner after the bid.
- B. Operate Elevator:
 1. Elevator Contractor must operate elevator for other Trades/Crafts that must work in the hoistway to perform their work at no additional cost to Owner.
- C. Cutting and patching:
 1. Any provision required to facilitate the installation of the elevator equipment must be the responsibility of Elevator Contractor.
 2. Openings required in the hoistway must be completed by drilling or cutting. Elevator Contractor must provide all pipe sleeves, anchor plates, hanger supports, inserts, and bolts required for their work.
- D. Standard products: Unless otherwise indicated, the equipment to be furnished under these specifications must be the standard products of manufacturers regularly engaged in its production.
 1. Apparatus, equipment and systems furnished must be similar and equal with respect to quality, functional performance, capacity and efficiency.
 2. Where the actual equipment furnished requires certain changes in pipe location, controls, electrical equipment and foundations, the Contractor must coordinate such changes and submit them for approval.

8.63.1(3) SUBMITTALS

- A. Submit shop drawings for approval. Drawings must contain enough detailed information to determine that the equipment conforms to the requirements of this specification and not less than the following information:
 - 1. Elevator diagrams showing service to each level of building
 - 2. Show location of machinery and controls in machine rooms, layout of the hoistway in plan and elevation and all other layout information and clearance dimensions required by the Elevator Safety Code.
 - 3. Arrange the elevator equipment in a neat and workman-like manner so that all valves, fittings, etc. are readily accessible.
 - 4. Submit layout drawings as required by the Elevator Safety Code to the authority having jurisdiction (AHJ).
 - 5. Submittals to the AHJ must have all information pertinent to the installation to determine whether the installation complies with all applicable codes.
 - 6. Provide shop drawings and catalog cuts for all contractor-furnished material and equipment, including, but not limited to, doors, frames, car enclosure, car frame, car and hall fixtures, controls, motors, guide rails, and brackets. Motor data must include temperature rise ratings in a form that can readily be measured in the field after installation.
 - 7. Coordination information including rail, buffer and jack reactions; and data as specified in the Elevator Safety Code
 - 8. Complete information on motor, electrical services, controls, and all other coordination information.
- B. Wiring diagrams: Provide complete and legible wiring and single line diagrams showing the electrical connections, functions, and sequence of operation of all apparatus connected with the elevators, both in the machine room and in the hoistway.

6-63.1(4) OPERATIONS AND MAINTENANCE MANUALS

- A. Furnish an operation and maintenance manual covering the stipulated mechanical systems and equipment. Remove system types not used. The manual must comply with all requirements indicated in the Project Closeout section of the specifications. Furnish one complete draft manual for Owner review not later than two weeks after issue of the permanent state operating certificate.
- B. The manual must be complete in all respects for all equipment, controls, accessories and appurtenances stipulated. Include as a minimum the following:
 - 1. Drawing or diagram showing equipment location
 - 2. The original factory Adjuster's Manual used to adjust the specific installation (including "as-adjusted" field notes)
 - 3. Step-by-step procedure for start-up, operation and shutdown
 - 4. Maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides for all elevator equipment, including brakes and door equipment. Include oil flow schematic diagrams and adjusting instructions for hydraulic valves and pumps. Include cross section of seals and retainer and procedures for packing hydraulic jack(s). Provide specification for hydraulic oil.
 - 5. Preventative maintenance schedule
 - 6. Lubrication schedule including type, grade, temperature, range and frequency
 - 7. Safety precautions, including diagrams and illustrations as needed for clarity

8. Test procedures
9. Parts list, with manufacturers' names and catalog numbers. Lists must be complete for the materials installed.
10. Serial number of each major piece of equipment
11. Service organizations and sources of spare parts with names, addresses, and telephone numbers
12. Provide all service and field technical bulletins or manuals normally supplied to the factory Adjuster.

8-63.1(5) MATERIAL AND EQUIPMENT

- A. General: Material and equipment must be new, of the best quality used for the purposes in good commercial practice, the best of their respective kinds, and as specified.
 1. Equipment must be standard products of reputable manufacturers with minimum of ten (10) years of experience in the manufacture of elevator equipment.
 2. Furnish equipment complete with all parts necessary for proper operation. Material and equipment must be cleaned, free of corrosion, and selected to provide quiet operation.
 3. Where two or more units of the same class of equipment are required, those units must be products of a single manufacturer.
- B. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.
- C. Delivery and Storage: Material and equipment must be suitably protected against corrosion, dirt, mechanical damage, weather and chemical damage before and during installation as recommended by the manufacturer and as approved by the Elevator Consultant.
 1. Replace defective and damaged equipment and materials at no additional cost to the owner.

8-63.1(6) ELEVATOR-ELECTRICAL

- A. Provide electrical components of the elevator equipment and systems, including motors, motor starters, controllers, control instruments, switches, conduit, wire, and relays under this Section as specified in this section and as necessary for complete and operable systems. Furnish interconnecting wiring for components of equipment as an integral part of the equipment. Interconnecting conduit and wiring connecting such assemblies must conform with Section 8-33.
- B. Electrical equipment and wiring must conform to applicable paragraphs of Electrical Specifications and National Electrical Code current edition.
- C. For equipment with electrical components, provide UL or equivalent label on each component for which published standards exist.
- D. The frames of all motors, hoist machine, controller, transformer and the metal enclosures for all electrical equipment in or on the car, hoistway and machine room must be grounded in accordance with NFPA 70-Article 250.
- E. Provide "daisy chain" electrical grounding for all machine room electrical cabinets.
- F. Provide required and adequate electrical wiring gauge sizing and number of electrical conductors to eliminate any voltage/ampereage drop/variation for all the machine room, hoistway switches/interlocks, car operating fixtures/positions indicators/exhaust fan/car lighting/inspection station/leveling devices, hall stations/position indicators and all other elevator electrical equipment.

G. Conductors and Connections:

1. Provide new wiring in machine room, hoistway and car. Wiring must be copper throughout with individual wires coded and connections on identified studs or terminal blocks.
2. Use no splices or similar connections in wiring except at terminal blocks, control cabinets, and junction boxes.
3. Provide 20% spare wires in all wiring runs. Separate and mark all spare wires. All spare wire ends must be turned back or protected against accidental exposure to any live electrical circuit or electrical ground.
4. Provide material and labor to connect machine room telephone wires to elevator controller. Owner must provide telephone wires to the elevator machine room in a 6" x 6" electrical box adjacent to the elevator controller.

H. Wireways and raceways:

1. Provide new painted or galvanized steel conduit and duct. Conduit size, one-half (1/2") minimum. Do not use flexible conduit exceeding thirty-six inches (36") in length.
2. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protection devices. Plastic wire ties must not be allowed for conduit fastening.

8-63.1(7) PAINTING

- A. All exposed metal work furnished in these specifications, except as otherwise specified, must be properly painted after installation.
- B. Paint hoist machine, controller and other machine room equipment with a contrasting color to the machine room floor. Pinch points, Guards around rotating equipment, trip hazards, etc. must be painted in Safety Yellow. (OSHA reg. 1910.144 (a)(3). If the equipment has been painted in the factory then only provide same type of paint for touch up whereby possible scratches occurred during shipment and installation, unless the original color does not contrast with Light Gray.
- C. Paint machine room and pit floor with light gray enamel.
- D. Paint all exposed metal surfaces in the elevator pit with light gray enamel with exception to the areas and or devices in the pit area which should be Safety yellow.

8-63.1(8) MAINTENANCE

- A. Provide maintenance service of the equipment for a period of twelve months after issue of the permanent state operating certificate.
 1. This service must include regular systematic examinations(minimum one hour per month) of the installation by competent and trained employees of this Contractor; and must include all necessary adjustments, lubrication, cleaning, supplies and parts to keep this equipment in operation, except such parts made necessary by misuse, accidents or negligence not caused by this Contractor.
 2. Provide written reports of each service call, whether routine or emergency, describing services performed.
 3. Basic service work must be performed during regular working hours of regular working days. Emergency callback service must be available on a 24-hour, 7-day basis. Response time must be 2 hours maximum.
- B. The final elevator installation must be maintainable by a trained elevator mechanic without the need to purchase or lease additional tools or software to diagnose problems and/or change operational parameters of the elevator system.

1. All tools and software necessary to diagnose problems and/or change operational parameters of the elevator system must be retained by the Owner and must function for the life of the installed equipment.
2. Hardware and software needed for diagnosis and operating parameter modification must be products offered as standard by the manufacturer of the control system.
3. No substitutions of proprietary circuit boards, EPROMS, hardware locks, software passwords or coding must be allowed.
4. As a condition of the installation, the original equipment manufacturer must guarantee to sell and deliver, on a timely basis, replacement parts and software updates to a third-party elevator maintenance company at a fair market price.

8-63.1(9) WARRANTY

- A. The Elevator Contractor must warrant the completed elevator(s) in accordance with Washington State law and regulation, but in no case less than complete coverage of parts and labor for one (1) year after issue of the permanent operating permit.
- B. The warranty maintenance service will meet the following criteria:
 1. In the case of non-emergency service calls, the Contractor must be onsite within Sixty (60) minutes or less from the time the call is placed to Contractor by the City during weekdays, Monday through Friday, 7:30 a.m. to 5:00 p.m.
 2. In cases of entrapment during weekdays, Monday through Friday, 7:30 a.m. to 5:00 p.m., response time must be within Thirty (30) minutes. However, all reasonable measures must be taken to arrive on the job-site within Fifteen (15) minutes.
 3. Entrapments after hours must be responded to within Sixty (60) minutes.
 4. Routine service requests after normal business hours must be responded to within Ninety (90) minutes.
 5. Provide 24/7 answering service.
 6. Respond to messages within Fifteen (15) minutes.
 7. Emergency service requests after regular hours or on weekends not including entrapments, response time to be no more than Ninety (90) minutes.
- C. Provide maintenance service of the equipment for a period of twelve (12) months after issue of the permanent operating certificate.
 1. This service must include regular systematic examinations of the installation by competent and trained (minimum 5 years of experience servicing similar installations) employees of this Contractor; and must include all necessary adjustments, lubrication, cleaning, supplies and parts to keep this equipment in operation, except such parts made necessary by misuse, accidents or negligence not caused by this Contractor.
 2. System must be provided with remote monitoring for use in predictive maintenance.
 3. Provide an MCP for each elevator. The MCP must include, but is not limited to the following:
 - a. Examinations, maintenance, and tests of equipment at scheduled intervals in order to ensure that the installation conforms to the requirements of ASME A17.1/CSA B44/CSA B44 Section 8.6. The maintenance procedures and intervals must be based on:
 - 1) equipment age, condition, and accumulated wear
 - 2) design and inherent quality of the equipment

- 3) usage
- 4) environmental conditions
- 5) improved technology
- 6) the manufacturer's recommendations for any SIL rated devices or circuits
- b. Cleaning, lubricating, and adjusting applicable components at regular intervals and repairing or replacing all worn or defective components where necessary to maintain the installation in compliance with the requirements of ASME A17.1/CSA B44/CSA B44 Section 8.6.
- c. The instructions for locating the Maintenance Control Program must be provided in or on the controller along with instructions on how to report any corrective action that might be necessary to Owner.
- d. The maintenance records required must be kept at a central location agreeable and accessible to Owner and the Elevator Contractor's elevator personnel.
- 4. The Maintenance Control Program must be accessible to the elevator personnel and must document compliance with ASME A17.1/CSA B44/CSA B44 Section 8.6.
 - a. Procedures for tests, periodic inspections, maintenance, replacements, adjustments, and repairs for all SIL rated E/E/PES electrical protective devices and circuits must be incorporated into and made part of the Maintenance Control Program.
 - b. Where unique or product-specific procedures or methods are required to inspect or test equipment, such procedures or methods must be included in the Maintenance Control Program.
- 5. The MCP must be unique to this building's elevator equipment. Instructions for locating the MCP on site must be located in or on the controller of each elevator. All record keeping must be in conformance with ASME A17.1/CSA B44, Section 8.6 and be kept on site.
- 6. Basic service work must be performed during regular working hours of regular working days. Emergency callback service must be available on a 24-hour, 7-day basis. Response time must be 1 hour maximum.

8-63.1(10) QUALITY ASSURANCE

- A. Elevator Contractor must furnish Owner with all special tools, meters, diagnostic tools/devices, troubleshooting special hand-held tools/devices, printed information, adjusting information and all other special tools/devices to perform maintenance, troubleshooting, repairing and adjusting at conclusion of elevator installation. If any special tool, meter, diagnostic tools/device requires readjusting or re-programming Elevator Contractor must pay for all costs including freight for a period of five (5) years from date of elevator final acceptance by Owner. Cost, if any, for the above stated items must be included in Base Bid. After the initial five (5) year period all upgrades, readjustments, or reprogramming of any or all diagnostic tools or devices will be provided as needed or required on a purchase order basis with the original Elevator Contractor that installed/manufactured the elevator equipment with Owner.
- B. Elevator Contractor must provide and install all software improvement up-grades for a period of five (5) years from date of elevator final acceptance by Owner and city of Seattle inspector.

- The upgrades are defined as improvements for the elevator operation. If any elevator safety software up-grades are designed or discovered by the elevator manufacturer, the up-grades must be installed immediately. Elevator Contractor must pay all costs of the software up-grades.
- C. Elevator Contractor must provide Owner the ability to purchase and receive all elevator replacement parts within twenty-four (24) hours from date of parts order by Owner. Replacement and spare parts are defined as any and all items required to maintain, service, repair, adjust and operate the elevator as designed and installed, in a safe and trouble-free manner. Elevator Contractor must sell any and all spare parts including proprietary parts to Owner during the entire life cycle of the elevator equipment.
 - D. The final Elevator Installation must be maintainable by a trained elevator mechanic without the need to purchase or lease additional tools or software to diagnose problems and/or change operational parameters of the elevator system. All tools and software necessary to diagnose problems and/or change operational parameters of the elevator system must be retained by Owner and must function for the life of the installed equipment. Hardware and software needed for diagnosis and operating parameter modification must be products offered as standard by the manufacturer of the control system. No substitutions of proprietary circuit boards, EPROMS, hardware locks, software passwords or coding must be allowed. As a condition of the Elevator Installation, the original equipment manufacturer must guarantee to sell and deliver, on a timely basis, replacement parts and software updates to Owner and/or to a third-party elevator maintenance company at a fair market price for a 5-year period.
 - E. Elevator Contractor must supply a list, in writing, of all proprietary equipment that will be provided. A list of these items must be provided together with a guarantee of availability. This guarantee must specify that all proprietary parts must be available for the life of the elevator equipment and within a twenty-four (24) hour period of order placed. Owner may return the worn or defective part to Elevator Contractor after the replaced part is delivered to Owner and the elevator has been placed in normal operation. Elevator Contractor must submit a list of all proprietary equipment that is required in the elevator drive and control system. The list must include individual item cost and part numbers or coding. Parts ordering information must be provided.

8-63.2 PRODUCTS

8-63.2(1) GENERAL

- A. Installers:
 - 1. KONE
 - 2. Otis
 - 3. Schindler
 - 4. Thyssenkrupp
 - 5. Mid-American
 - 6. Cascade
 - 7. Additional installers by prior approval.
- B. Equipment Manufacturers:
 - 1. MEI
 - 2. EECO

3. Canton
 4. Approved Equal
- C. Cab Manufacturers:
1. Concept
 2. H&B
 3. G&R
 4. Approved Equal
- D. Description and Performance: Installation will be in accordance with the following details and consist of:

1	Quantity and type	One (1) new twin-jack two-stage above-ground holeless hydraulic elevator.
2	Elevator #	1
3	Capacity	4,000 lbs
4	Loading	Class A, per ASME A17.1
5	Car speed	125 Feet per minute
6	Leveling	+/- 1/4 inch with any load
7	Operation	Simplex Automatic as normal mode, independent service or functional equivalent selectable by switch.
8	Control	Solid state microprocessor, non-proprietary
9	Power supply	Primary power to be 480 volts, 3 phase, 60 hertz
10	Rise	Approx. 13 feet – refer to Architectural Drawings
11	Number of stops	2
12	Number of openings	1 Front 1 Rear
13	Lighting supply	120 volts, 1 phase, 60 hertz
14	Clear car inside	Refer to drawings
15	Cab Height	9'-0"
16	Type of doors, Car & Hoistway	Two speed, side opening
17	Hoistway and car opening size	48" x 84"

8-63.2(2) GENERAL MATERIALS

- A. Where stainless steel is specified, it must be corrosion resisting steel, Type 316 5WL rigidized, or 150-grit non-directional finish on exposed surfaces. All surfaces labeled as non-directional must be smooth and without waves. Bright, mirror-like finish for stainless steel is not acceptable because of the difficulty with cleaning and repair.

- B. Where glass is specified, it must be laminated safety glass conforming to CPSC 16 CFR Part 1201 and meeting the strength requirements for car and hoistway doors, per ASME A17.1 2013.
- C. Steel:
 - 1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A1008, matte finish.
 - 2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568 and A1011.
 - 3. Structural Steel Shapes and Plates: ASTM A36.

8-63.2(3) ELEVATOR MACHINERY

- A. Each elevator must have a positive displacement hydraulic pump driven by an electric motor and operating a pair of telescopic hydraulic cylinders. The machine and all its components must meet the requirements of the Elevator Safety Code.

8-63.2(4) POWER UNIT

- A. Provide a dry power unit consisting of the motor, pump, drive assembly, oil control unit, oil reservoir, oil temperature sensor and oil drip pan, all mounted on a structural steel base and supports. Each power unit must have the capability of delivering oil pressure and volume to lift the assembled elevator with rated load at rated speed. Volume of each oil reservoir must be sufficient to lift its elevator through the rise specified, plus normal overtravel. The power unit must have a muffler in the discharge oil line near the pump, an Isolation coupling in the oil line and an enclosure of steel panels lined with sound-absorbing material. Basis of Design: MEI DS-96.
- B. Maximum sound generation of 80 dbA within the range of 20 Hz to 20 KHz, measured at 3 feet from the equipment within the machine room
- C. Hydraulic Pump
 - 1. The pump must be a Dry positive displacement type and must be designed and manufactured for oil-hydraulic elevator service. It must provide steady discharge with minimum pulsations, and its output must not vary more than 10% between no-load and full-load conditions of the elevator car.
- D. Pump Motor
 - 1. The pump motor must be designed for oil-hydraulic elevator service, of standard manufacture, and of duty rating to provide the service specified herein. (120 Starts per hour)
- E. Oil Control Unit
 - 1. The oil control unit must include the necessary valves all built into a single housing; welded manifolds with separate valves for each function will not be accepted. All adjustments must be accessible and must be made without removing the assembly from the oil line.
 - a. Relief valve must be externally adjustable and must be capable of bypassing the total oil flow without increasing back pressure more than 10% above working pressure.
 - b. Up start and stop valve must be externally adjustable, and designed to bypass oil flow during start and stop of the motor pump assembly. Valve must close slowly, insuring smooth up starts and stops.

- c. Check valve must be designed to close quietly without permitting any perceptible reverse flow.
- d. Lowering valve and leveling valve must be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve must be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.

8-63.2(5) OIL COOLER

- A. Oil cooler installed in machine room. The unit will include an adjustable thermostat, a 10 micron in-line filter with sight gauge with an exterior housing. Basis of Design MEI-BOL.

8-63.2(6) JACK ASSEMBLY

- A. Cylinders: Seamless steel pipe. Two hydraulic cylinders designed to stand upright on the pit floor on either side of the car. Design head to receive unit-type packing and provide means to collect oil at cylinder head and return automatically to oil reservoir. The cylinder must be finished with rust-inhibiting air-dry enamel. Apply two coats by brush, or spray according to manufacturer's recommendations.
- B. Each cylinder must have a machined steel flange at the upper end and a heavy steel bulkhead at the lower end.
- C. Plungers: Polished seamless steel tubing or pipe. A stop ring electrically welded to the plunger to positively prevent the plunger from leaving the cylinder. If plunger length exceeds 24 feet, provide two or more sections not exceeding 16 feet in length, or coordinate installation of longer unit at the jobsite. Join section by internal threaded couplings. Multiple section jack units must be factory polished while assembled and marked for proper future reassembly. Isolate plunger from car frame(s). Each piston in multi-stage jacks to have individual head bearings and packing gland assemblies.
- D. Equalization: Provide direct mechanical means of equalizing position and speed of plungers. If speed and position of cylinders are not synchronized the elevator must self-correct by auto-lowering to lowest floor and restarting. If after two attempts to readjust the position and or speed the plungers are not synchronized the elevator must shut down.

8-63.2(7) PIPE AND FITTINGS

- A. Provide pipe and fittings of the size, type and weight recommended by the manufacturer. Provide two manual gate or ball valves in line for each elevator, one adjacent to pump and one adjacent to the jacks.
- B. Seismic Rupture Valve: Provide a safety (rupture) valve in the oil hydraulic line in accordance with ASME A17.1.

8-63.2(8) BUFFERS

- A. Spring buffers must be installed in the pit as a means for stopping the car at the bottom limits of travel. Provide for adequate working space below car when car is at the lowest level of travel.

8-63.2(9) ROLLER GUIDES

- A. Provide spring isolated roller guides with seismic retainer plates.

8-63.2(10) GUIDE RAILS

- A. Provide 15 lb. planed tee steel guide rails that meet the requirements of the Elevator Safety Code.

8-63.2(11) LOW OIL INDICATOR

- A. Provide indicator light on controller to indicate that reservoir is low on oil.

8-63.2(12) TRAVELING CABLES

- A. A traveling cable must be provided for electrical connections between each car and its hoistway.
 - 1. Each cable must have adequate conductor capacity for all control, communication and lighting functions specified herein. Provide minimum 15% spare conductors.
 - 2. Additional provisions: five (5) pair of shielded wires, one (1) RG-6/U coax cables, one (1) CAT5e, and two (2) pair of 14 gauge wire for optional CCTV power
 - 3. Each cable must have flame retarding and moisture resisting outer cover. Cables must be flexible and must be suitably suspended to relieve strains in the individual conductors.
 - 4. Terminate all conductors on a terminal board with permanent identification matching that used in schematic and wiring diagrams.

8-63.2(13) HYDRAULIC OIL

- A. Provide vegetable based, biodegradable hydraulic fluid that meets the requirements of the elevator manufacturer with minimum flammability. Chevron Clarity or approved equal.

8-63.2(14) ELEVATOR CAR

- A. Car Frame and Platform:
 - 1. Provide a car frame fabricated from steel.
 - 2. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a steel sub-floor. Underside of the platform must be fireproofed. The car platform must be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Car Enclosure: The car enclosure must be steel and must comply with the Elevator Safety Code.
 - 1. Walls: Cold-rolled steel with glazed panels above and below the handrail, non-directional stainless-steel accents panels of 5WL rigidized steel. Refer to drawings for finish details.
 - e. Glazed panels above handrail must be operable to allow for cleaning from the inside of the cab. Operable panels must comply with the requirements of A17.1
 - 2. Reveals: Stainless steel, non-directional finish.
 - 3. Car Top: The car top must not be thinner than 14 gauge cold-rolled steel suitably reinforced.
 - 4. Ceiling: Downlight type, vandal-resistant LED downlights in non-directional, stainless steel drop ceiling.
 - 5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with 5WLstainless steel.
 - 6. Doors: Horizontal sliding car doors. Elevator must have laminated glass panels and reinforced with steel for panel rigidity. Glass panels must compose at least 60% of the area of the door and meet the requirements of ASME A17.1 2013 2.11.7.2 and 2.11.11.5.7. Car panels must be aligned with the corresponding panel in the hoistway door.

7. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
8. Door Finish: Doors must be 16-gauge non-directional finish stainless steel, sandwich construction without binder angles, with laminated safety glass panels. Glass panels must compose at least 60% of the area of the door. Car panels must be aligned with the corresponding panel in the hoistway door.
9. Cab Sills: Nickel-silver. Rated for Class A loading.
10. Handrail: Provide 1.5" diameter cylindrical metal on side walls. Handrails must have a stainless steel, non-directional finish.
11. Floor Finish: Fluid applied flooring, Sherwin Williams Shark Grip or approved equal. Floor must comply with radiant flux requirements of A17.1.
12. Exhaust Fan: A two-speed exhaust fan, must be mounted on the car top.
 - d. A battery pack must be provided which is capable of running the exhaust fan for a minimum of 1 hour after loss of normal power.
13. Car Operating Station, General: The main car control in each car must contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Swing return must have a non-directional stainless steel finish. The main car operating panel must be NEMA 4X rated, mounted in the return and comply with A117.1-408 and ADA 2010 standards. Vandal-resistant pushbuttons that illuminate using long lasting LED's must be included for each floor served, and emergency buttons and switches must be provided in accordance with code.
 - e. An access-controlled panel segment must contain light switch, utility outlet, fan switch, and switch for operating mode selection.
14. Hands Free Phone: A security telephone must be flush mounted within the primary car operating panel.
 - f. Necessary wires must be included in the car traveling cables.
15. Emergency Car Lighting: emergency power unit must be provided to illuminate the elevator car and provide current to the alarm bell in the event of power failure. Emergency lighting must be accomplished through one of the normal lighting fixtures mounted in the cab ceiling.
16. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station must be mounted in the door operator assembly.
17. Alarm Bell: Provide alarm bell.
- C. Door Operator: Wet rated, closed-loop, microprocessor controlled, AC motor-driven door operator, with adjustable torque limits. Door movements must be electrically cushioned at both limits of travel and the door operating mechanism must be arranged for manual operation in event of power failure. Doors must automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. GAL MOVFR or approved equal.
 1. No Un-Necessary Door Operation: The car door must open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
 4. Nudging Operation: The doors must remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer will sound. When the obstruction is removed, the door will begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors will stop and resume closing only after the obstruction has been removed.
 5. Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.
 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.
 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor must have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- D. Door Edge Protective Device: Provide each passenger car door with an infrared type reopening device extending the full height.
- E. Toe Guard: Provide toe guards, fabricated from 14-gauge steel, a) at the lowest landing of each hoistway, and b) on each car sill. Toe guards must have manufacturer's standard enamel finish.

8-63.2(15) POWER AND CONTROL DEVICES

- A. Hydraulic Elevators Solid state logic control: Provide a reduced voltage motor starter and solid state logic controller with voltage and current capability ample to operate the elevator at the specified conditions. Basis of design: MCE Motion 2000, EC Pixel, Smartise or approved equal.
1. Solid state power control: Provide a solid state logic controller to operate the pump motor, valves, and other electromechanical devices.
 - a. The controller must include interfacing pilot electromechanical devices as required for accepting the necessary elevator hoistway switches and operating switches.
 - b. These include, as a minimum, terminal slowdown devices, over-travel limit switches, solid state magnetic leveling switches, inspection operating pushbuttons, and emergency stop switch.
 2. Microprocessor elevator logic control: Accomplish the operation utilizing microprocessor computer logic control.
 - a. The elevator control program must be contained in nonvolatile, programmable, read-only memory.
 - b. Construct the control such that future alterations in elevator operation, including changes of operating parameters (including but not limited to speed, acceleration, jerk, pre-opening, door speed, door dwell, floor counts for leveling, and car zoning), can readily be made as part of normal maintenance and service.

- c. If a separate, detachable device is required, it must be furnished.
 - d. Monitor and control safety circuits by the programmable logic control with redundant protection.
 - e. Contain the microprocessor elevator logic control in a NEMA 1 cabinet.
- 3. Fault diagnosis: Provide capability to diagnose faults to the level of individual circuit boards and individual discreet major components for both the solid state power controller and the elevator logic controller.
 - a. If fault diagnosis requires a separate, detachable device, it must be furnished.
- 4. Automatic Light and Fan shut down: The control system must evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings must be field programmable.
- B. Remote Monitoring: The installed controller must be capable of connecting to maintenance providers remote monitoring service via standard telephone line and/or ethernet connection.
- C. Battery Lowering Device: Provide batter power and capacity to provide the capability of emergency power operation as follows:
 - 1. Upon loss of normal building power, the elevator must automatically travel to the lowest landing, open its doors and shutdown until return to normal power occurs.
- D. Firefighters service: Provide all elevator control functions, car operating devices, and hall operating devices necessary for "firefighters service - automatic elevators" as required by the Elevator Safety Code.
- E. Terminal limit switches: Provide terminal limit switches in the hoistway designed to automatically stop the car at terminal landings.
 - 1. Design the final hoistway limit switches to automatically cut off the power and apply the brake, should the car travel beyond either terminal landing.
- F. Automatic Leveling Device: Provide the elevator with a two-way automatic maintaining leveling device.
- G. Hall Buttons:
 - 1. Hall Stations, General: Vandal resistant buttons with center jewels which illuminate to indicate that a call has been registered at that floor for the indicated direction. Each button must be provided with an internal automatic stop to prevent damage of switches that register the call. All fixtures must be NEMA 4X vandal resistant type.
 - a. Phase 1 firefighter's service key switch, with instructions, must be incorporated into the hall station at the designated level.
- H. Hall Direction Lanterns and Sound Signals:
 - 1. Column Mounted Car Riding Lantern: A car riding lantern must be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern must remain illuminated until the door(s) begin to close. Lanterns must be visible from the floor area adjacent to the hall call buttons.

8-63.2(16) ENTRANCES

- A. Hoistway Entrances: Provide new listed doors and hoistway door frames.
 - 1. Provide bottom of doors with removable phenolic guides which run in the sill slots with minimum clearance.

2. Provide manual access with lunar key or other approved device at each entrance.
 3. Provide Hoistway Signs and Floor Designations attached to each entrance frame which comply with ADA Standards and A117.1.
- B. Fascia Plates: Provide fascia plates, fabricated from 14 gauge steel, to be fastened to the header and the sill above. Fascia plates must have manufacturer's standard enamel finish.
- C. Landing Sills
1. Provide nickel silver sills together with all necessary supports and hardware for installation. Rated for Class A loading.
 - a. Install in accordance with manufacturer's recommendations.
 - b. Grout sills solidly their full length after installation.
- D. Door Hangers and Tracks:
1. Tracks must be of bar steel with the working surface contoured to match the sheaves.
 2. Design the hangers for power operation and have provisions for vertical and lateral adjustment.
 3. Design hangers for two-point suspension of the door panel.
 4. Hanger sheaves must be polyurethane with pre-lubricated and sealed bearings.
- E. Dust Cover
1. Provide dust covers, fabricated from 14 gauge steel, at each landing.
 2. Dust covers must have manufacturer's standard enamel finish.
- F. Hoistway Doors
1. The hoistway entrance must be provided with doors of minimum 16 gauge facing into the car stainless steel around the leading door edges, and suitably reinforced.
 - a. Doors must be 16-gauge non-directional finish stainless steel, sandwich construction without binder angles, with laminated safety glass panels. Glass panels must compose at least 60% of the area of the door and meet the requirements of ASME A17.1 2013 2.11.7.2 and 2.11.11.5.7. Car panels must be aligned with the corresponding panel in the hoistway door.
 - b. Provide bottom of doors with removable phenolic guides which run in the sill slots with minimum clearance.
 - c. Car door interlocks conforming to ASME A17.1, section 2.14.4.2, to prevent car doors from being opened when the car is outside a landing zone, must be included in all car doors.
- G. Hall Buttons
1. Hall Stations, General: Vandal resistant buttons with center jewels which illuminate to indicate that a call has been registered at that floor for the indicated direction. Each button must be provided with an internal automatic stop to prevent damage of switches that register the call. All fixtures must be NEMA 4X, surface mounted, vandal resistant type.
 - a. Phase 1 firefighter's service key switch, with instructions, must be incorporated into the hall station at the designated level.
 2. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads must comply with Americans with Disabilities Act (ADA) requirements

H. Hall Direction Lanterns and Sound Signals:

1. Column Mounted Car Riding Lantern: A car riding lantern must be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern must remain illuminated until the door(s) begin to close.
- I. Finishes: Structural members and other components for which finish is not otherwise specified must have prime coat finish.
- J. Hoistway Access Switches: Provide hoistway access switches, at upper and lower terminal landing.

8-63.2(17) PIT AND MACHINE ROOM

- A. Emergency stop switch: In each elevator pit, provide an emergency stop switch accessible from the pit access opening.

8-63.3 EXECUTION

8-63.3(1) INSTALLATION OF ELEVATOR SYSTEMS

- A. General: Comply with manufacturer's instructions and the Elevator Safety Code for work required during installation.
- B. Before beginning the installation, examine the hoistway and machine room to verify conditions and provide written notice of any conditions which would substantially hinder or prevent proper execution of the work. Do not proceed with the installation until the cited conditions have been corrected.
- C. Jack Installation
1. Install jack cylinders plumb and true with hoistway. Provide adequate support for telescopic cylinder.
- D. Rails
1. Install rail brackets as needed to meet the requirements of the Elevator Safety Code.
 2. Align rails plumb and accurately centered for elevator car position and travel.
- E. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance and replacement of worn parts.
1. Comply with standards of AWS D1.1 for workmanship and for qualifications of welding operators.
- F. Electrical Work: All work must conform to the requirements of the Contract. Requirements specific to elevators include:
1. Mark each component, including but not limited to relays, switches, timers, fuses and overload devices, with permanent identification that corresponds with the nomenclature of the wiring diagrams and the operations and maintenance manuals.
 2. Terminate all field wiring at each control cabinet on terminal strips suitable for the use. Field wiring must not terminate on the studs of relays or other devices and equipment.
- G. Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays.
1. Use benchmarks, lines and levels to ensure dimensional coordination of the work.

2. Coordinate installation of hoistway entrances with installation of elevator guide rails, for accurate alignment of entrances with cars.
 3. Where possible, delay final adjustment of sills and doors until car is operable in shaft.
 4. Reduce clearances to minimum, safe, workable dimension at each landing.
- H. Lubrication: Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.

8-63.3(2) FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Engineer and governing authorities in advance of dates and times tests are to be performed on the elevator
- C. Protection: At time of final completion of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period. Repair or replace, to the Owner's satisfaction, any components worn significantly or damaged before the Owner obtains beneficial use.

8-63.3(3) INSTRUCTION AND MAINTENANCE

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions..
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

8-63.3(4) CONDITIONS PRECEDENT TO FINAL ACCEPTANCE

- A. Instructions to operators: Instruction of the designated employees of the Owner in the operation and care of equipment and systems must have been completed.
- B. Code compliance: All code compliance tests must have been performed and acceptance certified by the authorities having jurisdiction and permanent elevator operating permit issued.
- C. Acceptance tests: All acceptance tests must have been completed.
- D. Submittal of maintenance manuals.
- E. Final check: Make a final check of each elevator operation, with Owner's personnel present and just prior to date of substantial completion to determine that control systems and operating devices are functioning properly. Any and all damage and/or significant wear must have been repaired.
- F. Cleaning: The work site must be clean. Clear away all debris, surplus materials, etc., resulting from work or operations, leaving the job and equipment furnished in a clean, first-class condition.
- G. Punchlist: All items on the punchlist must be completed to the satisfaction of the Engineer.

8-63.4 MEASUREMENT

- A. Measurement of "Union Elevator" will be per lump sum.

8-63.5 PAYMENT

- A. "Union Elevator" must include all costs for the work to furnish and install complete and operable elevator system depicted on the elevator Drawings and described in Section 8-63.

Add the following Section to Division 8:

8-64 COMMON WORK RESULTS FOR PLUMBING (SP 12-19-19)

8-64.1 GENERAL

- A. Specification Section based on CSI Specification Section 22 05 00 Common Work Results For Plumbing

8-64.1(2) WORK INCLUDED

- A. Work includes the following:
 - 1. Provide all design, materials, equipment, labor, supervision, tools and items necessary for the construction, installation, connection, start-up, testing and operation of all plumbing work for this project as defined the Contract Documents.

8-64.1(3) DEFINITIONS AND ABBREVIATIONS

- A. The word "provide", as used in these specifications, means "furnish and install".
- B. The word "accepted", as used in these specifications, means the acceptance of the Engineer.
- C. Abbreviations:
 - 1. ANSI American National Standards Institute
 - 2. ASHRAE American Society of Heating, Refrigerating & Air Conditioning Engineers
 - 3. ASME American Society of Mechanical Engineers
 - 4. ASTM American Society for Testing and Materials
 - 5. AWS American Welding Society
 - 6. CISPI Cast Iron Soil Pipe Institute
 - 7. F Fahrenheit
 - 8. FM Factory Mutual Engineering Corporation
 - 9. HI Hydraulic Institute
 - 10. IBC International Building Code
 - 11. IMC International Mechanical Code
 - 12. MSS Manufacturers' Standardization Society of the Valve and Fittings Industry, Inc.
 - 13. NEC National Electric Code
 - 14. NEMA National Electrical Manufacturer's Association
 - 15. NFPA National Fire Protection Association
 - 16. NSF National Sanitation Foundation
 - 17. OSHA Occupational Safety and Health Administration
 - 18. psi Pounds per square inch

- 19. psig Pounds per square inch gauge pressure
- 20. SMACNA Sheet Metal and Air-Conditioning Contractors' National Association
- 21. UL Underwriters' Laboratories, Inc.
- 22. V Volts
- 23. UPC Uniform Plumbing Code
- 24. WAC Washington Administrative Code
- 25. WSEC Washington State Energy Code
- 26. WISHA Washington Industrial Safety & Health Act

- D. Some of these abbreviations may not be used. All other abbreviations must have the definition commonly associated with them by the trade or industry. Confirm the meaning of any unclear or unknown definitions with the Engineer before proceeding with any work.

8-64.1(4) LAW AND ORDINANCES

A. General:

- 1. All plumbing work specified under this contract must be in strict accordance with the latest rules and regulations of all applicable codes.
 - 2. Contractor is not relieved from furnishing and installing work shown or specified which may be beyond requirements of ordinances, laws, regulations, and codes. This work must be included within the construction contract.
 - 3. Contractor is not relieved from furnishing and installing work required by the local Authority Having Jurisdiction (AHJ) which may be beyond requirements of ordinances, laws, regulations, and codes. Review by AHJ of systems should be sequenced to accommodate time in the construction schedule for revisions/correction and second review by AHJ.
- B. Approval: File necessary plans, prepare documents and obtain necessary approval of governmental departments having jurisdiction and required certificates of inspection for work and deliver same to Engineer before requesting acceptance and final payment for work.
- C. Procure and pay for all the necessary permits and certificates for all work as required by law. In addition, perform all ordinance and performance tests in the presence of the Engineer, and be responsible for advance notification. Submit copies of signed and accepted permits to the Engineer.

8-64.1(5) MATERIAL REVIEW, SUBMITTALS AND SHOP DRAWINGS

A. General:

- 1. .
- 2. Do not place orders for materials, fixtures, or equipment until approval is obtained from Engineer in writing. Verbal approval must not be contractually binding and will not be considered.
- 3. Make every attempt to respond to the reviewer's comments in a timely manner.
- 4. The project construction schedule, beginning with the acceptance of the bid and confirmation of the successful bidder, is not the responsibility of the Consultant Engineer. The Contractor's schedule must recognize and accommodate the review intervals specified herein. The schedule must identify and accommodate the specified submittal and re-submittal review and response period. The contractor must not anticipate or base the construction schedule on expedited reviews or reviews of partial submittals. Submittals must be organized and delivered as specified. No exceptions.

B. Submit

1. Provide submittals for all equipment and systems indicated and specified by the Contract Documents. Submit shop drawings showing the completed plumbing system design.
2. Provide five copies of the submittals in 3-ring notebook(s), organized by specification section, large enough to accept total volume of material to the Engineer. Reference project information must include
 - a. Project title,
 - b. Project number and Location,
 - c. Architect,
 - d. Engineer,
 - e. Contractor,
 - f. Subcontractor(s),
 - g. Submission date,
 - h. Specification sections submitted.
3. Label cover and binder end. Clearly indicate any items not included with submitted assemblies. Consultant Engineer will not take responsibility for collating submitted information into notebooks.
4. Submit only the work of one section per submittal. Submittals within a section must be organized by subsection so that they are in the order they appear in the specification. Items not in the specification but shown only on the Drawings must be included as though they appear at the back of the specification section and be labeled with the appropriate sheet number or be submitted in a separate submittal.
5. Label every submitted product with the associated specification section reference (e.g. 23 05 00-1.05.B.3-"Product A") and indicate the specific product if multiple products, sizes, models, etc., are shown.
6. The Contractor must make every attempt to respond to the Consultant Engineer's comments in a timely manner. Submittal material requiring more than three Consultant Engineer reviews will be considered non-responsive. The Consultant Engineer may elect to charge the contractor on an hourly basis for additional consultation as required to secure a responsive submittal.
7. Submittals not bound and organized as specified will be rejected.
8. Digital PDF submittals will be accepted in lieu of physical submittals at the discretion of the Engineer and must meet the same organizational requirements. PDFs must be named and organized per the above requirements. Bookmarks should be utilized for each major section and all products must be marked with the referenced specification section.

C. Standards Compliance and Certification:

1. Where equipment or materials are specified to conform with requirements of standards of recognized technical or industrial organizations such as American National Standards Institute (ANSI), American Society for Mechanical Engineers (ASME), Underwriters Laboratories Refrigeration Institute (ARI), or National Electrical Manufacturer's Association (NEMA), that use a label or published listing as a method of indicating compliance, proof of such conformance must be submitted and accepted.

2. Submit certification for the product submitted and not pre-printed certifications. Do not make statements in the certifications that could be interpreted to imply the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material." Simply state that the product conforms to the requirements specified.
- D. Substitution of Materials: Substitutions of materials will only be considered where specified materials cannot be obtained or where prior approval has been provided. All work and equipment required incidental to the substitution is the responsibility of the Contractor.

8-64.1(6) SHOP DRAWINGS

- A. Shop drawings required for submission must include but are not limited to:
 1. Plan location of all Section 8-64 through 8-66 equipment.
 2. Domestic Waste and Vent Piping
 3. Rainwater Leaders – size and routing
 4. Rain water harvesting System
 5. Refrigerant piping.
 6. Access Doors for all Section 8-64 through 8-66 equipment as required.
 7. Control systems applicable to Section 8-64 through 8-66 (Wire and Equipment, Control Sequences).
 8. Mechanical room(s) layout.
- B. All shop drawings must bear the Contractor's stamp, certifying that the contractor has:
 1. Verified all field dimensions and quantities as shown on the shop drawings.
 2. Verified all field construction criteria, materials, catalog numbers and similar data.
 3. Reviewed and coordinated submittal data with requirements of the work and the Contract Documents with the field conditions.
 4. Coordinated all equipment clearances and manufacturers' written installation requirements.
 5. Coordinated with all other trades' routing, access, space and clearance requirements.
- C. Shop drawings must be drawn on the Architect's final backgrounds; at a minimum, all walls, room numbers, and plan name indicating floor are to be included on the shop drawings. Drawings should be performed by Computer Aided Drafting software (preferred) or drawn neatly by hand in permanent ink. Any field verified dimensions should be shown, as well as each piece of equipment related to the shop drawing. Do not resubmit the mechanical or architectural sheets marked-up with notes.
- D. Submit in mailing tube if drawing cannot be shipped flat. Do not fold.
- E. Submit drawings the same size as the bid set, 8-1/2" x 11", 11" x 17" or 24" x 36" unless size of the items depicted makes such sizes impractical. Shop drawings may be submitted as PDFs but must be full size or half-size documents.
- F. Acceptance does not extend to products not represented by or included on the shop drawings, nor does it extend to verification of quantity or dimension surveys. Review is limited to checking for conformance with the design concept and to verify that the contractor has taken care in coordination between trades. No changes from the provisions of the Contract Documents are intended and the Contractor remains responsible for compliance with the provisions therein.

- G. Shop drawings that do not meet the above requirements will be returned without review.

8-64.1(8) CONSULTANT REVIEW

- A. Review in general and does not:
1. Permit departure from Contract Documents.
 2. Relieve Contractor from responsibility for error in detail, quantities, dimensions or related items.
 3. Accepted departure from previous instructions or detail.
 4. Relieve Contractor of responsibility to provide all components, wiring, etc., required to make item operational or usable.
 5. Relieve Contractor of the responsibility to coordinate all power and clearance requirements with other trades.
 6. Imply acceptance of items for which no data is submitted.
- B. Work which requires submittals must not be started without Consultant Engineer's review.
- C. Allow fifteen (15) working days for Consultant Engineer review.
- D. Acceptance will be indicated by a signed stamp affixed to the submittal, or a letter over the Consultant Engineer's signature. No exceptions.
- E. Re-submittals
1. Items of materials, fixtures and equipment not accepted by Consultant Engineer must be resubmitted within 15 working days after Consultant Engineer review. If Contractor fails to submit items listed below for approval or resubmit in the event of disapproval within specified time, Contractor must provide materials, fixtures and equipment as scheduled on drawings. Where equipment is not scheduled the Contractor must provide materials, fixtures and equipment as identified in the specifications.
 2. Decision of Consultant Engineer must be final and binding and items must be provided without change in contract price or time of completion.

8-64.1(9) PUNCH LIST & WARRANTY

- A. Inform project design team of construction progress and schedule a site visit by the Engineer prior to covering pipe, valves, equipment that will, once construction is completed, be otherwise hidden from view. A substantial completion site visit will be completed at a later date.
- B. Punch list items must be provided to the contractor in writing. A written response indicating the corrective action taken or explanation of the situation must be returned to the Engineer.

8-64.2 PRODUCTS

8-64.2(1) MOTORS

- A. Provide motors conforming to the following unless noted otherwise:
1. Design and Construction: Unless otherwise indicated, provide electric motors and enclosures described by this specification conforming to the applicable definitions and requirements of NEMA MG-1.
 2. Standard Commercial Product: Provide motors of manufacturers' standard commercial product. A standard commercial product is a product which has been or will be sold on the commercial market through advertisements or manufacturers' catalogs or brochures, and represents the latest production model(s).

3. Nameplates: Provide all motors with readily visible nameplates containing the information required in NEMA MG-1.
4. Drive guards: Provide drive guards and shaft guards for all exposed, rotating, shafts and drive connections.

B. Motor Requirements:

1. Manufacturer: General Electric, Lincoln, Allis-Chalmers, Goulds or U.S. Motors or accepted equal.
2. Type: Furnish High Efficiency motors. Motor efficiencies must meet or exceed the efficiency values required by the Washington State Energy Code.

8-64.2(3) EXPANSION SHELLS AND BOLTS

A. Expansion Shells for Rod Hangers

1. Phillips, Gregory, Omark, or Fastite in holes drilled in concrete.

B. Expansion Bolts for Equipment

1. USM or McCullough in holes drilled in concrete.
2. No screwed adapters underground.

8-64.2(4) FORMED STEEL CHANNELS AT SLAB

- A.** Provide for all equipment; number and size per manufacturer's recommendations or as indicated.

8-64.2(5) ANCHOR BOLTS

- A.** Provide for all equipment; number and size per manufacturers' recommendations or as indicated.

8-64.2(6) SUPPLEMENTARY STEEL FRAMING

- A.** Standard structural steel shapes or Schedule 40 steel pipe, galvanized with extra-heavy finish.

8-64.2(7) SLEEVES

- A.** Materials, General Schedule: 40 galvanized steel pipe with unthreaded ends, or standard structural steel shapes.
- B.** Firestopping: Three-hour rated penetration sealing system per UL 1479 and ASTM E-814. 3M Fire Barrier, Dow Chemical RTV, Manville Cerafiber, or accepted.
- C.** Seal: Seal annulus with bolted compression type seal. Link Seal or accepted equal.

8-64.2(8) WELDING TO BUILDING STRUCTURAL MEMBERS

- A.** Not allowed except as indicated.

8-64.2(9) NAMEPLATES

- A.** Laminated black plastic with lettering cut through to white background. Plastic strips with raised letters made by a marking device are not acceptable.

8-64.2(10) VALVE TAGS

- A.** Must be 0.030" thick brass, 1" diameter size; state the service and destination of the line controlled. Provide tag inscriptions made with a lettering device with 5/16" high cut lettering. Laminated plastic tags, construction similar to nameplates will also be acceptable.

- B. Provide a valve tag list that assigns valve tag numbers to functions.

8-64.2(11) PIPING IDENTIFICATION

- A. Self adhesive, pre-printed identification labels indicating direction of flow and pipe contents, using common industry abbreviations. Identify pipe at every change of direction.
- B. Comply with the latest ANSI Pipe Marking Standards for letter height and label placement.

8-64.2(12) PAINTING

- A. Paint all exposed fixtures and equipment in conformance with applicable specifications. Coordinate color with Engineer. Refer to Architectural documents for paint and application requirements.

8-64.2(13) EQUIPMENT LISTING REQUIREMENTS

- A. Whenever UL Standards exist for equipment provide UL-accepted equipment bearing the UL label.

8-64.3 EXECUTION

8-64.3(1) INSPECTION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until any unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

8-64.3(2) PREPARATION

- A. Field Measurements: Field-verify locations of new and existing work prior to commencing work of this Section.
- B. Protect surrounding areas and surfaces to preclude damage from work of this Section.

8-64.3(3) INSTALLATION, ERECTION, AND PERFORMANCE

- A. Install, apply, erect, and perform the work in accordance with "Quality Assurance" provisions, Specifications, and manufacturers' installation instructions and directions. Where these may be in conflict, the more-stringent requirements govern.

8-64.3(4) CLEANING

- A. Promptly remove waste material and rubbish caused by mechanical construction work. At completion of the project, clean all equipment, piping and fixtures installed or provided under this Contract.

8-64.3(5) CUTTING AND PATCHING

- A. Cut all openings and holes required for mechanical work. Carefully examine existing conditions prior to commencing work.

8-64.3(6) ACCESSIBILITY

- A. Locate valves, dampers, controls, etc., to be easily accessible.
- B. Install all equipment that requires periodic servicing or repairs to be readily accessible. Otherwise, obtain Engineer's approval of location. Where valve and equipment is concealed behind access panels or by ceiling tiles, label panel or tile appropriately.
- C. Provide access panels as indicated or required for piping, valve or equipment access. Refer to Architectural Documents to determine fire-rating requirements. The access panel size must be in proportion to the equipment, piping, or valve requiring access. Minimum access panel

size must be 12" x 12". Due to the diagrammatic nature of the drawings, not all access panels are shown. Access panels are to be included as part of the base bid work.

8-64.3(7) SPECIAL PROTECTION

- A. Exercise maximum precaution to provide positive protection for the existing building and equipment from damage of any kind, and in particular prevent any water and dust seepage into the existing building.
- B. Storage of materials: Make all necessary provisions to prevent damage or corrosion of materials.

8-64.3(8) EQUIPMENT INSTALLATION

- A. General: Provide supports for all equipment and appurtenances as required, including braces as required for seismic restraint; these include frames or supports for pumps and air handlers and all mechanical equipment. Bracing must conform with the requirements of IBC and IMC. Include the design, engineering and installation of these members is the responsibility of the contractor.
- B. Provide material suitable for exterior installation where the installed condition is in an unconditioned, exterior, or exposed location.
- C. Suspended Equipment: Provide hangers from structure as required; span between structural members with additional structural steel as required to mount equipment in locations shown. Do not fasten hangers to metal deck. Do not use powder-actuated fasteners.
- D. Floor-Mounted Equipment - General:
 - 1. Provide machine and floor or foundation fastenings; set equipment on concrete pads. Provide equipment base drawings, bolt-setting information, and anchors for all floor-mounted equipment. Provide concrete expansion anchors through concrete equipment pads, installed into existing structural concrete slabs.
 - 2. Install all equipment at the locations, and to the dimensions indicated. Set equipment accurately with principal centerlines and level, using manufacturers' leveling screws, blocks, shims, or wedges. Do not distort equipment or base plates.
 - 3. Install all equipment and piping such as to provide adequate access for service. This includes access to equipment covered in other divisions or sections of this specification.

8-64.3(9) PIPE SUPPORTS

- A. Attach hangers and support rigidly to the building structure; provide supplementary steel framing and bracing at all changes in pipe direction to resist thrust of flowing water. Provide seismic bracing as required by codes. Do not fasten hangers to metal deck. Do not use powder-actuated fasteners.
- B. Provide additional steel support for piping runs through tight confinements. Provide trapeze system with vibration isolation and seismic restraint for piping through joists and as applicable, due to accessibility of ductwork and mechanical equipment.

8-64.3(10) EXPANSION SHELLS AND BOLTS

- A. Use only where necessary to support piping or equipment from existing concrete slabs or walls.

8-64.3(11) SLEEVES AND SEALING OF SLEEVES

- A. Provide all sleeving and sealing of sleeves for pipes.

- B. Provide annular clear space of approximately 1/4" to 1/2"; size to accommodate insulation passing through sleeve where applicable.
- C. Wherever piping passes through any floor slab above occupied space or equipment, provide pipe sleeves extending 1" above floor.
- D. Set sleeves in place prior to pouring of concrete in new construction; core drill and grout sleeves in place for unit masonry construction and existing construction.
- E. Sealing of sleeves through floor slabs and firewalls: Provide firestop system by 3M or accepted equal.
- F. Sealing of sleeves for below grade floors and walls: Provide Link Seal. Refer to Section 8-65.

8-64.3(12) NAMEPLATES

- A. Provide for all equipment; fasten mechanically. Label access panel or ceiling appropriately for concealed equipment.

8-64.3(13) VALVE TAGS

- A. Provide on all new valves; fasten with brass chain to the valve stem.

8-64.3(14) PIPING IDENTIFICATION

- A. Provide pipe identification labels on not less than 10 foot centers, on both sides of a wall penetration, and at every change in direction, so that a label is visible from a standing position on the floor, not more than three feet from the wall. Refer also to this Section for pipe labeling requirements.

8-64.3(15) PAINTING

- A. General Paint exposed equipment, piping, sheet metal work and mechanical system appurtenances unless noted otherwise. Coordinate color with Engineer. Refer also to Section 8-59.
- B. Application:
 - 1. Thoroughly clean surfaces to be painted to remove dirt, grease and scale. Wash galvanized surfaces with mild solution of acid prior to painting to effectively clean oils from surface and to etch zinc.
 - 2. Paint insulated surfaces and covered piping with one primer coat and two finish coats.
 - 3. Paint exposed equipment, pipes and supports with one primer coat and two finish coats. Paint factory painted equipment to match colors selected by the Engineer: touch up damaged areas with paint to match factory color.
 - 4. Paint the supporting devices for mechanical devices or systems specified to be painted.

8-64.3(16) MISCELLANEOUS EQUIPMENT AND FIXTURE CONNECTIONS

- A. Provide piping, fittings, and make all final mechanical connections in accordance with manufacturers' recommendations for Owner-furnished equipment and fixtures, and equipment and fixtures specified.
- B. Perform on-site review and refer to manufacturers' shop drawings for details of connections. Provide rough-in at locations to conveniently serve items.

8-64.3(18) WIRING

- A. Where power for a piece of equipment is not shown on electrical drawings, provide resources to install wire from piece of equipment to nearest electrical panel; coordinate power requirements with electrical engineer and wire as directed.
- B. Coordinate extent of work with the Electrical sub-contractor.
- C. Wiring must conform to applicable sections of these specifications. Provide wiring from branch circuit over current device to motor controller to motor terminals, including installation of starter and all connections. Provide raceway and conductors as shown for remote control, or interlock connections. Coordinate other control wiring with Sections 8-67 through 8-70 of the Specifications. Provide overload elements in controllers sized to match motor nameplate full load amperes. Space within controllers must not be used as a junction box.

8-64.4 MEASUREMENT

- A. Measurement of "Union Mechanical Plumbing and Ventilation" will be per lump sum.

8-64.5 PAYMENT

- A. "Union Mechanical Plumbing and Ventilation" must include all costs for the work to furnish and install complete and operable mechanical plumbing and ventilation systems depicted on the Drawings and described in Sections 8-64, 8-65, 8-66, 8-67, 8-68, 8-69, 8-70.

Add the following Section to Division 8:

8-65 PLUMBING PIPING (SP 12-19-19)

8-65.1 GENERAL

- A. Specification Section based on CSI Specification Section 22 10 00 Plumbing Piping

8-65.1(1) WORK INCLUDED

- A. Work includes general requirements for plumbing piping and associated appurtenances as outlines in Section 8-64.
- B. Materials and labor for the installation of all plumbing piping work related to the following and as described in the contract documents.

8-65.1(2) QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with all applicable City, County, and State Codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.
- B. Basis: Seattle Building Code; Seattle Plumbing Code; Seattle Mechanical Code.

8-65.1(3) SUBMITTALS

- A. General: Submit in accordance with Section 1-06 and the following:
 - 1. Submit coordinated plumbing piping shop drawings, prepared on the architectural background. Shop drawings must indicate the location of:
 - a. Pipes and Fittings
 - b. Valves
 - c. Access Panels and access clearances

- d. Plumbing Fixtures and Equipment
- 2. Product Data:
 - a. Pipe and Fittings
 - b. Valves
 - c. Gaskets
 - d. Strainers
 - e. Sleeves
 - f. Seals
 - g. Unions
 - h. Dielectric Unions
 - i. Pipe, Hangers and Support
 - j. Accessories (gauges, valves)

8-65.1(4) STANDARDS

A. American National Standards Institute, Inc. (ANSI):

- B1.1 Unified Screw Threads
- B2.1 Pipe Threads (Except Dry Seal)
- B16.1 Cast-Iron Pipe Flanges & Flanged Fittings, 125, and 250 psi
- B16.3 Malleable Iron Threaded Fittings, Class 150 and 300 Pound
- B16.5 Steel Pipe Flanges, Flanged Valves and Fittings Including Ratings for Class 150.
- B16.18 Cast Bronze Solder Joint Fitting
- B16.22 Wrought Copper and Bronze Solder-Joint Pressure Fittings
- B18.2.1 Square Hex Bolts, Screws, Including Askey

B. American Society for Testing and Materials (ASTM)

- A53 Pipe, Steel, Black and Hot-Dipped, Zinc- Coated, Welded, and Seamless
- A120 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized), Welded and Seamless, for Ordinary Uses
- A47 Malleable Iron Castings
- A536 Ductile Iron Castings
- A183 Heat-Treated, Carbon-Steel Track Bolts and Carbon-Steel Nuts
- A126 Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- A181 Forgings, Carbon Steel for General Purpose Piping
- A307 Carbon Steel Externally-Threaded Standard Fasteners
- A36 Structural Steel
- B32 Solder Metal
- B61 Seam or Valve Bronze Casting
- B62 Composition Bronze or Ounce-Metal Castings

B88 Seamless Copper Water Tube

C. Federal Specification (Fed. Spec.)

WW-H-171D Hangers and Supports, Pipe

D. Manufacturers' Standardization Society (MSS)

SP-69 Pipe Hangers and Supports - Selection and Application

8-65.2 PRODUCTS

8-65.2(1) GENERAL

- A. Comply with "Quality Assurance" provisions, Specifications, and Manufacturers' Data. Where these may be in conflict, the more stringent requirements govern.
- B. Pressure Ratings: Provide all components with minimum pressure rating of 150 psig working pressure.

8-65.2(2) PIPING SYSTEMS

- A. All material in conformance with the standards listed in 1.4.
 - 1. Domestic Waste and Vent:
 - a. Pipe: Service weight cast-iron throughout
 - 2. Condensate/Drip Drainage:
 - a. Pipe: Copper (Type L or DWV)
 - 3. Rainwater Leaders:
 - a. Pipe: Schedule 40, service weight cast-iron

8-65.2(3) SLEEVES

- A. Footing Encasement Sleeve: Schedule 80 PVC sleeve.
- B. Floor, Wall and Roof Sleeves: Schedule 40 steel pipe.
- C. Underground walls, floors: Rubberized link assembly fitting in the wall/pipe annulus with compression/expansion adjusted by through bolts. Link Seal or accepted equal.

8-65.2(4) PIPE HANGERS AND SUPPORTS

- A. Description: Provide in accordance with Federal Specification WW-H-171D and MSS SP-69.
- B. Acceptable Manufacturers: ITT-Grinnell, Fee & Mason, Elcen, Unistrut, Powerstrut, Superstrut, or accepted.
- C. Materials:
 - 1. Match piping material at point of contact with piping; carbon steel, cast iron or malleable iron for black steel pipe; carbon steel, iron or malleable with zinc coating or cadmium-plated for galvanized steel pipe; carbon steel or malleable iron with copper finish or PVC plastic coated for copper pipe or plastic pipe.
 - 2. Rods: Hot rolled steel, ASTM A36. Size in conformance with the following:

Rod Diameter (Inches)	Pipe Size (Inches)	Load at 650F (Pounds)
3/8	2 and smaller	610

1/2	2-1/2 and 3-1/2	1,130
5/8	4 and 5	1,810
3/4	6	2,710
7/8	8 to 12	3,770

D. Components:

1. Ring Hangers:
 - a. 2" and smaller: Adjustable swivel type, Grinnell 97 or 104.
 - b. 2-1/2" and larger: Adjustable split-ring swivel type, Grinnell Figure 104.
2. Clevis Hangers: Grinnell Figure 260
3. Trapeze Hangers and Multiple Pipe Supports: Structural steel shapes in conformance with all codes and standards, supported by rods or structural steel shapes as required.
4. Horizontal Pipes at Walls:
 - a. 2-1/2" and smaller: Malleable-iron, one-hole clamp, Grinnell 126.
 - b. 3" and larger: Welded-steel bracket, Grinnell Figure 213, 194, 195, 199, used in conjunction with ring or clevis hangers.
5. Vertical Pipes at Walls:
 - a. 1" and smaller: Galvanized steel pre-formed metal shapes, Unistrut P1100 Series with P2024 clamps for O.D. tubing and P2909 clamps for pipe.
 - b. 2-1/2" and smaller: Galvanized steel pre-formed metal shapes, Unistrut P1100 Series with P2558 pipe straps.
 - c. 3" and larger: Welded-steel brackets as specified for horizontal pipes at walls, connected to Grinnell Figure 212 pipe clamp with Figure 110R eye socket.
6. Insulation Protection: Coordinate with insulation subcontractor, Section 22 07 00.

8-65.2(5) DIELECTRIC UNIONS

- A. Provide at each joint between dissimilar metals:
1. 2" and smaller: Insulating unions.
 2. 2-1/2" and larger: Insulating flange union, 1/2 flange union with bolt insulators, dielectric gasket, bolts and nuts.

8-65.2(6) ACCESS DOORS

- A. Provide access door to all valves and plumbing equipment that is located behind finished surfaces. Locate all access doors on shop drawings for coordination with Engineer.
- B. Doors must be hinged metal doors with keyed access, unless otherwise specified by Engineer.

8-65.3 EXECUTION

8-65.3(1) INSPECTION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until any unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

8-65.3(2) PREPARATION

- A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this Section.
- B. Protect surrounding areas and surfaces to preclude damage from work of this Section.

8-65.3(3) INSTALLATION, APPLICATION, ERECTION AND PERFORMANCE

- A. Install, apply, erect, and perform the work in accordance with "Quality Assurance" provisions, Specifications, and manufacturers' written installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.
- B. Provide thrust bracing of all ells and tees on the following piping systems 3" and larger in size:
 - 1. Thrust bracing must be affixed to fittings with metallic clamp devices with minimum 1-1/4" schedule 40 pipe struts. Paint all metallic parts for corrosion protection. Meet requirement of NFPA-13 for fire sprinkler piping thrust bracing.

8-65.3(4) INSTALLATION OF PIPING

- A. General: Install pipe generally sloped to permit drainage at all low points, free from traps, and in a manner to conserve space for other work; cap or plug all open ends.
 - 1. Slope must be 1/4" per linear foot unless otherwise noted. Pipe must be installed per code.
- B. Location of Piping:
 - 1. Piping plans, sections, details and diagrams are diagrammatic indicating general arrangement of piping installation. Locate piping to avoid interference with building structural members, equipment, building openings, light fixtures, ductwork, electrical work, and other obstructions. Provide offsets as required.
 - 2. Arrange piping to allow access for operation, service, disconnection, and removal and replacement of valves, fixtures and equipment.
 - 3. In general, maintain the maximum possible headroom in ways of egress, including pedestrian walkways and maintenance aisles, maintain a headroom of 7' 2" from the floor to the bottom of any component.
 - 4. Route piping parallel to column lines and perpendicular to floor unless indicated otherwise.
- C. Provide unions or flanges at valves, fixtures and equipment if a means of disconnection is not otherwise provided.
- D. Provide reducing fittings for all changes in pipe size; bushings are not acceptable: Eccentric type as shown.
- E. Use fittings for all changes in direction of piping.
- F. Two position valve stems horizontal or above.
- G. Install valves at every branch off the main, to a maximum of 10 fixtures per branch.
- H. Provide air relief valves at all high points in system to bleed air out of the pipes.
- I. Provide hose end drain valve at all low points in system. System must be fully drainable.
- J. Install heat tracing tape after piping has been pressure tested and all leaks disclosed and repaired. Install in accordance with manufacturer's written instructions and test for continuity and repair any shorts or open circuits prior to applying insulation.

8-65.3(5) SLEEVES

- A. Pipes passing through walls, floors or roofs must be sleeved by schedule 40 steel pipe sleeves sized two inches greater than the pipe diameter. Fill annular space with a listed and fire rated, non-hardening caulking/safing compound. Piping must not directly contact the sleeve.
- B. Pipes passing through underground exterior walls must be sleeved and sealed with a link-type seal.

8-65.3(6) JOINTS

A. Screwed:

1. Provide threads of iron and steel pipes, fittings and couplings in accordance with ANSI B31.1.
2. Produce sufficient lengths of high-quality threads to ensure full metal-to-metal contacts when screwed home in fittings; countersink, ream, and clean ends of pipes after threading.
3. Make up full connections with not more than one full thread exposed, by such method that will not subject pipes or fittings to twisting or cross strains; lubricate male threads only with thread lubricant.

B. Brazed or Soldered:

1. Cut ends square and remove all fins and burrs. Replace all dents and damaged tubing with new tubing.
2. Remove all grease and oil from all joints by wiping with clean cloth saturated with a suitable chemical solvent and then clean with energy cloth.
3. After cleaning, apply non-corrosive flux, apply heat and solder and hold joint rigidly until brazing or solder has hardened.
4. Before brazing or soldering, remove stems and washers of solder-joint valves.

C. Welded:

1. Description: Weld 2-1/2" and larger steel piping, and shaped nipples to existing piping for connection of new piping.
2. Employ only skilled welders who hold one of the following certificates dated within the preceding 12 months:
 3. Certificate of the National Certified Pipe Welding Bureau.
 4. Certificate from a recognized testing laboratory indicating satisfactory welding test results in accordance with the American Petroleum Institute "Standard for Field Welding of Pipe Lines" or ASME Boiler and Unfired Pressure Vessel Code, Section IX, "Welding Qualifications".
5. Beveling: Perform mechanically or by flame cutting. Where beveling is done by flame cutting, thoroughly clean surfaces of scale and oxidation just prior to welding.
6. Erection: Do not split, bend, flatten or otherwise deform piping before, during or after installation. During erection, take care to remove all dirt, scale and other foreign matter from inside the piping by use of a pipe swab or pipe "pig" before connecting sections, valves, equipment and fittings. Where the pipe temperature falls to 32 degrees F or lower, heat the pipe to approximately 100 degrees F for a distance of 1 foot each side of the weld before welding, and finish the weld before the pipe cools to 32 degrees F.

8-65.3(7) PIPE HANGERS AND SUPPORTS

A. Spacing of Hangers and Supports:

Nominal Pipe Size (Inches)	Maximum Span (Feet)		
	STEEL	COPPER	PVC-CPVC
1	7	6	3
1-1/2	9	6	3
2	10	8	4
2-1/2	11	10	4
3	12	10	4
4	14	10	5
5	16	--	5
6 & Larger	17	--	5
6	17	--	5
8	--	--	6
10	--	--	7

1. Support all piping independent from connected equipment. Provide additional hangers or supports at concentrated loads such as flanges, valves, equipment, and similar items.

B. In general, route vertical piping in a manner in which it can be attached to adjacent walls or columns.

C. Anchoring, Guiding and Supporting Piping:

1. Anchor all piping and support in a manner such that expansion and contraction will take place in the direction desired.
2. Prevent vibration with vibration dampers and prevent undue strains on equipment served.
3. Fabricate hangers used for the support of 2" nominal pipe size and larger piping to permit adequate adjustment after erection while still supporting the load.
4. Use wall brackets where the pipes are adjacent to walls or other vertical supports which may be used for supports.
5. Provide supports to adequately carry the weight of the lines and maintain proper alignment.
6. Provide inserts and sleeves for supports in concrete where necessary.
7. Provide pipe guides and anchors at all points where necessary to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying and undue strain.
8. Provide seismic bracing and thrust bracing on all piping.

D. Insulation Protection: Provide insulated piping with a pipe insulation protection device at each support.

8-65.4 MEASUREMENT

- A. Refer to Section 8-64.4.

8-65.5 PAYMENT

- A. Refer to Section 8-64.5.

Add the following Section to Division 8:

8-66 COMMERCIAL PLUMBING FIXTURES (SP 12-19-19)

8-66.1 GENERAL

- A. Specification Section based on CSI Specification Section 22 42 00 Commercial Plumbing Fixtures

8-66.1(1) WORK INCLUDED IN THIS SECTION

- A. Work includes general requirements for plumbing piping and associated appurtenances as outlines in Section 8-64 and 8-65.
- B. Materials and labor for the installation of all plumbing piping work related to the following and as described in the contract documents.

8-66.1(2) QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with all applicable City, County, and State Codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.
- B. Basis: Seattle Building Code; Seattle Plumbing Code; Seattle Mechanical Code.
- C. Standards: Ratings per Hydraulic Institute.

8-66.1(3) SUBMITTALS

- A. General: Submit in accordance with Section 1-06 and the following section.
- B. Provide shop drawings for plumbing work. Include all pipe, fixtures, and access doors required for service of equipment in this section.

8-66.2 PRODUCTS

8-66.2(1) PIPE AND FITTINGS

- A. Soil, and Waste Piping in Building Underground
 - 1. Refer to Section 8-65.
- B. Condensate Drain Piping
 - 1. Copper DWV grade as specified under soil, waste, and vent piping.
- C. Alternate Materials and Installation
 - 1. As allowed by Section 8-64.

8-66.2(2) DRAINS

- A. Floor Drain FD - 1:
 - 1. Not used.

B. Trench Drain TD-1:

1. Plastic HDPS trench body suitable for traffic loading with integral 1% slope. Grate must be of ductile iron and rated for traffic loading (HS20 or Class E). Zurn, J.R. Smith, Mifab, or approved equal.
2. Provide with Dome strainer, sediment bucket, and ductile iron gate.
3. Drain grate shall conform to the latest accessibility requirements of ICC A117.1 and ADA Section 302.3 "Openings".

8-66.2(3) CLEANOUTS AND CLEANOUT ACCESS COVERS

- A. Provide caulked or threaded type extended to finished floor or wall surface. Insure ample clearance at cleanout for rodding of drainage system. Cast iron or bronze construction by Zurn, Mifab, J.R. Smith or equal.
- B. Floor Cleanout Access Covers in unfinished and finished areas:
1. Round with nickel bronze scored frames and plates. Provide round access covers in finished areas with depressed center section to accommodate floor finish. Wall cleanouts to have chrome plated caps.
- C. Floor (FCO):
1. Round with Nickel Bronze scored frames and plates. Bronze scoriated cover, Vandal Proof. J.R.Smith 4020 or approved equal.
- D. Walls (WCO):
1. Bronze plug with stainless steel access cover. Zurn Z-1440.
- E. Clean out (CO):
1. Cast iron body with cast plug. Zurn or accepted equal.
- F. Grade Level (GCO):
1. Cast iron with polypropylene cleanout plug with threaded bras insert cover marked "C.O.". JR Smith 4020 or equal.

8-66.2(4) OIL WATER SEPARATORS

- A. Oil/sediment interceptor: Provide acid resistant coated interior, steel construction, bronze fittings, double wall trap seal, removable sediment bucket, and internal vent connection. Integral storage compartment.
- B. Coordinate with structural on clearance requirements for installation in vault or pre-cast enclosure. Coordinate traffic loading requirements and access requirements with invert depth in field.
- C. Refer to schedule sheet for basis of design.

8-66.2(5) SANITARY SUMP PUMPS:

- A. Provide a new sump pump at elevator sump pit.
- B. Provide a fully submersible sump pump suitable for the passing of min 1/2" spherical solids. Provide with a control panel with DDC integrate-able alarm signal, float switches, and safeties. Provide with hardwired power connection and coordinate power requirements with site electrician.
- C. Basis of Design: Refer to schedules on plan.

8-66.2(6) ROOF DRAINAGE

- A. RD -1: Refer to Architectural for downspout detail at scupper.

8-66.3 EXECUTION

8-66.3(1) GENERAL

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until any unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.
- B. Provide operation and maintenance manuals in accordance with Section 8-65.

8-66.4 MEASUREMENT

- A. Refer to Section 8-64.4.

8-66.5 PAYMENT

- A. Refer to Section 8-64.5.

Add the following Section to Division 8:

8-67 COMMON WORK HVAC (SP 12-19-19)

8-67.1 GENERAL

- A. Specification Section based on CSI Specification Section 23 05 00 Common Work HVAC

8-67.1(1) WORK INCLUDED

- A. Work includes the following: Provide all materials, equipment, labor, supervision, tools and items necessary for the construction, installation, connection, testing and operation of all mechanical work for this project.
- B. Work includes the following:
 - 1. Motors
 - 2. Motor Control equipment
 - 3. Supports and support accessories
 - 4. Anchoring Hardware
 - 5. Identification
 - 6. Balancing work
 - 7. Painting
- C. Seismic/structural calculations related to the seismic support work of this section are the responsibility of the bidding contractor.

8-67.1(2) DEFINITIONS AND ABBREVIATIONS

- A. The word "provide", as used in these specifications, means "furnish and install".
- B. The word "accepted", as used in these specifications, means the acceptance of the Engineer.
- C. Definitions and abbreviations of all terms must be in accordance with applicable definitions of:

ANSI

American National Standards Institute

ASHRAE	American Society of Heating, Refrigerating & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CISPI	Cast Iron Soil Pipe Institute
FM	Factory Mutual Engineering Corporation
HI	Hydraulic Institute
MSS	Manufacturers' Standardization Society of the Valve and Fittings Industry, Inc.
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
UL	Underwriters' Laboratories, Inc.
IBC	International Building Code
UPC	Uniform Plumbing Code
IMC	International Mechanical Code
WAC	Washington Administrative Code
WSEC	Washington State Energy Code
WISHA	Washington Industrial Safety & Health Act

- D. Some of these abbreviations may not be used. All other abbreviations must have the definition commonly associated with them by the trade or industry. Confirm the meaning of any unclear or unknown definitions with the Engineer before proceeding with any work.

8-67.1(3) DRAWINGS AND SPECIFICATIONS

- A. The drawings and specifications are intended to cover all mechanical work, unless otherwise shown. Provide all materials that are necessary for the proper completion of the installation or operation of the equipment.
- B. The drawings are diagrammatic and do not show exact or complete ductwork and piping configurations or the necessary number and types of fittings. Provide all labor and materials required to complete the work indicated.

8-67.1(4) LAW AND ORDINANCES

- A. General:
1. All mechanical work specified under this contract must be in strict accordance with the latest rules and regulations of all applicable codes.

2. Contractor is not relieved from furnishing and installing work shown or specified which may be beyond requirements of ordinances, laws, regulations, and codes. This work must be included within the construction contract.
- B. Approval: File necessary plans, prepare documents and obtain necessary approval of governmental departments having jurisdiction and required certificates of inspection for work and deliver same to Engineer before requesting acceptance and final payment for work.
- C. Procure and pay for all the necessary permits and certificates as required by law. In addition, perform all ordinance and performance tests in the presence of the Engineer, and be responsible for advance notification. Submit copies of signed and accepted permits to the Engineer.

8-67.1(5) MATERIAL REVIEW, SUBMITTALS AND SHOP DRAWINGS:

- A. General:
 1. Provide submittals for all equipment and systems indicated and specified by the Contract Documents.
- B. Prepare and distribute submittals:
 1. Identify each transmittal using the bid item number.
 2. Pay for all costs associated with materials, reproduction, and distribution.
- C. Submittals must be complete, containing the information describing the equipment and systems of all trades. All submittals and submittal information must be submitted at the same time, organized as described below.
- D. The project construction schedule, beginning with the acceptance of the bid and confirmation of the successful bidder, is not the responsibility of the Engineer. The contractor's schedule must recognize and accommodate the review intervals specified herein. The schedule must identify and accommodate the specified submittal and re-submittal review and response period. The contractor must not anticipate or base the construction schedule on expedited reviews or reviews of partial submittals. Submittals must be organized and delivered as specified. No exceptions.
- E. Review all items prior to submission. Submittals must bear the General Contractors stamp, certifying that the contractor has:
 1. Verified all field dimensions and quantities.
 2. Verified all field construction criteria, materials, catalog numbers and similar data.
 3. Reviewed and coordinated submittal data with requirements of the work and the Contract Documents.
- F. Indicate any item, component, material or portion of work which deviates from Contract Documents and completely describe and illustrate nature and extent of deviation. Unless such departures are accepted as indicated in paragraph "Engineer Review", such departures must not be permitted.
- G. Make submittals sufficiently in advance of required acceptance date to allow Engineer 10 working days for each review and resubmission if necessary.
 1. Items submitted without Contractor's review stamp will be returned without action, for resubmission.
 2. Items not submitted in accordance with provisions of this section will be returned, without action, for re-submittal.
 3. Submission of items not accepted as specified by the project manual or addenda will be rejected.

- H. Do not place orders for materials, fixtures, or equipment until acceptance is obtained from Engineer in writing. Oral acceptance will not be considered.

8-67.1(6) SUBMITTALS AND SHOP DRAWINGS

A. Submit:

1. Provide five copies of the submittals in 3-ring notebook(s), organized by specification section, large enough to accept total volume of material. Reference project information must include:
 - a. Project title,
 - b. Project number and Location,
 - c. Architect,
 - d. Engineer,
 - e. Contractor,
 - f. Subcontractor(s),
 - g. Submission date,
 - h. Specification sections submitted.
2. Label cover and binder end. Clearly indicate any items not included with submitted assemblies. Engineer will not take responsibility for collating submitted information into notebooks. Submittals not bound and organized as specified will be rejected.
3. The contractor must make every attempt to respond to the Engineer comments in a timely manner. Submittal material requiring more than three Engineering reviews will be considered non-responsive. The Architect / Engineer may elect to charge the contractor on an hourly basis for additional consultation as required to secure a responsive submittal.
4. Label every submitted product with the associated specification section reference (e.g. 23 05 00-1.05.B.3-“Product A”) and indicate the specific product if multiple products, sizes, models, etc., are shown.
5. The Contractor must make every attempt to respond to the Consultant Engineer's comments in a timely manner. Submittal material requiring more than three Consultant Engineer reviews will be considered non-responsive. The Consultant Engineer may elect to charge the contractor on an hourly basis for additional consultation as required to secure a responsive submittal.
6. Submittals not bound and organized as specified will be rejected.
7. Digital PDF submittals will be accepted in lieu of physical submittals at the discretion of the Engineer and must meet the same organizational requirements. PDFs must be named and organized per the above requirements. Bookmarks should be utilized for each major section and all products must be marked with the referenced specification section.

B. Standards Compliance and Certification:

1. Where equipment or materials are specified to conform with requirements of standards of recognized technical or industrial organizations such as American National Standards Institute (ANSI), American Society for Mechanical Engineers (ASME), Underwriters Laboratories Refrigeration Institute (ARI), or National Electrical Manufacturer's Association (NEMA) that use a label or published listing as a method of indicating compliance, proof of such conformance must be submitted and accepted.

2. Submit certification for the product submitted and not pre-printed certifications. Do not make statements in the certifications that could be interpreted to imply the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material." Simply state that the product conforms to the requirements specified.

C. Substitution of Materials:

1. Substitutions of materials will only be considered where specified materials can not be obtained. All work, including engineering and detailing, and equipment required incidental to the substitution is the responsibility of the Contractor. Substitutions are only permitted if approved in writing by the Engineer. Verbal approvals must not be binding.
2. Substitutions

D. Shop Drawings:

1. Submit in mailing tube if drawing cannot be shipped flat. Do not fold.
2. Submit drawings 8-1/2" x 11", 11" x 17" or 24" x 36" unless size of the items depicted makes such sizes impractical.
3. Prepare shop drawings on a background furnished by the Engineer.
4. Prior to any installation or fabrication of the system components, the contractor must submit five complete sets of shop drawings to the Engineer for approval by the Engineer.
5. Contractor must schedule submittal to Engineer and include sufficient resources with bid to accommodate an additional revision and re-submittal.
6. Incomplete shop drawings will be rejected unless prior approval is requested and given from the Engineer for partial submittals.
7. Review of the shop drawings by the Engineer or AHJ does not relieve the contractor from coordinating the installation of the work with all other trades, nor from compliance with all applicable codes and standards.

E. Submittal Review:

1. Review is general and does not:
 - a. Permit departure from Contract Documents.
 - b. Relieve Contractor from responsibility for error in detail, quantities, dimensions or related items.
 - c. Approve departure from previous instructions or detail.
 - d. Relieve Contractor of responsibility to provide all components, wiring, etc., required to make item operational or usable.
 - e. Imply approval of items for which no data is submitted.
2. Work which requires submittals must not be started without Engineer's review.
3. Allow ten working days for engineering review.
4. Approval will be indicated by a signed stamp affixed to the submittal, or a letter over the Engineer's signature. No exceptions.

F. Re-submittals:

1. Items of materials, fixtures and equipment not accepted by Engineer must be resubmitted within 30 days after engineering review. If Contractor fails to submit items listed below for approval or resubmit in the event of disapproval within specified time, Contractor must provide materials, fixtures and equipment as scheduled on drawings. Where equipment is not scheduled the Contractor must provide materials, fixtures and equipment as identified in the specifications.

- G. Decision of Engineer must be final and binding and items must be provided without change in contract price or time

8-67.1(7) SAFETY AND PROTECTION:

- A. Drive Guards: Provide OSHA-accepted drive and shaft guards for all exposed, rotating shafts and drive connections between motors and driven equipment. Include steel frames securely fastened for easy removal to the equipment frame. Provide tachometer cut-out at shafts where applicable.
- B. Head Protection: Where pipe hangers, equipment support angles, etc., are exposed in walkways, or in access ways for any maintenance, cover all such potentially injurious protrusions less than 7' 2" above the floor with padding; secure and permanently fasten, and finish to match adjacent finishes.

8-67.1(8) TESTING, DEMONSTRATION AND COMMISSIONING

- A. Demonstrate that all equipment operates as indicated and in accordance with manufacturer's recommendations. Support the inspections and testing of components and systems called for to commission the mechanical system. Commissioning must be by the Owner, coordinate efforts and support required with the Owner's project manager. Perform tests in the presence of the Engineer and Owner's Project Manager; give minimum one-week notice prior to test. Provide all instruments and personnel required to conduct the tests.

8-67.1(9) OPERATIONS AND MAINTENANCE MANUALS

- A. Furnish operations and maintenance (O&M) manuals to the Engineer before conducting owner instruction session. Furnish copies of the O & M manuals for review.
- B. O & M manuals must include full descriptions of all systems and products installed under this contract. Furnish complete narrative descriptions, product and originals of equipment descriptions with exploded diagrams, parts lists including part numbers, disassembly and assembly instructions and control wiring diagrams.

8-67.1(10) RECORD DOCUMENTS

- A. Maintain record documents as construction commences. Evaluation of pay requests must be partially based on the level of completion indicated by the record documents..
- B. Mechanical Subcontractor must transfer marks from the jobsite record set to electronic records (AutoCAD) and furnish a reproducible plan set and electronic records (As-Built Drawings) at the conclusion of the contract. This includes but is not limited to detailed and accurate drawings of all site and building piping, equipment, and appurtenances.

8-67.1(11) INSTRUCTION PERIODS FOR OWNER'S PERSONNEL

- A. Description: Following installation of all mechanical equipment and prior to acceptance of the mechanical work, conduct demonstrations and instruction periods to point out locations of servicing points and required points of maintenance and operation to Owner's Project Manager.

8-67.1(13) INDUSTRY STANDARDS, CODES AND SPECIFICATIONS

- A. All materials, equipment, and systems must conform to the following applicable industry standards, codes and specifications:

ANSI	AWS	IBC	NEMA	SMACNA	WISHA
ASHRAE	CISPI	IMC	NFPA	UL	WSEC
ASME	FM	MSS	NSI	UPC	
ASTM	HI	NEC	OSHA	WAC	

- A. Where differences occur between state laws, local ordinances, industry standards, utility company regulations and contract documents, the most stringent must govern.

8-67.1(14) QUALITY ASSURANCE:

- A. Regulatory Requirements: Comply with all applicable City, County, and State codes and ordinances. In case of conflict with drawings or specifications, the more stringent requirements govern.
- B. All equipment specified herein, including but not limited to motors, motor control equipment, starters, panels, etc., must be UL listed. European standard must not be considered as an equivalent.
- C. Basis: Seattle Building Code, Seattle Plumbing Code; Seattle Mechanical Code and local amendments to the same.
- D. Installing Contractor Qualifications: HVAC, sheetmetal and air moving equipment systems must be installed by experienced, sheetmetal contractors and experienced installers. The installation of ductwork and air moving systems must be by journeyman sheetmetal workers or by journeyman sheetmetal workers supervising apprentices. Installers must be employed directly by the contractor, and not subcontracted. Journeymen must have minimum 5 years of experience successfully installing HVAC, sheetmetal and air moving equipment systems similar to those described by these contract documents.

8-67.2 PRODUCTS

8-67.2(1) GENERAL

- A. Comply with "Quality Assurance" provisions, Specifications, and Manufacturers' Data. Where these may be in conflict, the more stringent requirements govern. 8-67.2(2) MOTORS
- A. Provide motors conforming to the following unless noted otherwise:
1. Design and Construction: Unless otherwise indicated, provide electric motors and enclosures described by this specification conforming to the applicable definitions and requirements of NEMA MG-1.
 2. Standard Commercial Product: Provide motors of manufacturers' standard commercial product. A standard commercial product is a product which has been or will be sold on the commercial market through advertisements or manufacturers' catalogs or brochures, and represents the latest production model(s).
 3. Nameplates: Provide all motors with readily visible nameplates containing the information required in NEMA MG-1.
- B. Motor Requirements:

1. Manufacturer: General Electric, Lincoln, Allis-Chalmers, Goulds or U.S. Motors or accepted equal.
2. Type: Furnish High Efficiency motors. Motor efficiencies must meet or exceed the efficiency values required by the Washington State Energy Code.

8-67.2(3) MOTOR CONTROL EQUIPMENT

- A. General: The mechanical contractor is responsible for providing and installing motor control equipment as required for mechanical equipment and systems, unless otherwise indicated or directed. Motor control equipment must be comprised of and comply with the following:
- B. Magnetic motor starters: Where equipment is under automatic control and is furnished with a disconnecting means, provide magnetic motor starters. Starters must conform to or contain items called for below and unless noted otherwise, must be full voltage non-reversing for NEMA size 3 and under. No starters smaller than NEMA size 0 and no half size starters are permitted. Provide starters with protection for phase loss, phase imbalance, overload, and ground fault. Wye-delta type must have motor designed for this use. Coordinate work as required.
 1. Overload devices: Melting alloy or bimetallic type. One overload must be provided for each phase. Provide ambient compensated overload devices only when the motor is at a constant temperature and the controller is subject to a separate, varying temperature. Automatic reset overload devices are not permitted.
 2. Accessories: Each magnetic motor controller must include, "HAND-OFF-AUTO" selector switch, 120 volt coil (unless noted otherwise), red running pilot light, green off pilot light, 100VA (minimum) control transformer (except for 115 volt motors), surge suppression kit, with fused primary and secondary, two spare auxiliary interlock contacts and all other accessories required or noted.
 3. Enclosures: Motor controllers must be contained in an enclosure suitable for the environment in which the controller is mounted. Enclosures located in damp, moist locations and outdoors must be NEMA 3R throughout.
- C. Combination motor controller, motor starter and disconnect. Where equipment is under automatic control and is not provided with a disconnecting means, provide combination motor starter and disconnect. Provide as specified above, and also include a disconnecting means. Must be fused switch type (Class RK5), or motor circuit protector type rated for 22,000 RMS A.I.C. minimum unless noted otherwise and containing all accessories as listed above. If externally powered control circuits are used, provide an auxiliary switch on the disconnect switch or protector and fuse in lieu of the control transformer. Switch or protector must be capable of being padlocked in the off position.
- D. Manual Starters: Where equipment is under manual control, provide manual starter. Starter must be toggle switch type, lockable in the "off" position, with overload relays, pilot light and enclosure per above.
- E. Accepted Manufacturers: Allen Bradley or as accepted through prior approval.

8-67.2(4) EXPANSION SHELLS AND BOLTS

- A. Expansion Shells for Rod Hangers
 1. Phillips, Gregory, Omark, or Fastite in holes drilled in concrete.
- B. Expansion Bolts for Equipment
 1. USM or McCullough in holes drilled in concrete.
 2. No screwed adapters underground.

8-67.2(5) FORMED STEEL CHANNELS AT SLAB

- A. Provide for all equipment; number and size per manufacturer's recommendations or as indicated. Provide supports as needed to support, seismically brace, and protect structure and waterproofing.

8-67.2(6) ANCHOR BOLTS

- A. Provide for all equipment; number and size per manufacturers' recommendations or as indicated.

8-67.2(7) SUPPLEMENTARY STEEL FRAMING

- A. Standard structural steel shapes or Schedule 40 steel pipe, galvanized with extra-heavy finish.

8-67.2(8) SLEEVES

- A. Materials, General Schedule: 40 galvanized steel pipe with unthreaded ends, or standard structural steel shapes.
- B. Firestopping: Three-hour rated penetration sealing system per UL 1479 and ASTM E-814. 3M Fire Barrier, Dow Chemical RTV, Manville Cerafiber, or accepted.
- C. Seal: Seal annulus with bolted compression type seal. Link Seal or by prior approval.

8-67.2(9) WELDING TO BUILDING STRUCTURAL MEMBERS

- A. Not allowed except as indicated.

8-67.2(10) NAMEPLATES

- A. Laminated black plastic with lettering cut through to white background. Plastic strips with raised letters made by a marking device are not acceptable.

8-67.2(11) VALVE TAGS

- A. Must be 0.030" thick brass, 1" diameter size; state the service and destination of the line controlled. Provide tag inscriptions made with a lettering device with 5/16" high cut lettering. Laminated plastic tags, construction similar to nameplates will also be acceptable.

8-67.2(12) PIPING IDENTIFICATION

- A. Self adhesive, pre-printed identification labels indicating direction of flow and pipe contents, using common industry abbreviations. Identify pipe at every change of direction.

8-67.2(13) SPECIAL MAINTENANCE MATERIALS

- A. Provide for equipment requiring frequent replacement of maintenance materials. Provide an extra set of filters, and belts; together with application devices and instructions.

8-67.2(14) PAINTING

- A. Paint all exposed fixtures and equipment in conformance with Sections 8-59 and 8-60. Coordinate color with Engineer. Refer to Architectural documents for paint and application requirements.

8-67.2(15) EQUIPMENT LISTING REQUIREMENTS

- A. Whenever UL Standards exist for equipment provide UL-accepted equipment bearing the UL label.

8-67.3 EXECUTION

8-67.3(1) INSPECTION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until any unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

8-67.3(2) PREPARATION

- A. Field Measurements: Field-verify locations of new work prior to commencing work of this Section.
- B. Protect surrounding areas and surfaces to preclude damage from work of this Section.

8-67.3(3) INSTALLATION, ERECTION, AND PERFORMANCE

- A. Install, apply, erect, and perform the work in accordance with "Quality Assurance" provisions, Specifications, and manufacturers' installation instructions and directions. Where these may be in conflict, the more-stringent requirements govern.

8-67.3(4) CLEANING

- A. Promptly remove waste material and rubbish caused by mechanical construction work. At completion of the project, clean all equipment, piping and fixtures installed or provided under this Contract.

8-67.3(5) CUTTING AND PATCHING

- A. Cut all openings and holes required for mechanical work. Coordinate with other trades prior to commencing work.

8-67.3(6) ACCESSIBILITY

- A. Locate valves, dampers, controls, etc., to be easily accessible.
- B. Install all equipment that requires periodic servicing or repairs to be readily accessible. Otherwise, obtain Engineer's approval of location. Where valve and equipment is concealed behind access panels or by ceiling tiles, label panel or tile appropriately. Show location of all access clearances on the coordinated shop drawings.
- C. Provide access panels as indicated or required for piping, valve or equipment access. Refer to Architectural Documents to determine fire-rating requirements. The access panel size must be in proportion to the equipment, piping, or valve requiring access. Minimum access panel size must be 12" x 12". See Sections 8-53 through 8-57.

8-67.3(7) SPECIAL PROTECTION

- A. Exercise maximum precaution to provide positive protection for the new installed equipment from damage of any kind, and in particular prevent any water and dust seepage into the building.
- B. Storage of materials: Make all necessary provisions to prevent damage or corrosion of materials.

8-67.3(8) EQUIPMENT INSTALLATION

- A. General: Provide supports for all equipment and appurtenances as required, including braces as required for seismic restraint; these include frames or supports for pumps and air handlers and all mechanical equipment. Bracing must conform with the requirements of IBC and IMC. Include the design, engineering and installation of these members is the responsibility of the contractor.

- B. Suspended Equipment: Provide hangers from structure as required; span between structural members with additional structural steel as required to mount equipment in locations shown. Do not fasten hangers to metal deck. Do not use powder-actuated fasteners.
- C. Floor-Mounted Equipment - General:
 - 1. Provide machine and floor or foundation fastenings; set equipment on concrete pads. Provide equipment base drawings, bolt-setting information, and anchors for all floor-mounted equipment. Provide concrete expansion anchors through concrete equipment pads, installed into structural concrete slabs.
 - 2. Install all equipment at the locations, and to the dimensions indicated. Set equipment accurately with principal centerlines and level, using manufacturers' leveling screws, blocks, shims, or wedges. Do not distort equipment or base plates.
 - 3. Install all equipment, piping and ducting such as to provide adequate access for service. This includes access to equipment covered in other divisions or sections of this specification.

8-67.3(9) PIPE SUPPORTS

- A. Attach hangers and support rigidly to the building structure; provide supplementary steel framing and bracing at all changes in pipe direction to resist thrust of flowing water. Provide seismic bracing as required by codes. Do not fasten hangers to metal deck. Do not use powder-actuated fasteners.
- B. Provide additional steel support for piping runs through tight confinements. Provide trapeze system with vibration isolation and seismic restraint for piping through joists and as applicable, due to accessibility of ductwork and mechanical equipment.

8-67.3(10) EXPANSION SHELLS AND BOLTS

- A. Use only where necessary to support piping or equipment from concrete slabs or walls.

8-67.3(11) SLEEVES AND SEALING OF SLEEVES

- A. Provide all sleeving and sealing of sleeves for pipes and ducts.
- B. Provide annular clear space of approximately 1/4" to 1/2"; size to accommodate insulation passing through sleeve where applicable.
- C. Wherever piping passes through any floor slab above occupied space or equipment, provide pipe sleeves extending 1" above floor.
- D. Set sleeves in place prior to pouring of concrete in new construction; core drill and grout sleeves in place for unit masonry construction.
- E. Sealing of sleeves through floor slabs and firewalls: Provide firestop system by 3M or accepted equal.
- F. Sealing of sleeves for below grade floors and walls: Provide Link Seal. Refer to Sections 8-67 through 8-70.
- G. Refer to Architectural details for slab penetrations.

8-67.3(12) NAMEPLATES

- A. Provide for all equipment; fasten mechanically. Label access panel or ceiling appropriately for concealed equipment.

8-67.3(13) VALVE TAGS

- A. Provide on all new valves; fasten with brass chain to the valve stem.

8-67.3(14) PIPING IDENTIFICATION

- A. Provide pipe identification labels on not less than 10 foot centers, on both sides of a wall penetration, and at every change in direction, so that a label is visible from a standing position on the floor, not more than three feet from the wall. Refer also to this Section for pipe labeling requirements.

8-67.3(15) PAINTING

- A. General Paint exposed equipment, ducts, piping, sheet metal work and mechanical system appurtenances unless noted otherwise. Coordinate color with Engineer. Refer to Sections 8-59 and 8-60.
- B. Application:
 - 1. Thoroughly clean surfaces to be painted to remove dirt, grease and scale. Wash galvanized surfaces with mild solution of acid prior to painting to effectively clean oils from surface and to etch zinc.
 - 2. Paint insulated surfaces and covered piping with one primer coat and two finish coats.
 - 3. Paint exposed equipment, pipes and supports with one primer coat and two finish coats. Paint factory painted equipment to match colors selected by the Engineer: touch up damaged areas with paint to match factory color.
 - 4. Paint the supporting devices for mechanical devices or systems specified to be painted.

8-67.3(16) MISCELLANEOUS EQUIPMENT AND FIXTURE CONNECTIONS

- A. Provide piping, ductwork, and make all final mechanical connections in accordance with manufacturers' recommendations for Owner-furnished equipment and fixtures, and equipment and fixtures specified.
- B. Perform on-site review and refer to manufacturers' shop drawings for details of connections. Provide rough-in at locations to conveniently serve items.
- C. Provide a pressure/temperature port within 6" of all temperature and pressure sensors inserted into the duct and piping. Coordinate with Sections 8-30 and 8-71 for final location and count of sensors.

8-67.3(17) BALANCING WORK

- A. General: The Mechanical Subcontractor must provide all support for commissioning, balancing and testing work. Coordinate with Section 8-67.
- B. Work by Mechanical Subcontractor:
 - 1. Provide the balancing subcontractor with access to all equipment installed under this contract requiring balancing. Provide ladders, scaffolding, lifts as required to permit the Subcontractor to complete their work.
 - 2. Operate the mechanical systems and be responsible for all equipment until the balancing and testing is complete. Before balancing and testing commences, check all rotating equipment for proper rotation and lubricate per the manufacturers' recommendations.
 - 3. Do not assume that equipment is shipped from the factory configured to meet specified volumes and quantities. Include and provide belt, sheave, starter heater and other equipment changes, and all work as required as part of this contract in order to permit balancing to required values.

4. Before balancing and testing commences, operate all pumps and auxiliary equipment for a minimum of one hour. During this period, check out and calibrate all control components under operating service.

C. Work Coordinated With Owner:

1. Coordinate balancing with other work and building occupancy to ensure no interruptions occur.

8-67.3(1) WIRING

- A. Wiring must conform to applicable sections of these specifications. Provide wiring from branch circuit over current device to motor controller to motor terminals, including installation of starter and all connections. Provide raceway and conductors as shown for remote control, or interlock connections. Coordinate other control wiring with Sections 8-30, 8-67 through 8-70 of the Specifications. Provide overload elements in controllers sized to match motor nameplate full load amperes. Space within controllers must not be used as a junction box.

8-67.4 MEASUREMENT

- A. Refer to Sections 8-64.4.

8-67.5 PAYMENT

- A. Refer to Sections 8-64.5.

Add the following Section to Division 8:

8-68 REFRIGERANT PIPING (SP 12-19-19)

8-68.1 GENERAL

- A. Specification Section based on CSI Specification Section 23 23 00 Refrigerant Piping

8-68.1(1) DESCRIPTION

A. General:

1. Work includes all refrigerant products, material, equipment and installation. Provide all refrigerant pipe and pipe fitting as required by the mechanical system design, the specifications and/or the contract documents. Provide a complete and operable system. Comply with the requirements of Section 8-67.

B. Work Included:

1. Refrigerant pipe, fittings, connections, procedures and testing. The contractor must coordinate the refrigeration piping needs with the actual condensing unit and air handler furnished, and include in with their costs all hardware, tubing, piping and accessories required. Work and installation must be per the manufacture's written instructions.

C. Code:

1. All work must be installed in accordance with Seattle Mechanical Code, International Building Code and all local codes and amendments there to. Refer to Specification Section 8-67.

8-68.1(2) SUBMITTALS

- A. Comply with the requirements of Section 8-67 . Provide submittals for the equipment and materials listed in 8-67.2.

8-68.1(3) QUALITY ASSURANCE

- A. Brazing, Soldering and Welding Materials and Procedures: Conform to ASME Code and applicable State, and local, regulations.

8-68.1(4) QUALIFICATIONS

- A. All piping, start-up and testing must be performed by a licensed refrigeration mechanic.

8-68.1(5) SHOP DRAWINGS

- A. General: Submit the following.
 - 1. Product Data:
 - a. Pipe and Fittings
 - b. Valves and accessories.
 - 2. Submit coordinated plumbing piping shop drawings, prepared on the architectural background. Shop drawings must indicate the location of:
 - a. Pipes and Fittings

8-68.2 PRODUCTS

8-68.2(1) PIPE AND TUBE

- A. Refrigerant Piping:
 - 1. Dimensional requirements for pipe, pipe fittings and components must conform to ANSI 15 and ANSI B31.5. Tubing used for refrigerant service must be cleaned, sealed, capped or plugged prior to being shipped from the manufacturer's plant.
- B. Pipe and Fittings:
 - 1. Underground: Type K Copper, hard-drawn, seamless copper tube.
 - 2. Aboveground: Type L Copper, hard-drawn, seamless copper tube.
 - 3. ASTM B 20, straight length except that coil length may be used for connection to equipment, limit use of coiled copper to 6-feet or less. Fittings must be ANSI B16.18, cast bronze or ANSI B16.22, wrought copper with brazing or solder joints, and ANSI B16.24 bronze flanges and flanged fittings.
- C. Pipe Sleeves:
 - 1. Pipe sleeves through outside walls, floors or roof slabs must be zinc-coated steel pipe conforming to ASTM A120. Sleeves through inside partitions must be zinc-coated sheet steel not less than 0.0217 inches thick conforming to ASTM A 525.
- D. Brazing Metal:
 - 1. AWS A5.8 15 percent silver-base alloy, minimum melting point 452 degrees F for pressure up to 150 psi.
- E. Solder Metal:
 - 1. ASTM B 32, Grade 95TA, tin-antimony alloy, minimum melting point 452 degrees F for pressure up to 150 psi.

8-68.2(2) FILTER DRYERS

- A. Sporlan or approved equal.

8-68.2(3) SIGHT GLASSES

- A. Sporlan or approved equal.

8-68.2(4) THERMAL EXPANSION VALVES

- A. The thermal expansion valves are provided matched to the air handling unit coils by the air handler or air conditioning unit manufacturer.

8-68.3 EXECUTION

8-68.3(1) EXAMINATION

- A. Verify conditions, including defects or errors which would cause defective installation/ application or products or cause latent defects in workmanship or function.

8-68.3(2) PREPARATION

- A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this Section.
- B. Protect surrounding areas and surfaces to preclude damage from work of this Section. Refrigerant piping must be protected against entrance of foreign matter, dirt and moisture. Open connections to compressors, condensers, evaporators and other equipment tightly capped until assembly.

8-68.3(3) INSTALLATION, APPLICATION, ERECTION AND PERFORMANCE

- A. Install, apply, erect, and perform the work in accordance with "Quality Assurance" provisions, Specifications, and manufacturers' written installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.
- B. Provide thrust bracing of all ells and tees on the following piping systems 3" and larger in size:
 - 1. Thrust bracing must be affixed to fittings with metallic clamp devices with minimum 1-1/4" schedule 40 pipe struts. Paint all metallic parts for corrosion protection.

8-68.3(4) UNDERGROUND REFRIGERANT PIPING

- A. Underground refrigerant piping must be installed inside a vapor tight protective sleeve to prevent insulation deterioration and water infiltration. Refrigerant pipe installed inside underground casing must be continuous without any joints. Underground refrigerant pipe must be located at a level below the frost line.
- B. Refrigerant lines must be insulated separately and if more than one system is installed use a separate casing for each set of refrigerant piping.
- C. Install casing as one continuous piece.

8-68.3(5) INSTALLATION OF PIPING

- A. General: Install pipe free from traps, and in a manner to conserve space for other work; cap or plug all open ends.
- B. Location of Piping:
 - 1. Piping plans, sections, details and diagrams are diagrammatic indicating general arrangement of piping installation. Locate piping to avoid interference with building structural members, equipment, building openings, light fixtures, ductwork, electrical work, and other obstructions. Provide offsets as required.

2. Arrange piping to allow access for operation, service, disconnection, and removal and replacement of valves, fixtures and equipment.
 3. In general, maintain the maximum possible headroom in ways of egress, including pedestrian walkways and maintenance aisles, maintain a headroom of 7' 2" from the floor to the bottom of any component.
 4. Route piping parallel to column lines and perpendicular to floor unless indicated otherwise.
- C. Provide unions or flanges at valves, fixtures and equipment if a means of disconnection is not otherwise provided.
- D. Provide reducing fittings for all changes in pipe size; bushings are not acceptable: Eccentric type as shown.
- E. Use fittings for all changes in direction of piping.
- F. Two position valve stems horizontal or above.
- G. Install valves at every branch off the main, to a maximum of 10 fixtures per branch.
- H. Provide air relief valves at all high points in system to bleed air out of the pipes.

8-68.3(6) SLEEVES

- A. Pipes passing through walls, floors or roofs must be sleeved by schedule 40 steel pipe sleeves sized two inches greater than the outside diameter of pipe with insulation. Fill annular space with a listed and fire rated, non-hardening caulking/safing compound. Piping must not directly in contact with the sleeve wall.
- B. Pipes passing through underground exterior walls must be sleeved and sealed with a link-type seal.

8-68.3(7) JOINTS

A. Brazed or Soldered:

1. Cut ends square and remove all fins and burrs. Replace all dents and damaged tubing with new tubing.
2. Remove all grease and oil from all joints by wiping with clean cloth saturated with a suitable chemical solvent and then clean with energy cloth.
3. After cleaning, apply non-corrosive flux, apply heat and solder and hold joint rigidly until brazing or solder has hardened.
4. Before brazing or soldering, remove stems and washers of solder-joint valves.
5. Pass nitrogen gas through the pipe to prevent oxidation as each joint is brazed. Cap the system with a reusable plug after each brazing operation to retain the nitrogen and prevent entrance of air and moisture.

B. Welded:

1. Description: Weld 2-1/2" and larger steel piping, and shaped nipples to existing piping for connection of new piping.
2. Employ only skilled welders who hold one of the following certificates dated within the preceding 12 months:
3. Certificate of the National Certified Pipe Welding Bureau.
4. Certificate from a recognized testing laboratory indicating satisfactory welding test results in accordance with the American Petroleum Institute "Standard for Field

Welding of Pipe Lines" or ASME Boiler and Unfired Pressure Vessel Code, Section IX, "Welding Qualifications".

5. Beveling: Perform mechanically or by flame cutting. Where beveling is done by flame cutting, thoroughly clean surfaces of scale and oxidation just prior to welding.
6. Erection: Do not split, bend, flatten or otherwise deform piping before, during or after installation. During erection, take care to remove all dirt, scale and other foreign matter from inside the piping by use of a pipe swab or pipe "pig" before connecting sections, valves, equipment and fittings. Where the pipe temperature falls to 32 degrees F or lower, heat the pipe to approximately 100 degrees F for a distance of 1 foot each side of the weld before welding, and finish the weld before the pipe cools to 32 degrees F.

8-68.3(8) REFRIGERATION PIPING

- A. Fabrication and Assembly of Piping and Components: Fabrication of piping and components must conform to ANSI 15 and ANSI B31.5 and as specified herein. Piping must be cleaned, sealed, plugged, or capped for delivery to the site.
- B. Refrigerant piping must slope in the direction of refrigerant flow. Trapping of lines must not be permitted except as indicated or required by the manufacturer's written installation instructions. Sleeves of suitable size must be provided for lines passing through building walls as specified herein.
- C. Returning Oil From Refrigeration System: Refrigerant lines must be installed so that the gas velocity in the evaporator suction line is sufficient to move the oil along with the gas to the compressor.
- D. Except as indicated otherwise where equipment location requires a vertical riser, the line size must be such as to allow sufficient velocity to lift the oil at minimum system loading pressure and velocity and pressure drop. The larger riser must have a trap, of minimum volume, obtained by use of 90 degree ells. The smaller riser must be arranged with inlet close to end lower horizontal line, and the larger riser must connect from end of lower horizontal line to the top of upper horizontal line. Valves must not be installed in risers.

8-68.3(9) HANGERS AND SUPPORTS

- A. Spacing of Hangers and Supports:

Nominal Pipe Size (Inches)	Maximum Span (Feet)
COPPER	
1	6
1-1/2	6
2	8
2-1/2	10
3	10
4	10
5	--
6 & Larger	--
6	--
8	--
10	--

1. Support all piping independent from connected equipment. Provide additional hangers or supports at concentrated loads such as flanges, valves, equipment, and similar items.
- B. In general, route vertical piping in a manner in which it can be attached to adjacent walls or columns.
- C. Anchoring, Guiding and Supporting Piping:
 1. Anchor all piping and support in a manner such that expansion and contraction will take place in the direction desired.
 2. Prevent vibration with vibration dampers and prevent undue strains on equipment served.
 3. Fabricate hangers used for the support of 2" nominal pipe size and larger piping to permit adequate adjustment after erection while still supporting the load.
 4. Use wall brackets where the pipes are adjacent to walls or other vertical supports which may be used for supports.
 5. Raise piping located on roof decks above the plane of the roof. Do not use wood blocks instead provide more permanent means of support.
 6. Provide supports to adequately carry the weight of the lines and maintain proper alignment.
 7. Provide inserts and sleeves for supports in concrete where necessary.
 8. Provide pipe guides and anchors at all points where necessary to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying and undue strain.
 9. Provide seismic bracing and thrust bracing on all piping.
- D. Insulation: Provide insulated piping with a pipe insulation protection device at each support.

8-68.3(10) CLEANING OF THE REFRIGERATION PIPING SYSTEM

- A. When installations of the various components of the piping system are completed, they must be cleaned before final closing. All piping and components must be cleaned free of scale and thoroughly flushed of all foreign matter. Thoroughly clean all strainers and valves. Equipment must be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. The Contractor must maintain the system in this clean condition until final approval.

8-68.3(11) FIELD INSPECTION

- A. General:
 1. Prior to initial operation, conduct tests on the piping system. Materials and equipment required for tests must be furnished by the Contractor. Defects disclosed by the test must be corrected by the party responsible for installation and prior to acceptance must be performed in the presence of the Engineer and must be subject to his approval.
- B. Preparation for Tests:
 1. Before tests are made, controls and equipment that may be damaged by the test pressure employed must be temporarily removed.
- C. Charging the System for Test:
 1. The low and high pressure sides of the system must be charged with a dry, inert gas, such as nitrogen (N₂) or anhydrous carbon dioxide (CO₂) using a small amount of the refrigerant gas to act as a tracer.

2. Use pressure limiting or reducing valve with pressure gage on the high-pressure gas tank to limit the pressure in the system to the specified test pressure for the respective refrigerant.

D. Leakage Test:

1. With the system charged to the desired pressure, the gas supply must be tightly shut off and the system held for 30 minutes, during which time there must be no loss of pressure. If a pressure drop, not attributable to temperature changes, occurs during this period the entire system must be checked with a halied torch or an electronic leak detector.
2. If any leak is found, the leak must be repaired and the system tested for another 30 minute period at the test pressure. Testing and repair must continue until there is no loss of pressure.

E. Evacuation:

1. After completion of testing of refrigerant system for leaks remove all air and moisture from the system by using a vacuum pump. The pump must be capable of reducing the absolute pressure in the system to a point where any water present in the lines will vaporize at a temperature appreciably below the ambient temperature and will be withdrawn from the system.
2. Before conducting the evacuation test, inspect the vacuum pump oil for purity and provide new oil charge if existing charge is contaminated. Conform with the following requirements.

F. Extent of Evacuation:

1. Evacuate the system to a maximum absolute pressure of 0.020 inches of mercury (500 microns) or lower. During the evacuation the ambient temperature must not be below 35 degrees F. Use pressure gages for measurement of pressure.

G. Criteria of Dryness:

1. Upon achieving specified evacuation of system valve off the vacuum pump from the system for a period of at least 12 hours. The system must be considered tight and dry and free of air if the absolute pressure has not increased by more than .002 inches of mercury (50 microns) at the expiration of this period.
2. Repeat the pressure test if the pressure rise exceeds 0.02 inches of mercury which indicates a leak in the system or presence of moisture. If no leaks are found, resume the evacuation test and continue until dryness of system is achieved.

H. Sealing Off the System:

1. When a satisfactory vacuum has been obtained it must be broken with the introduction of vapor (no liquid) and subsequent sealing off of the system.

I. Charging of Refrigerant for the Piping System:

1. The Contractor must furnish the initial charge of refrigerant which must be charged by connecting the drums of refrigeration into the low side of the system where it will be evaporated. The gross and net weights of the drum must be noted. Place the drum on a scale so that it may be determined when it has been emptied.
2. The charging connection must be loosely connected to the system connection, so that the initial flow of refrigerant will expel air from the connection, following which the loose joint must be started and operated while charging continues.
3. Unless otherwise recommended by the manufacturer, the following procedures must be exercised during the charging operation:

- a. Place the refrigerant condensing system in operation.
 - b. Place the fluid circulation system, of water coolers or evaporator fans of a direct-expansion system in operation.
- J. Startup and Operational Tests:
 1. The refrigeration piping system must be started up and initially operated. During this time the various strainers must be periodically cleaned until no further accumulation of foreign material occurs. Care must be exercised so that minimum loss of refrigeration occurs when the strainers are cleaned. Safety and automatic control instruments must be adjusted as necessary to place them in operation and sequence as indicated.
 2. A factory or manufacturer's representative must be present and provide start-up documentation for all refrigerant systems. Document all data required for tests and provide to Balancing Agent along with start-up forms.

8-68.4 MEASUREMENT

- A. Refer to Section 8-64.4.

8-68.5 PAYMENT

- A. Refer to Section 8-64.5.

Add the following Section to Division 8:

8-69 HVAC GRAVITY VENTILATORS (SP 12-19-19)

8-69.1 GENERAL

- A. Specification Section based on CSI Specification Section 23 37 23 HVAC Gravity Ventilators

8-69.1(1) WORK INCLUDED

- A. Work includes sheet metal work, related components and duct cleaning.

8-69.1(2) QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. Comply with all applicable City, County and State Codes and Ordinances and local amendments to Codes and Ordinances. In case of conflict with drawings or specifications, the Codes and Ordinances govern.
 2. Basis: Seattle Building Code; Seattle Plumbing Code; Seattle Mechanical Code; NFPA 90A.

8-69.1(3) SUBMITTALS

- A. General: Submit in accordance with Section 8-67 and the following.
- B. Shop Drawings: Submit coordinated ductwork shop drawings for the building. Prepare shop drawings on backgrounds provided by the Engineer coordinated with steel, plumbing, piping and electrical.
- C. Product Data:
 1. Roof Ventilators
- D. Submit the manufacturer's installation and startup manual & operating and maintenance manual as a part of the initial equipment submittal. These must be bound in a separate 3-ring

binder from the product data and must meet the requirements of Section 8-67. Product data submitted without this additional data must be returned unreviewed as incomplete.

8-69.2 PRODUCTS

8-69.2(1) ROOF VENTILATOR, RV

A. RV

1. Roof relief ventilators must be constructed of heavy gauge aluminum or galvanized steel as specified. Bases must be constructed so that the curb cap is 6 in larger than the throat size. Standard base height must be 5 in. Hood support members must be constructed of galvanized steel and fastened so that the hood can be either removed completely from the base or hinged open.
2. Provide with motor operated damper and curb. Coordinate roof slope with curb construction. Provide hinged access for service to damper.
3. Birdscreens constructed of 0.5 in galvanized steel mesh must be mounted horizontally across the discharge area of the hood. Relief units with throat widths through 48 in must ship assembled when throat lengths do not exceed 96 in.
4. Basis of Design: Greenheck WRH or accepted equal.

B. RV:

1. Roof Intake ventilators must be constructed of heavy gauge aluminum or galvanized steel as specified. Bases must be constructed so that the curb cap is 6 in larger than the throat size. Standard base height must be 5 in. Hood support members must be constructed of galvanized steel and fastened so that the hood can be either removed completely from the base or hinged open.
2. Provide with motor operated damper and curb. Coordinate roof slope with curb construction. Provide hinged access for service to damper.
3. Optional 12-in bases must be furnished for intake applications to restrict entry of moisture and for all applications where rain and snow may accumulate on the roof deck.
4. Basis of Design: Greenheck WIH or accepted equal.

8-69.3 EXECUTION

8-69.3(1) INSPECTION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until any unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

8-69.3(2) PREPARATION

- A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this Section.
- B. Protect surrounding areas and surfaces to preclude damage from work of this Section.

8-69.3(3) CLEANING AND ADJUSTING

- A. Plenums and casings must be thoroughly cleaned of all debris and blown free of all small particles of rubbish and dust before installing and making final duct connections. Equipment must be wiped clean, with all traces of oil, dust, dirt or paint spots removed. Ductwork and plenums must be cleaned, and openings sealed during any construction activities. Covers

from duct openings may be removed when the system is approved to be operated for air balancing and building conditioning.

8-69.3(4) INSTALLATION, APPLICATION, ERECTION AND PERFORMANCE

- A. Install, apply, erect and perform the work in accordance with "Quality Assurance" provisions, Specifications, and Manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.
- B. Ductwork: All ductwork must be installed in workmanlike manner, by craftsmen with at least five years of experience in the sheet metal trade. Fabrications, fittings, joints, take-offs, attachment to sheetmetal work, turning vanes, dampers and sealing must be in accordance with the requirements of SMACNA HVAC Duct Construction Standards and as indicated.
- C. Offsets: The drawings do not show all offsets which may be required. Make offsets with fittings with as small an angle of offset as possible; do not use square corners unless specifically shown; when square corners are used, install turning vanes.
- D. Access Doors: Provide at each duct smoke detector, motor-operated damper, plenum, fire damper, or at other points requiring maintenance access.
- E. Flexible Connections: Provide at all fans except internally isolated equipment and air terminal units.

8-69.4 MEASUREMENT

- A. Refer to Section 8-64.4.

8-69.5 PAYMENT

- A. Refer to Section 8-64.5.

Add the following Section to Division 8:

8-70 SPLIT-SYSTEM AIR-CONDITIONERS (SP 12-19-19)

8-70.1 GENERAL

- A. Specification Section based on CSI Specification Section 23 81 26 Split-System Air-Conditioners

8-70.1(1) DESCRIPTION

- A. Work includes all room air conditioning equipment, including temperature controls, all products, material, equipment, and installation. Provide all equipment as required by the system design, the specifications, and/or the contract documents. Provide a complete and operable system. Coordinate electrical requirements of all equipment furnished hereunder with Section 8-30, and the Electrical Contractor.

8-70.1(2) CODES

- A. All work must be installed in accordance with Uniform Mechanical Code, Uniform Building Code, Washington State Energy Code and all local codes. Refer to Specification Section 8-67. All assemblies must be UL listed.

8-70.1(3) SUBMITTALS

- A. Provide submittal information in accordance with Section 8-67. Provide submittal information for all equipment items specified including the following.

1. Air conditioner layout, sections, hardware,
2. Performance information,
3. Condensing unit characteristics.
4. Submit the manufacturer's installation & startup manual as a part of the initial equipment submittal.
5. Submit the manufacturer's operating and maintenance manual as a part of the initial equipment submittal.
6. Documentation of UL listing of all assemblies and products of this Section.

8-70.1(4) QUALITY ASSURANCE

- A. Comply with the requirements of Section 8-67.

8-70.2 PRODUCTS

8-70.2(1) GENERAL

- A. The room air conditioner must be split system, air cooled, wall mounted with integral grilles. Cooling capacities as scheduled. The unit must include a non-automatic disconnect switch mounted in the high voltage section of the electric panel. Furnish air conditioner with controls, thermostat, refrigerant line set and all necessary accessories for a complete installation.
- B. Provide with structural supports and seismic bracing to accommodate location shown and noted on plan.
- C. Basis of Design: Mitsubishi.
 1. Acceptable Manufacturers: Carrier, Mitsubishi, Trane, Sanyo.

8-70.2(2) CABINET AND FRAME

- A. Cabinets must be constructed from galvanized steel with a minimum thickness of 20 gauge for steel panels. Cabinet panels must be adequately reinforced for the maximum static pressures anticipated. All panel joints must be bolted and caulked to ensure air and weather resistance, as required. The cabinet interior must be insulated with minimum 1" thick, 1.5 pound per square foot density fiberglass insulation board. The unit must have access doors of a construction similar to cabinet panels. Brass hinges, continuous bulb gasket all around door.

8-70.2(3) CABINET PENETRATIONS

- A. Pipe conduit and other penetrations of fan cabinets must be tightly sealed against present and anticipated air, sound and water leaks. Resiliently gasketed sleeves or approved equal.

8-70.2(4) AIR COOLED REFRIGERATION CIRCUIT

- A. Indoor Evaporator Unit:
 1. The evaporator coil must be copper tube with maximum 12 fins per inch of corrugated aluminum. Expansion valve must be of adjustable thermostatic type. Compressor must be hermetic type with complete overload protection anti-slug device, crankcase heater, sightglass, short cycle timer, and low override pressure timer. Filter drier must be high capacity flare fitting type for non-torch servicing. The circuit must contain high and low pressure switches and suction line accumulator. Reheat coil must be electric.
 2. Provide indoor unit with integral condensate drain pan. If unit is unavailable with an integral drain pan then provide a drain pan below the cooling coil to catch condensate drip.

3. Provide indoor unit with condensate pump. Condensate drain lines must be provided by the contractor as part of the base bid and routed to nearest approved drainage location.
4. Provide internal drain pan with a water level switch to shut off unit in the case of drain pan overflow due to clogging, unit failure, or condensate pump failure. Provide any additional tertiary drain pans as required by specific local codes.

B. Outdoor Air-Cooled Condenser Unit:

1. The system must have a direct drive propeller fan type air cooled condenser. The condenser must be constructed of galvanized steel and contain a copper tube aluminum fin. All components must be factory assembled, charged with refrigerant, sealed and be capable of being connected to the evaporator section using pre-charged refrigerant line sets. Condenser must be capable of operations to -20 degrees Fahrenheit. All controls must be factory mounted in the air cooled condenser. Provide factory roof curb. The air cooled condenser must be manufactured by the manufacturer of the indoor unit.
2. Provide unit with drain pan to collect condensate the forms during heating operation of the heat pump. Route condensate in the same fashion as the condensate of the indoor unit. Route by gravity where possible.

C. Piping:

1. The mechanical must verify refrigerant line size with the manufacturer before ordering or installing piping. The contractor must submit factory line sizing information to the mechanical engineer for review before installation.
2. Condensate piping, and pump, to be provided.
3. Refer to Section 8-68 for underground piping specification

8-70.2(5) TEMPERATURE CONTROLS

- A.** Furnished by the equipment manufacturer, for installation by the mechanical contractor.
1. As manufactured by selected manufacturer, or an accepted equivalent.

8-70.3 EXECUTION

8-70.3(1) EXAMINATION

- A.** Verify conditions, including defects or errors which would cause defective installation/application of products or cause latent defects in workmanship or function.

8-70.3(2) INSTALLATION

- A.** Install in accordance with manufacturer's written recommendations and as specified. Furnish all required materials, accessories, appurtenances and work required to support or suspend equipment. Install equipment with associated ductwork and piping to permit access to doors and panels as required for periodic maintenance.
- B.** Start-up must be performed by a manufacturer authorized technician and per the manufacturer's written instructions.
- C.** Equipment Manufacturer's Participation in Project Commissioning
1. Assist in developing the final functional test procedures.
 2. Provide authorized startup technician to perform functional performance testing as specified in Section 8-67, and related sections.

3. Provide building commissioning support.

8-70.3(3) LOCATION AND SIZE

- A. The equipment scheduled on the drawings is selected and configured to fit in the mechanical space available. Insure that substitute equipment will fit without change in function or quality. Cost of all materials and work to accommodate substitute equipment is the sole responsibility of the contractor.

8-70.3(4) ROOM AIR CONDITIONER

- A. Equipment must be wiped clean, with all traces of oil, dust, dirt or paint spots removed. Temporary filters must be provided for all fans that are operated during construction, and after construction dirt has been removed from the building, new filters must be installed.
- B. Bearings must be properly lubricated with oil and grease as recommended by the manufacturer. Belts must be tightened to proper tension.
- C. All controls and other miscellaneous equipment requiring adjustment must be adjusted to setting indicated or directed. Fans must be adjusted to the speed indicated by the manufacturer to meet specified conditions.
- D. Furnish and install complete, all pipe, refrigerant piping, and control connections required.

8-70.4 MEASUREMENT

- A. Refer to Section 8-64.4.

8-70.5 PAYMENT

- B. Refer to Section 8-64.5.

Add the following Section to Division 8:

8-71 FIRE DETECTION AND ALARM (SP 12-19-19)

8-71.1 GENERAL

- A. Specification Section based on CSI Specification Section 28 31 00 Fire Detection and Alarm.

8-71.1(1) SUMMARY

- A. This Section includes specifications for furnishing, and installing a digital fire detection, and alarm system at the Union Street Bridge.
- B. Work covered by this section includes the furnishing of labor, equipment, and materials for the installation of the fire alarm system.
- C. The Station fire detection and alarm systems must consist of all necessary hardware equipment and software programming to perform fire detection and alarm functions as well as the required interfaces to the Elevator.
- D. Fire Detection and Alarm must include:
 1. Fire alarm control panel
 2. Manual fire alarm boxes
 3. System smoke detectors
 4. Heat detectors

5. Notification appliances
 6. Device guards
 7. Remote Annunciator
 8. Addressable interface (Input/Output) device
 9. Digital alarm communicator transmitter
 10. Network communications
- E. Note that fire alarm control panel and field devices are required to be installed in damp non-heated outdoor areas. All fire alarm devices must be rated for the environment at which they are installed whether damp location under outdoor canopy or wet location outdoors uncovered.

8-71.1(2) REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents.
1. National Fire Protection Association (NFPA)
 - a. NFPA 70 National Electrical Code
 - b. NFPA 72 National Fire Alarm Code
 - c. NFPA 90A Standard for Installation of Air Conditioning and Ventilating Systems
 - d. NFPA 101 Life Safety Code
 - e. NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems
 2. International Fire Code Institute (IFC)
 - a. Uniform Fire Code (UFC)
 - b. International Association of Plumbing and Mechanical Officials (IAPMO)
 - c. Uniform Mechanical Code (UMC)
 3. Code of Federal Regulations (CFR)
 - a. 42 U.S.C. 12181 Americans with Disabilities Act of 1990 (Title II) (ADA)
 - b. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
 - c. Standards for Accessible Design
 4. Institute of Electrical and Electronics Engineers (IEEE)
 - a. Standard 1100-2005 IEEE Recommended Practice for Powering and Grounding Electronic Equipment.
 5. Seattle Fire Code
 6. Seattle Electrical Code
 7. Seattle Mechanical Code
 8. ADA Accessibility Guidelines
 9. Local Jurisdictional Adopted Codes and Standards

8-71.1(3) SUBMITTALS /TRANSMITTALS

- A. General

1. Submittals must be approved by the local AHJ prior to submitting them to the Resident Engineer.
2. Shop drawings must be prepared by persons with NICET certified level IV minimum and must be trained and certified by the manufacturer in fire alarm system design.

B. Submittals

1. Product Data: For each type of product, including furnished options and accessories
 - a. Include construction details, material descriptions, dimensions, profiles and finishes
 - b. Include rated capacities, operating characteristics, electrical characteristics, operating temperature and humidity limitations, mounting and wiring and description of the function and operation of the device
 - c. Shop Drawings
 - d. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and requirements of the Seattle Fire Department
 - e. Drawings must be drawn 24 inches by 36 inches. Layout Plan Drawings, Interconnect Drawings, and Wiring Diagrams must have Seattle Fire Department approval prior to submitting to the Resident Engineer. Submitted Drawings must have Seattle Fire Department approval marked thereon
 - f. Provide a general layout of the complete system including equipment arrangement. It must be the responsibility of the fire alarm installer to verify dimensions and ensure compatibility all other systems interfacing with the fire alarm system.
 - g. Identify on the Drawings; raceway and conductor sizes and types with number of conductors in each conduit. Provide each raceway and device with a unique alphanumeric identification.
 - h. Indicate on the point to point wiring diagrams, interconnecting wiring within the panel between modules, and connecting wiring to the field device terminals. Identify all terminal landing point interfaces.
 - i. Input/output matrix and sequence of operations
 - j. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 - k. Show field wiring to all systems including but not limited to electrical power, Communications and Elevator.
 - l. For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - m. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
 - n. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.

- o. Indicate audible appliances required to produce square wave signal in accordance with NFPA 72.
- 2. Interconnect Drawings: Show only external connections between equipment and devices. All wires must be identified with alphanumeric designators and all termination points must show the correct terminal identification.
- 3. Wiring Diagrams: Show the general physical arrangement of the component parts of the equipment and the connection of all internal wiring. All components, wires, terminal strips, and terminals must be identified with alphanumeric designators.
- 4. Equipment Mounting Details: Show the mounting location for all floor and wall mounted equipment including distance from floor and column lines, and fabrication details for all special mounting brackets. Details must also provide any special installation instructions. These details may be included on the Layout Plan Drawings if space allows.
- 5. Layout Plan Drawings: Show every device provided under this Section in its relative spatial location. Sections and elevations must be utilized as necessary to accurately describe the installed location of all devices.
- 6. System Calculations: Provide voltage drop calculations indicating the system ability to furnish power at a minimum of 90 percent of nameplate listing in a standby power condition with all devices in alarm utilizing the proposed wire type and size. Demonstrate that no single wire run between a circuit and its most remote device exceeds the manufacturer's recommendations for wire length, circuit resistance, or circuit wire to wire and wire to ground capacity.
- 7. Battery Calculations: Itemize battery loads under standby and alarm conditions. Auxiliary power supplies and transponder battery calculations must demonstrate the ability of the batteries to supply the required secondary power for a period of 24 hours (or local code requirements) with no external power applied and furnish power for worst case alarm signaling for 5 minutes at the end of this period with all devices in alarm and all device LED's lighted. Battery sizing must be at a factor of 1.5 times the results of this mathematical requirement to account for battery aging between replacements and for system modifications and expansions. Complete the Fire Alarm Emergency Power Calculation form in NFPA 72 appendix.
- 8. Recommended Spare Parts List
 - a. Submit a listing of all devices and components recommended for Owner purchase as spare parts to support the system. The list must include recommended quantities for all items.
 - b. Provide unit price list valid for 90 days after submittal.
 - c. Scheduled Testing: The vendor must include step-by-step procedures and allowances for performance testing every fire alarm device and system output to demonstrate functionality in accordance with specification requirements and Seattle Fire Department requirements.
- 9. Operation and Maintenance Manuals: Manuals must contain the following minimum information:
 - a. Complete Operating Instructions
 - b. Preventative Maintenance Instructions
 - c. Catalog Sheets on all Devices and Equipment
 - d. Manufacturers Operation and Maintenance Instructions
- 10. Field Testing Requirements

- a. Scheduled Testing: The vendor must include step-by-step procedures and allowances for performance testing every fire alarm device and system output to demonstrate functionality in accordance with specification requirements and Seattle Fire Department requirements.
- b. Acceptance Test Procedure (ATP)
 - (i) Submit for approval, prior to testing, an ATP meeting the requirements of this Section
 - (ii) Submit, for system record, all required data as compiled during installation and testing upon completion of the ATP tests. These data must be loose leaf bound and labeled as system acceptance testing information.
 - (iii) Submit, for system record, a completed "Fire Alarm System Certification and Description" as included in NFPA 72.
- 11. Record Drawings: At the completion of the installation, provide record drawings to reflect the accurate as-built condition. Working plans must show actual, accurate locations of devices, and actual routing of conduit and location of end of line devices. The installer must provide updated as-builts on CADD and two full-size prints of the As-Built Drawings.
- 12. Qualifications of the installer
- 13. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
 - 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.
- 14. Warranty

8-71.1(4) QUALITY ASSURANCE

A. Regulatory Requirements

- 1. "Component Listing: Fire detection and alarm components furnished under this Section must be UL listed, listed in the Fire Equipment List or FM, approved for fire signaling or fire suppression use. Accessory equipment must be manufactured with UL listed components.
- 2. Conform to the requirements of NFPA 101 and NFPA 72.
- 3. Conform to applicable local regulations. Design and installation must meet the requirements of the Seattle and Mercer Island Fire Department.

B. Qualifications

- 1. Manufacturer: Company specializing in smoke detection and fire alarm systems with a minimum of 5 years experience.
- 2. Installer: Company specializing in smoke detection and fire alarm systems with 5 years documented experience and certified by the manufacturer as a fire alarm installing contractor.
 - a. Contract must ensure that Installer evaluates and supplements the design shown in the Contract Drawings as required for proper detection and alarm annunciation

consistent with the characteristics of the products he proposes to incorporate into the system.

- b. Contract must ensure that Installer prepares a design that, in addition to the minimum requirement shown, includes all additional design equipment and installation necessary to obtain Seattle and Mercer Island Fire Department acceptance.
3. Warranty: All manufacturer warranties must be passed on to the Owner. Installation must be warranted for a minimum period of 2 years.

8-71.2 PRODUCTS

8-71.2(1) SYSTEM DESCRIPTION

- A. Noncoded, UL-certified addressable system with multiplexed signal transmission and horn/strobe evacuation.
- B. Automatic sensitivity control of smoke detectors
- C. All components provided must be listed for use with the environment
- D. All devices listed and labeled as defined in NFPA 70 and marked for intended location and application
- E. Fire alarm signal initiation must be by one or more of the following devices and systems:
 1. Manual Stations
 2. Heat detectors
 3. Smoke detectors
 4. Loss of communication with network
- F. Fire alarm signal must initiate the following actions:
 1. Operate alarm notification appliances
 2. Identify alarm and specific initiating device at fire alarm control panel
 3. Transmit alarm signals to the remote alarm receiving station.
 4. Recall elevators to primary or alternate recall floors
 5. Record events in system memory
- G. Supervisory signal initiation must be by one or more of the following devices and actions
 1. User disabling of zones or individual devices
 2. Loss of communication with any panel on the network
- H. System trouble signal initiation must be by one or more of the following devices and actions:
 1. Open circuits, shorts, and grounds in designated circuits
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices
 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, or Ethernet module
 4. Loss of primary power at fire-alarm control unit
 5. Ground or a single break in internal circuits of fire-alarm control unit
 6. Abnormal ac voltage at fire-alarm control unit

7. Break in standby battery circuitry
8. Failure of battery charging
9. Abnormal position of any switch at fire-alarm control unit or annunciator

8-71.2(2) PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire alarm control panel and associated raceways must withstand the effects of earthquake motions determined in according to local building codes. Withstand must mean the equipment must remain in place without separation of any parts from the device when subjected to seismic forces.
- B. Fire Alarm Control Panel
 1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs must be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP must be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system must require no manual input to initialize in the event of a complete power down condition. The FACP must provide a minimum 500-event history log.
 2. Addressable Initiation Device Circuits: The FACP must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP must be listed for releasing service.
 4. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - a. Annunciator and Display: Liquid crystal type two line 40 characters min
 - b. Keypad arranged to permit entry and execution of programming, display and control commands
 5. Initiating Device, Notification-Appliance and Signaling-Line Circuits
 - a. Pathway Class Designations: NFPA 72 Class A
 - b. Install no more than 256 addressable devices on each signaling-line circuit
 6. Serial Interfaces/Other Interfaces (Minimum Requirements)
 - a. Contact closures for alarm signals to BMS
 - b. Contact closures or RS 232 port for alarm signals to PA system
 - c. Contact closures for alarm signals to EVS

- d. One dedicated RS 485 port for connection to central station
 - e. One RS 232 port for PC configuration
 - f. Fiber Optic interface for fire alarm network
7. Notification-Appliance Circuit
- a. Audible appliances must sound in a three-pulse temporal pattern, as defined in NFPA 72.
 - b. Ability to mute horns and keep strobes operational for horn/strobe devices
 - c. Where notification appliances provide signals to sleeping areas, the alarm signal must be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
 - d. Visual alarm appliances must flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
8. Elevator Recall
- a. Elevator recall must be initiated only by one of the following alarm-initiating devices:
 - (i) Elevator lobby detectors except the lobby detector on the designated floor.
 - (ii) Smoke detector in elevator machine room.
 - (iii) Smoke detectors in elevator hoistway.
 - b. Elevator controller must be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
 - c. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room must shut down elevators associated with the location without time delay. For City of Seattle, Comply with Directors Rule 17-2005
 - (i) Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor
9. Remote Smoke-Detector Sensitivity Adjustment: Controls must select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.
10. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
11. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.
12. Primary Power: 24-V dc obtained from 120-V ac service via UPS and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals must be powered by 24-V dc source.
- a. Alarm current draw of entire fire-alarm system must not exceed 80 percent of the power-supply module rating.

13. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - a. Batteries: Sealed, valve-regulated, recombinant lead acid
 14. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.
- C. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes must be finished in red with molded, raised-letter operating instructions in contrasting color; must show visible indication of operation; and must be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Double-action mechanism requiring two actions to initiate an alarm, breaking glass or plastic rod and pull lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 2. Station Reset: Key- or wrench-operated switch.
 3. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.
- D. System Smoke Detectors
1. General Requirements for System Smoke Detectors
 - a. Comply with UL 268; operating at 24-V dc, nominal.
 - b. Detectors must be two-wire type.
 - c. Base Mounting: Detector and associated electronic components must be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - d. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - e. Integral Visual-Indicating Light: LED type, indicating detector has operated
 - f. Remote Control: Unless otherwise indicated, detectors must be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity from the fire alarm control panel.
 2. Photoelectric Smoke Detectors
 - a. Detector address must be accessible from fire-alarm control unit and must be able to identify the detector's location within the system and its sensitivity setting.
 - b. An operator at fire-alarm control unit, having the designated access level, must be able to manually access the following for each detector:
 - (i) Primary status
 - (ii) Device type
 - (iii) Present average value
 - (iv) Present sensitivity selected
 - (v) Sensor range (normal, dirty, etc.)
- E. Heat Detectors

1. General Requirements for Heat Detectors: Comply with UL 521.
 - a. Temperature sensors must test for and communicate the sensitivity range of the device.
2. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 degrees F or a rate of rise detector
 - a. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.
 - b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
3. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 degrees F
 - a. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases].
 - b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

F. Notification Appliances

1. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
 - a. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
 - b. Provide ability to turn off horn while strobe is active
2. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
3. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
4. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns must produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.
5. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch high letters on the lens.
 - a. Rated Light Output: 15/30/75/110 cd, selectable in the field.
 - b. Mounting: Wall mounted unless otherwise indicated.
 - c. For units with guards to prevent physical damage, light output ratings must be determined with guards in place.
 - d. Flashing must be in a temporal pattern, synchronized with other units.
 - e. Strobe Leads: Factory connected to screw terminals.
 - f. Mounting Faceplate: Factory finished white].
6. Voice/Tone Notification Appliances
 - a. Comply with UL 1480.
 - b. High-Range Units: Rated 2 to 15 W.

- c. Low-Range Units: Rated 1 to 2 W.
- d. Mounting: surface mounted
- e. Matching Transformers: Tap range matched to acoustical environment of speaker location.

G. Addressable Interface Device

- 1. General
 - a. Include address-setting means on the module.
 - b. Store an internal identifying code for control panel use to identify the module type.
 - c. Listed for controlling HVAC fan motor controllers.
- 2. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- 3. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall, to circuit breaker shunt trip for power shutdown
 - a. Allow the control panel to switch the relay contacts on command.
 - b. Have a minimum of two normally open and two normally closed contacts available for field wiring.
- 4. Control Module
 - a. Operate notification devices.
 - b. Operate solenoids for use in sprinkler service.
 - c. Operate solenoids for use in tunnel standpipe

H. Digital Alarm Communicator Transmitter

- 1. Digital alarm communicator transmitter must be acceptable to the remote central station and must comply with UL 632.
- 2. The system must be capable of connection to a remote central station monitoring service.
- 3. Functional Performance: Unit must receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically connect to central station, capture telephone line(s) and dial a preset number for a remote central station. When contact is made with the central station, signals must be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter must initiate a local trouble signal.
- 4. Local functions and display at the digital alarm communicator transmitter must include the following:
 - a. Verification that network communication is available
 - b. Programming device
 - c. LED display
 - d. Manual test report function and manual transmission clear indication
 - e. Communications failure with the central station or fire-alarm control unit
- 5. Digital data transmission must include the following:
 - a. Address of the alarm-initiating device

- b. Address of the supervisory signal
 - c. Address of the trouble-initiating device
 - d. Loss of ac supply
 - e. Loss of power
 - f. Low battery
 - g. Abnormal test signal
 - h. Communication bus failure
- 6. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.
- I. Network Communications
 - 1. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.
 - 2. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.
- J. Device Guards: Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by device manufacturer.
 - 2. Finish: Paint of color to match the protected device.
- K. Remote Annunciator
 - 1. Description: Annunciator functions must match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions must match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 - a. Mounting: flush or surface cabinet, NEMA 250, Type 3R.
 - 2. Display Type and Functional Performance: Alphanumeric display and LED indicating lights must match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

8-71.2(3) MANUFACTURERS

- A. Johnson Controls Simplex

8-71.3 EXECUTION

8-71.3(1) EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
 - 2. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

8-71.3(2) EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup must be replaced.
 - 2. Devices installed but not yet placed in service must be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (above the finished floor).
 - 1. Comply with requirements for seismic-restraint devices specified
- C. Manual Fire-Alarm Boxes
 - 1. Mount manual fire-alarm box on a background of a contrasting color.
 - 2. The operable part of manual fire-alarm box must be between 42 inches and 48 inches above floor level. All devices must be mounted at the same height unless otherwise indicated.
- D. Smoke- or Heat-Detector Spacing
 - 1. Comply with Chapter 17 Initiation Devices, Section 17.7 Smoke-Sensing Fire Detectors in NFPA 72, for smoke-detector spacing.
 - 2. Comply with Chapter 17 Initiation Devices, Section 17.6 Heat-Sensing Fire Detectors in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing must not exceed 30 feet.
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined according to Annex in NFPA 72.
 - 5. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- E. Install a cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.
- F. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they must be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- G. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- H. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

8-71.3(3) PATHWAYS

- A. All conduit for fire alarm must be rigid galvanized steel (RGS). Minimum size must be 3/4 inch unless otherwise approved
- B. Contractor is responsible for all pathways. Exposed conduits must be installed tight against supporting surface and painted to match.

8-71.3(4) CONNECTIONS

- A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to elevator recall system and components.

8-71.3(5) IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified
- B. Install framed instructions in a location visible from fire-alarm control unit.

8-71.3(6) GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

8-71.3(7) FIELD QUALITY CONTROL

- A. Field tests must be witnessed by Resident Engineer and AHJ
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection must be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - c. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - d. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - e. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - f. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - g. Factory-authorized service representative must prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

8-71.3(8) DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. The basis for the training must be an approved O&M Manual for the installed fire alarm system. Coordinate and provide up to two 2-hour training sessions to accommodate training for Owners maintenance personnel.

8-71.4 MEASUREMENT

- A. Measurement of "Fire Alarm System" will be per lump sum.

8-71.5 PAYMENT

- B. "Fire Alarm System" lump sum must include all costs for the work to furnish and install a complete and operable fire alarm system as depicted on the Drawings and as described in this Section of the specifications. *Replace this Section with the following:*

Add 3-C

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar; 2015
- B. ASTM B32 - Standard Specification for Solder Metal; 2014.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- E. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2017.

Add the following Section to Division 8:

Add 3-B

Replace this Section with the following:

A. Stainless steel wall louver. →

8-72 LOUVERS (SP 12-19-19)

8-72.1 GENERAL

- A. Specification Section based on CSI Specification Section 10 83 00 Louvers

8-72.1(1) SECTION INCLUDES

- ~~A. Aluminum wall louver.~~

8-72.1(2) REFERENCE STANDARDS

- ~~A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).~~
- ~~B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.~~
- ~~C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.~~
- ~~D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.~~
- ~~E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.~~
- ~~F. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2017.~~

8-72.1(3) SUBMITTALS

- A. Shop Drawings: Submit detailed shop drawings, indicating component profiles, sections, finishes, fastening details, special details, and manufacturer's technical and descriptive data.
 - 1. Include field dimensions of openings and elevations on shop drawings.
 - 2. Indicate distinction between factory-assembled and field-assembled work on shop drawings.

8-72.1(4) DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened packaging, with labels clearly identifying manufacturer and material.

- B. Store materials indoors, protected from moisture, humidity, and extreme temperature fluctuations.

8-72.1(5) WARRANTY

- A. Correct defective work within a one year period after Date of Substantial Completion.
- B. Finish Warranty: Provide manufacturer's ten year warranty on factory finish against cracking, peeling, and blistering.

8-72.2 PRODUCTS

8-72.2(1) MANUFACTURERS

- A. Basis of Design: Greenheck ESD-635 Stationary Drainable Blade Louver.

8-72.2(2) STAINLESS STEEL LOUVERS

- A. Stainless Steel Louvers: Provide shop fabricated, shop finished louvers assembled into panels.
 - 1. Louver Type: Stationary Drainable Blade.
 - a. Blade Angle: 37 degrees from horizontal.
 - b. Horizontal Bar Spacing: 4 inch (101.6 mm) on center.
 - c. Louver Frame Depth: 6 inch (152.4 mm) deep.
 - 2. Panel Size and Configuration: As indicated on drawings.
 - 3. Frame/Support: Extruded aluminum tube or flat aluminum bar.

8-72.2(3) MATERIALS

- A. Stainless Steel blade:
- C. Concealed Structural Supports: Stainless steel, or steel coated for corrosion resistance and dissimilar metal isolation.

8-72.2(4) FABRICATION

- A. Shop fabricate louvers to the greatest extent possible.
- B. Disassemble as necessary for shipping and handling, clearly mark units for proper reassembly.
- C. Provide supports, anchorages, and accessories as required for complete assembled system.

8-72.2(5) FINISHES

- A. Stainless steel, exposed.

8-72.2(6) ACCESSORIES

- A. Fasteners: ASTM F593 stainless steel, sizes to suit installation conditions.
- B. Anchors and Inserts: Corrosion resistant; type, size, and material required for loading and installation as indicated.

8-72.3 EXECUTION

8-72.3(1) EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that painting, siding, and other adjacent work that might damage louver finish has been completed prior to start of installation.

8-72.3(2) INSTALLATION

- A. Install in accordance with manufacturer's written installation instructions.
- B. Set louvers level, plumb, with uniform joints, and in alignment with adjacent work as indicated.
- C. Mechanically secure louvers to supporting structure.

- D. Do not cut or trim members without approval of manufacturer; do not install damaged members.

8-72.3(3) TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch (3 mm).
- B. Maximum Offset From True Alignment: 1/8 inch (3 mm).

8-72.3(4) CLEANING

- A. Clean finished surfaces as recommended by manufacturer and maintain clean condition until Date of Substantial Completion.
- B. Replace any damaged materials using material provided by manufacturer to match original material.
- C. Replace louvers that have been damaged.

8-72.3(5) PROTECTION

- A. Provide protection of installed louvers to ensure louvers are without damage until Date of Substantial Completion.

8-72.4 MEASUREMENT

- A. Refer to Section 8-42.4.

8-72.5 PAYMENT

- A. Refer to Section 8-42.5.

Add the following Section to Division 8:

8-73 OWNER FURNISHED ART COORDINATION AND INSTALLATION (SP 2-4-20)

Add 1-P

8-73.1 GENERAL

The Contractor will provide coordination and installation services for Owner furnished art sculpture and art screen. Owner will provide documentation describing the artwork and its handling and installation details.

8-73.1(3) SUBMITTALS

- A. Topographic survey in State Plane Coordinates indicating the height and width of the bridge curb and Western Avenue curb where the art screen is to be located. Provide northing, easting and elevation at the top bottom and sides of the curb, every 5' feet along the curb and at angle points. Submit the survey information in AutoCAD 6-months prior to art screen installation.
- B. Topographic survey in State Plane Coordinates indicating the elevation and location of the art sculpture anchor bolts. Submit the survey information in AutoCAD 3-months prior to art sculpture installation
- C. Submit proposed fencing, location and size of the art storage and assembly space to the Engineer for approval.
- D. Submit an Artwork Installation Plan including, but not limited to, delivery schedules, site preparation, site access, handling, staging, rigging, hoisting, installation, and protection of the Artwork after installation.

8-73.1(4) DELIVERY, STORAGE, AND HANDLING

- A. Provide secure storage for the art screen between delivery and installation.
- B. Provide secure storage and assembly space for the art sculpture between delivery and installation.

8-73.2 PRODUCTS

8-73.2(1) MATERIALS

- A. All assembly materials will be Owner provided excluding anchor bolts and nuts.

8-73.3 EXECUTION

8-73.3(1) OFF-LOADING

- A. Provide all labor and equipment required to off-load the Art Screen and Art Sculpture from the delivery vehicle at the Union Pedestrian Bridge project site and into the storage and assembly location. Provide cribbing and other materials required to support the materials in a stable position off the ground and protect the material from damage.

8-73.3(2) INSTALLATION

- A. Install art screen in accordance with manufacturer's written installation instructions.
- B. Install art sculpture at the direction of the art fabricator. The art sculpture will be assembled on site by the art fabricator after deliver.
- C. Protect finished artwork and screen from damage after installation until contract completion.
- D. Provide access to elevators, temporary power, lighting, water, and toilet facilities as available and reasonably required during the Artwork installation period.

8-73.3(3) COORDINATION

- A. Notify the Owner 16 weeks prior to having the site ready for Art Screen installation and 12 weeks prior to having the site ready for the Art sculpture installation.
- B. Hold pre-installation meetings 6 months, 8 weeks, and 2 weeks prior to installation of the Art Art Screen Wall. The purpose of the meetings will be to review the installation schedule, coordinate the work, and outline procedural issues related to the installation.
- C. Hold pre-installation meetings 6 months, 8 weeks, and 2 weeks prior to installation of the Art sculpture. The purpose of the meetings will be to review the installation schedule, coordinate the work, and outline procedural issues related to the installation.

8-73.4 MEASUREMENT

Measurement for “Install Owner Furnished Art and Screen Wall” will be lump sum.

8-73.5 PAYMENT

The Bid Item price for “Install Owner Furnished Art and Screen Wall” must include all costs for the Work required to coordinate and install the art sculpture and art screen as described in this Section and as shown on the Drawings.

Add 1-P

Replace entire Section with the following:

8-73.1 General

Art Screen

The Contractor will coordinate, receive, protect, secure, take measurements, and install Owner-furnished art screen. Owner will provide documentation describing the art screen and its handling and installation details.

Art Sculpture

The Contractor will coordinate, protect, secure, and provide on-site assembly and installation by Others for the Owner-furnished art sculpture.

Division 8: Miscellaneous Construction

8-73.1(3) SUBMITTALS

Art Screen

Topographic survey in State Plane Coordinates indicating the height and width of the bridge curb and Western Avenue curb where the art screen is to be located. Provide northing, easting and elevation at the top bottom and sides of the curb, every 5' feet along the curb and at angle points. Submit to the Engineer the survey information in AutoCAD six-months prior to art screen installation.

Submit an Art Screen Installation Plan including, but not limited to, delivery schedules, site preparation, site access, handling, secure storage area, staging, rigging, hoisting, installation, and protection of the screen after installation.

Art Sculpture

Topographic survey in State Plane Coordinates indicating the elevation and location of the art sculpture anchor bolts. Submit the survey information in AutoCAD three-months prior to art sculpture installation. Anchorages in the concrete pedestal, must be coordinated with the Artist at least 30 days prior to pouring of concrete pedestal.

Submit proposed fencing, location and size of the art storage and assembly space to the Engineer for approval.

8-73.1(4) DELIVERY, STORAGE, AND HANDLING

Art Screen

Provide secure storage for the art screen between delivery and installation.

Art Sculpture

Provide a 62' x 24' secure storage and assembly space on Union Street between Western Avenue and Alaskan Way between the time the art sculpture is delivered and when installation is complete, estimated to be seven Working Days.

8-73.2 PRODUCTS

8-73.2(1) MATERIALS

Art Screen

All assembly materials will be Owner provided excluding anchor bolts and nuts.

8-73.3 EXECUTION

8-73.3(1) OFF-LOADING

Art Screen

Provide all labor and equipment required to off-load the screen from the delivery vehicle at the Union Pedestrian Bridge project site and into the storage and assembly location. Protect the screen from damage during off-loading and prior to installation.

Art Sculpture

Provide space as necessary for the art installation contractor to off-load the art sculpture into the assembly area.

Division 8: Miscellaneous Construction

8-73.3(2) INSTALLATIONArt Screen

Install art screen in accordance with manufacturer's written installation instructions. Refer to Appendix for a sketch of the art screen assembly. All materials listed below will be Owner furnished except as noted. Contractor must coordinate with the Artist for the duration of the assembly. The Artist will inspect each step of the assembly and may require adjustments. Contractor must receive approval from Artist before advancing to next step of assembly.. Anticipated assembly steps are as follows:

1. Install HSS posts perpendicular to the sloped bridge deck, plumb and in the same plane as other HSS posts, using leveling nuts as needed.
2. Install mounting brackets to HSS posts.
3. Grout under post base plates.
4. Install 40-inch wide back screen into mounting bracket slots.
5. Install lighting brackets on back screen or as indicated.
6. Install Contractor furnished electrical conduit from junction box stub ups and run up associated posts to junction box.
7. Install and test lighting fixtures and wiring.
8. Install front panels.

Art Sculpture

The art sculpture will be assembled and installed on site by Others after delivery. Provide access and accommodations for assembly equipment and personnel for seven Working Days. Provide access and assistance to adjacent businesses in accordance with Section 1-10.2(5)D.

8-73.3(3) COORDINATIONArt Screen

Notify the Owner 16 weeks prior to having the site ready for art screen installation

Hold pre-installation meetings 6 months, 8 weeks, and 2 weeks prior to installation of the art screen. The purpose of the meetings will be to review the installation schedule, coordinate the work, and outline procedural issues related to the installation.

Art Sculpture

Notify the Owner 12 weeks prior to having the site ready for the art sculpture installation.

Hold pre-installation meetings 6 months, 8 weeks, and 2 weeks prior to installation of the art sculpture. The purpose of the meetings will be to review the installation schedule, coordinate the work, and outline procedural issues related to the installation.

8-73.4 MEASUREMENT

Measurement for “**Install Owner Furnished Art Screen**” will be lump sum.

Measurement for “**Accommodate Owner Furnished and Installed Art Sculpture**” will be lump sum.

8-73.5 PAYMENT

The Bid Item price for “**Install Owner Furnished Art Screen**” must include all costs for the Work required to coordinate and install the art screen as described in this Section and as shown on the Drawings.

The Bid Item price for “**Accommodate Owner Furnished and Installed Art Sculpture**” must include all costs for the Work required to accommodate installation of the art sculpture as described in this Section and as shown on the Drawings.

DIVISION 9: MATERIALS

9-01 PORTLAND CEMENT AND BLENDED HYDRAULIC CEMENT

9-01.2 SPECIFICATIONS

9-01.2(3) BLENDED HYDRAULIC CEMENT (GSP 09-30-14)

Replace the first part of the first paragraph with the following:

Blended hydraulic cement must be either Type IP, Type IS, Type IL or Type IT cement conforming to AASHTO M 240 or ASTM C 595, except that the blended hydraulic cement must not contain more than 0.75-percent alkalis by weight calculated as Na_2O plus $0.658 \text{ K}_2\text{O}$ and the content of Tricalcium Aluminate (C_3A) must not exceed 8-percent by weight calculated as $2.650\text{Al}_2\text{O}_3$ minus $1.692\text{Fe}_2\text{O}_3$ and meet the following additional requirements:

9-03 AGGREGATES

9-03.16 RECYCLED MATERIAL (GSP 10-16-18)

9-03.16(1) GENERAL REQUIREMENTS

9-03.16(1)B RECYCLED PORTLAND CEMENT CONCRETE RUBBLE

Supplement the list in the second paragraph of this Section with the following:

4. As a backfill or bedding material for cast iron, ductile iron, or steel Water Mains and their associated appurtenances.
5. As a backfill or bedding material for any other utility where it crosses within 3 feet, horizontally or vertically, of cast iron, ductile iron, or steel Water Mains and their associated appurtenances.

9-04 JOINT AND CRACK SEALING MATERIALS

9-04.3 MORTAR AND NON-SHRINK CEMENT SAND GROUT

9-04.3(2)C GROUT FOR PIPE CONNECTIONS AND POLES & PEDESTALS

Replace this Section and Title with the following:

9-04.3(2)C GROUT FOR PIPE CONNECTIONS (GSP 09-30-14)

Grout for pipe connections to maintenance hole, catch basins, inlets, and similar utility appurtenances, and installing tees must meet section 9-20.3(4). Grout must be mixed to a damp packing or ramming consistency.

9-05 STORM DRAIN AND SANITARY SEWER STRUCTURES, CULVERTS, AND CONDUITS

9-05.2 CONCRETE PIPE

9-05.2(5) CONCRETE PIPE JOINTS AND TESTING (GSP 08-15-18)

Replace the contents of this section and replace with the following:

9-05.2(5)A GENERAL

All concrete pipe must be joined with rubber gaskets. The joints and gasket material must comply with the Specifications of ASTM C 443 and ASTM C 1619. Gasket Material must be protected as specified in Section 9-04.4(6). Both bell and spigot must be reinforced in all pipe 30 inches or larger in diameter per Section 8.2 of ASTM C 76.

9-05.2(5)B TESTING CONCRETE PIPE JOINTS

When a particular type of pipe joint design, joint material, and/or joining method has not previously been tested and approved by the Engineer, the proposed joint design must be tested in the presence of the Engineer as described in Section 9 of ASTM C 443 to qualify the design, joint material, and/or joining method for acceptance. As determined by the Engineer, additional testing may be required if subsequent field testing of installed pipe indicates difficulty in verifying acceptable joined pipe performance. The tests made under this Specification must be conducted at the Supplier and the Contractor must make available space and facilities to accommodate the testing in an efficient and workmanlike manner.

Add the following new Section:

9-05.4 POLYVINYL CHLORIDE (PVC) PIPE

9-05.4(2) C900 PVC PIPE (GSP 08-15-18)

C900 PVC pipe must be manufactured from compounds conforming to cell classification 21454 as defined in AWWA C900-16. The integral bell joint system must meet the requirements of ASTM D-3139 and utilize an elastomeric seal meeting the specification defined in ASTM F-477. Unless noted otherwise, C900 pipe used for Sewer and drainage applications must be dimension ratio (DR) 18 and must be colored white.

C900 PVC pipe as specified in this Section may only be used for Sewer and drainage applications and is not allowed for use in Water Mains.

9-05.15 CEMENT SLURRY ABANDONING PIPE OR FILLING ANNULAR SPACE BETWEEN 2 PIPES (GSP 10-09-17)

Delete the contents of this Section and replace it with the following:

Materials must comply with the following standards:

Material	Standard
Portland Cement	Section 9-01
Fly Ash	Section 9-23.6
GGBFS	Section 9-23.7
Limestone	Section 9-23.10
Fine Aggregate	Section 9-03.1(2)
Chemical Admixtures	Section 9-23.4
Foaming Agent	ASTM C869
Water	Section 9-25.1

Material used to fill the annular space between an inner and outer pipe, or used to abandon pipe in place, must be a foamed cement slurry that is pumpable, flowable, and must completely fill the annular space

between pipes or the interior space of the abandoned pipe without loss of volume. The foamed cement slurry must have the following properties:

Property	Requirement
Density – ASTM C138	65 pcf, min.
Slump – ASTM C143	8 inches, min.
Compressive Strength @ 24 hrs. – ASTM C4832	15 psi, min.
Compressive Strength @ 28 Days – ASTM C4832	150 psi, min.
Water-Cement Ratio	0.90 max.

In addition to the properties shown above, test cylinders made in accordance with ASTM C4832 from samples taken at the point of placement (after the pump, if used) must not show any loss of volume after the foamed cement slurry has achieved final set.

9-07 REINFORCING STEEL

9-07.5 DOWEL BARS (FOR CEMENT CONCRETE PAVEMENT) (GSP 08-15-18)

Delete the contents of this Section and replace it with the following:

Epoxy-coated dowel bars must be round plain steel bars of the dimensions shown on Standard Plans 405b and 405c. Dowels must conform to AASHTO M31, Grade 60 or ASTM A615, Grade 60, and must be coated with ASTM A1078 Type 2 coating except that the bars may be cut to length after being coated. Cut ends must be coated in accordance with ASTM A1078 with a patching material that is compatible with the coating, inert in concrete and recommended by the coating manufacturer. The thickness of the cured powder coating must be 10 mils $\pm$ 2 mils. The Contractor must furnish a written certification that properly identifies the coating material, the number of each batch of coating material used, quantity represented, date of manufacture, name and address of manufacturer, and a statement that the supplied coating material meets the requirements of ASTM A1078 Type 2 coating.

Patching material, compatible with the coating material and inert in concrete, and recommended by the manufacturer, must be supplied with each shipment for field repairs by the Contractor.

9-14 EROSION AND LANDSCAPE MATERIALS

9-14.1 SOILS (SP 08-22-17)

Replace this Section with the following:

The following soils and soil mixes are specified on Drawings or by the Engineer, according to project needs, and are all subject to General Quality Assurance, Testing, and Submittal Requirements of Section 9-14.1(1):

1. **Bioretention Soil.** An imported mix made of Mineral Aggregate and compost specified to comply with the infiltration and filtration requirements of stormwater management Structures. Bioretention soil must be procured only from suppliers which have an active solid waste handling permit from the local jurisdictional Health Department as per WAC 173-350-220 or WAC 173-308.

2. **Definitions:**

ASA: American Society of Agronomy.

SSSA: Soil Science Society of America

ASTM: ASTM International

USDA: United States Department of Agriculture

UC: University of California

Rock: 2-inch narrowly graded rock for structural soil

Soil: Clay or clay loam fertile soil

9-14.1(1) GENERAL TESTING AND SUBMITTAL REQUIREMENTS

Replace this Section and Title with the following:

9-14.1(1) GENERAL QUALITY ASSURANCE, TESTING, AND SUBMITTAL REQUIREMENTS (SP 08-22-17)

Candidate Subcontractor must submit written documentation verifying at least 5 years of contracting and landscape construction experience completing projects of similar scope, complexity, and value.

Candidate Subcontractor must submit at least five project references including project address, date of construction, dollar value, owner's name, contact name and address, owner's email and phone number.

Supply Company must have sufficient experience and training to provide suitable soils and uniform material. The installing company must have sufficient additional experience to properly install structural soil.

Testing Facility must be an independent certified laboratory and provide proof of verifiable experience and methods to provide accurate analysis for any soils specified in this Section and be located within the State of Washington or Oregon. All testing for soils specified in this Section must be done by the same pre-approved testing facility for the duration of the project.

All products supplied must comply with applicable state and local codes.

At least 60 working days prior to placement of any soils specified in Section 9-14, the Contractor must submit to the Engineer the following as specified in Section 1-05.3. All test results and certificates must be from samples collected and tested less than 90 days prior to date of submittal. For bioretention soil testing and submittal requirements, see this Section.

1. **Certificates:** Provide certificates required by authorities having jurisdiction, especially for any composted materials. Contractor must submit certification of compliance that all compost components meet all environmental standards of the State of Washington as well as the agronomic specifications. Composting facilities must provide a copy of permit from WDOE and Jurisdictional Health Dept.
2. **Notices and Scheduling:** Submit a Soil Placement Schedule itemizing time and volume of soils to be placed in accordance with the landscape Construction Phasing Plan.
3. **Manufacturer:** At least 30 days prior to ordering materials, submit information identifying sources for all soil components and the firm responsible for mixing of soil mixes. Provide sufficient number of samples to characterize and to evaluate the entire stockpile of soil. Manufacturer must facilitate inspections and allow observations of stockpiled soil components and soil mixes.

Engineer, Soil Scientist, and Owner's Representative must have the right to reject any soil Supplier that does not meet the requirements in this Section.

Soil Mix Supplier must have a minimum of 5 years' experience at supplying custom planting soil mixes.

Submit Supplier name, address, telephone, fax numbers, and contact name.

4. Submit certification that accepted Supplier is able to provide and store sufficient quantities of materials and mixes for each phase of the project, as identified by the Engineer.
5. **Laboratory Information:** Include the following information about the testing laboratories:
 - a. Name of laboratory(ies) including contact person(s),
 - b. Address(es),
 - c. Phone contact(s),
 - d. E-mail address(es),
 - e. Qualifications of laboratory and personnel including date of current certification by STA, ASTM, AASHTO, or approved equal.

9-14.1(1)A SOIL COMPONENTS, PLANTING SOIL, AND SUBSOIL TESTING: SUBMITTAL AND VISUAL INSPECTION REQUIREMENTS

At least 60 working days prior to Contract Awarded placement of any soils specified in Section 9-14, the Contractor must submit to the Engineer the following as specified in Section 1-05.3. All test results and certificates must be from samples collected and tested less than 90 days prior to date of submittal. For bioretention soil testing and submittal requirements see this Section.

General: All soil materials and amendments must fulfill the requirements as specified in the Contract Documents and be tested to confirm the specified characteristics.

Samples of individual components of soil mixes, in addition to blended soil mixes including mulch materials must be submitted by the Contractor for testing and analysis to the pre-approved testing laboratory. Comply with specific materials requirements specified.

Base component material or soil components for soil mixes must not be used until certified test reports by a certified soil laboratory, soil scientist, or agronomist have been received and approved by the Engineer.

When materials and amendments do not fulfill the requirements, make any and all soil mix amendments and resubmit test reports indicating amendments until approved.

The Engineer may request additional testing by Contractor for confirmation of mix quality and soil mix amendments at any time until completion.

Testing is required at the following intervals:

Testing of individual components for all soil and subsoil mixes.

After test results for components have been accepted, create sample mixes of each Topsoil Mix and each Subsoil mix and perform tests.

Soil Mix Identification: Provide unique Soil Mix Batch Number for each batch/pile of soil at soil mixing facility for each type of soil mix specified in this Section.

Soil Mix Delivery Tickets: Provide a unique Delivery Batch Ticket that identifies delivery trip number, delivery date, delivery time and identifies the unique Soil Mix Batch Number delivered to the site. Submit Delivery Batch Ticket at time of delivery and track placement in project.

Visual Inspection: Engineer, Soil Scientist, and Owners Representative must have the right to visual inspection of all batches of each soil mix at the mixing facility, a minimum of three times.

Soil manufacturer must facilitate visual inspection of all batches and provide six to ten subsamples, with one test from the perimeter of the stockpile and one test from excavation into the middle of the pile to the Engineer. The Engineer has the right to sample each batch for testing.

Soil Component Samples and Product Data: Prior to ordering the below listed materials, submit representative samples, history of source site(s), and manufacturers literature to the

Engineer for approval. Samples must be labeled to indicate location of source, date of sample, and project name. Do not order materials until Engineer's approval has been obtained. Delivered materials must closely match the approved samples.

Sandy Loam: Two, 5-gallon samples to fully characterize the source material.

Sand: Two 1-gallon samples to fully characterize the source material

Compost: Two 1-gallon samples to fully characterize the source material.

Gypsum and fertilizers: provide manufacturer's cut sheets.

Pumice: Two 1-gallon samples to fully characterize the source material.

Soil mixes: after approval of individual components the Contractor must submit the following samples in 5-lb bags and test reports to the Engineer for approval:

Bioretention Soil. An imported mix made of Mineral Aggregate and compost specified to comply with the WDOE infiltration and filtration requirements of stormwater management Structures. Bioretention soil must be procured only from Suppliers, which have an active solid waste handling permit from the local jurisdictional Health Department in accordance with WAC 173-350-220 or WAC 173-308.

Submittal Requirements: Submit certified reports for tests as described in this Section.

Submit certified reports from one pre-approved testing laboratory for any soils specified in Section 9-14, to the Engineer

Submit certified test reports for Planting Soil – Modified and WFS Subsoil, and Bioretention Soil on the Test Report forms provided in this Section to the Engineer.

Compost Analysis: Quality analysis results for the compost portion of each soil mix performed in accordance with TMECC standards be an STA Certified laboratory, as specified in Section 9-14.4(8).

Aggregate and Loam Analysis: Particle size analysis (ASTM D422 or AASHTO T88-00) including percent passing 1-inch, 1/2-inch, 1/4-inch, #4, #10, #20, #40, #100, and #200 sieves, and percent sand, silt and clay content determined by a Hydrometer Test of soil passing 2-millimeter screen.

Mix Analysis: Test results from an approved soil laboratory, analysis for nutrient levels and toxic elements by parts per million including the following content values:

1. Total Nitrogen and Soluble Nitrogen (NO₃ + NH₃)
2. Calcium
3. Phosphorous
4. Potassium
5. Sulphur
6. Sodium
7. Chloride
8. Boron
9. pH
10. Cation Exchange
11. Carbon –To- Nitrogen Ratio
12. Base Saturation

13. Percent organic matter as determined by Loss of Ignition Method. Test samples must be oven dried to a constant weight at a temperature of 105 degrees C.
14. Nutrient tests must include testing laboratory recommendations for supplemental additions to soils as calculated by amount of material to be added per volume of soils for type of plants to be grown in the soil
15. Metal Levels: Analysis for toxic elements by parts per million, zinc, copper, molybdenum, aluminum, arsenic, cadmium, chromium, copper, cobalt, lead, mercury, nickel, and selenium.
16. Soluble salt by electrical conductivity using method EC S-1.20 in The Western States Manual, saturated paste extract measured in milli-mhos per cm
17. Certified reports on analyses from producers of composted organic materials are required, particularly when sources are changed and when new stockpiles are used.
18. Particle size analysis (ASTM D422 or AASHTO T88-00) including percent passing 1", 1/2", 1/4", #4, #10, #20, #40, #100, and #200 sieves; and percent sand silt and clay content determined by a Hydrometer Test of soil passing 2-millimeter screen.
19. Test reports must be current (no more than 90 days old), must be performed must be performed by a regional (Puget Sound Region) pre-approved testing lab and must be done for the final soil mix, not individual components. Soil mix samples must meet or exceed these Specifications prior to delivery to the job site and must not require on-site mixing or substantial chemical alteration after delivery unless otherwise approved by the Engineer. See below for Test Reports:

Aggregate/Loam Test Report Summary: See Soil Test Report – Aggregate/Loam, in the Appendix

Compost Test Report Summary: See Soil Test Report - Compost, in the Appendix

Planting Soil (Modified) Test Report Summary: See Soil Test Report – Planting Soil (Modified), in the Appendix

Manufacturer: The Manufacturer's Certificate(s) of Compliance in accordance with Section 1-06.3 from the Supplier of the soil mix, and (if different) the Suppliers of the compost, including their name(s) and address(es).

Inspections: Engineer must be notified of inspection requests at least 3 full working days in advance. Contractor is responsible for any professional fees incurred if work progress is not ready for inspection at scheduled time and return visit is required.

Inspections are required at each of the following stages:

Visual inspection and opportunity to sample each Soil Mix Batch, in accordance with Section 9-14.1(1)A at the mixing facility prior to any soil deliveries to the project site.

Mock-up samples in accordance with Section 8-02.3(4)A for approval prior to placement of any soils.

Subgrade grading, compaction, and absence of silt layers or other materials or conditions potentially detrimental to drainage growth prior to placement of Drainage Layer or Drain pipe.

Subgrade or Drainage Layer grading, compaction and absence of silt layers or other materials or conditions potentially detrimental to drainage or plant growth prior to placing subsoils, bioretention, or topsoil.

Soil quality, depth, and compaction, prior to plant layout and installation.

Reports must be issued to the Engineer and Contractor simultaneously.

Acceptance of Soils Prior to Placement: The Contractor must not install any soils or soil mixes specified in Section 9-14 until the Engineer or a representative approved by the Engineer has reviewed and recorded the following:

Soil mix delivery ticket(s). A delivery ticket must be provided for each load, listing product type and source, unique Soil Mix Batch number, delivery date, and volume delivered. Each delivery ticket must be recorded along with approximate installed location in a pre-approved tracking log.

Soil Mix Samples: A minimum of one daily 1-gallon sample of each soil type delivered must be collected, labelled with the date delivered, batch number and delivery ticket number. Samples must be retained for visual inspection and comparison to approved submittals by the Engineer. A minimum of one sample per 300 yards delivered must be submitted by the Engineer to the approved testing lab to analyze for USDA Texture and Percent Organic Matter, using the methods specified in the Submittals Section 9-14.1(1)A.

Visually inspect all loads of soil on delivery and stop placement if it is determined that the delivered soil does not appear to match the Submittals; and require sampling and testing of the delivered soil using the methods specified in the Submittals Section 9-14.1(1)A before authorizing soil placement.

All testing costs are the responsibility of the Contractor.

Delivered soils that are determined by testing to not meet the specified sand, silt, clay, or organic content, will be remediated or replaced according to the Engineers direction, at the Contractors expense.

The Engineer may inspect any loads of soil on delivery and stop placement if it is determined that the delivered soil does not appear to match the Submittals; and require sampling and testing of the delivered soil, before authorizing soil placement. All testing costs must be the responsibility of the Contractor.

9-14.1(1)B DELIVERY, STORAGE, AND HANDLING

Material must not be handled or hauled, placed, or compacted when it is wet as after a heavy rainfall, muddy, frozen, or excessively dry. Soil must be handled only when the moisture content is less than at field capacity, is friable and is workable. The Engineer must be consulted to determine if the soil is too wet to handle.

Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from weather, damage, contamination, adulteration, injury, and theft.

Sequence deliveries to avoid delay. On-site storage space is permissible only with written notice from Engineer. Deliver materials only after preparations for placement of planting soil have been completed.

Prohibit vehicular and pedestrian traffic on or around stockpiled planting soil.

Protect soils and mixtures from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior to compaction. If excess water is introduced into the material after grading, allow material to drain to near optimum compaction moisture content before working.

Vehicular access to the site is restricted. Before construction, the Contractor must submit for approval a plan showing proposed routing for deliveries and site access.

Field Moisture Test of Friable Soil

Make a soil cast by squeezing soil in the palm of hand, if soil retains the compressed shape but crumbles upon being poked with a finger, the soil may be worked.

If the soil retains shape and will not crumble when poked, it is too wet and must not be worked.

If the soil glistens or free water drips when the sample is squeezed in the palm of hand, the soil is too wet and must not be worked. Protect Subdrainage Pipe sections from damage during delivery and store under tarp to protect from sunlight, when time from delivery to installation exceeds 1 week.

9-14.1(4) BIORETENTION SOIL

Procure bioretention soil only from Suppliers that have an active solid waste handling permit from the local jurisdictional Health Department in accordance with WAC 173-350-220 or WAC 173-308.

Bioretention soil must be a well-blended mixture of Mineral Aggregate and compost measured on a volume basis. Bioretention soil must consist of approximately two parts fine compost (approximately 35 to 40 percent) by volume as specified in Section 9-14.4(8) and 3 parts Mineral Aggregate (approximately 60 to 65 percent) by volume as specified in Section 9-03.2(2). The mixture must be well blended to produce a homogeneous mix and have an organic matter content of 4 percent to 8 percent determined using the loss on ignition method.

9-14.6 PLANT MATERIALS

9-14.6(1) DEFINITIONS

Replace this Section with the following:

9-14.6(1) DEFINITIONS (SP 03-07-16)

1. **Backfill:** The earth used to replace or the act of replacing earth in an excavation.
2. **Container-Grown Stock:** Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container but not root-bound and maintaining a firm ball when removed from container. Container must be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.
3. **Finish(ed) Grade (FG):** Elevation of top most surface indicated by Contract Documents for hardscape surfacing such as paving areas and for planting soil surface at planting bed areas.
4. **Planting Area:** Areas to be planted.
5. **Planting Soil (Modified):** Prepared soil mix, well-blended mix of naturally occurring USDA Sandy Loam soil and a minimum of 20 percent STA-certified Compost by volume as specified in Section 9-14.1(2).
6. **Topsoil Type A:** A general-purpose mix of USDA Sandy Loam and STA Certified compost as needed to comply with minimum organic matter content requirements. Similar to WSDOT's Topsoil Type A Specification as specified in Section 9-14.1(2).
7. **WFS Subsoil:** Naturally occurring USDA Sandy Loam or Loamy Sand soil as specified in Section 9-14.1(3).
8. **Plants:** trees, shrubs, groundcovers, grasses, perennials, vines, bulbs, and emergents as described in referenced standards, ANSI Z60 1.
9. **Rhizome:** Rhizomes are a prostrate or subterranean stem, usually rooting at the nodes and becoming erect at the apex. Rhizomes must have a minimum of two growth points. Tubers must be a thickened and short subterranean branch having numerous buds and eyes.
10. **Root Flare:** Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
11. **Weeds:** Any plant life not specified or scheduled in planting Drawings for this Contract Work.

Supplement Section 9-14.6(1) with the following:

9-14.6(1)A DRAWINGS REFERENCES AND DEFINITIONS (SP 03-07-16)

Refer to Drawings for plant list and planting layouts. The plant list is a guide only. Quantities, sizes, and types of plant material must be verified by Contractor's review of planting plans and layouts. Where discrepancies are identified and confirmed with Engineer, the planting Drawings must take precedence.

On planting Drawing sheet(s), each symbol or hatched area represents a plant or group of plants whether or not each symbol is specifically noted. Contractor must determine the plant type and size each symbol represents by using the following guidelines:

See legend and plant schedule.

If a plant symbol is part of a group of symbols, see noting for the group.

Botanical names must take precedence over common names.

9-14.6(2) QUALITY (SP 03-07-16)

Add the following after the eighth paragraph:

All Balled and Burlapped Plants must be field grown, and the root ball packaged in a burlap-and-twine and/or burlap-and-wire basket package.

Plants must be harvested with the following modifications to standard nursery practices.

Prior to digging any tree, using hand tools or an air spade, carefully removed the soil from the top of the root ball of each plant to locate the root crown. Care must be exercised not to damage the surface of the root crown and the top of the structural roots.

Balled and burlapped trees must be dug prior to leafing out (bud break) in the spring or during the fall planting period except for plants known to be considered as fall planting hazards. Plants that are fall planting hazards must only be dug prior to leafing out in the spring. Plants to be shipped or installed when in leaf must be pre-dug prior to bud break and stored appropriately protected storage yards with adequate water.

If wire baskets are used to support the root ball, a "low profile" basket must be used. A low-profile basket is defined as having the top of the highest loops on the basket no less than 4 inches and no greater than 8 inches below the shoulder of the root ball package.

Twine and burlap used for wrapping the root ball package must be natural, biodegradable material. If the burlap decomposes during the storage period, the root balls must be re-wrapped prior to shipping.

Trees greater than 4 inches in caliper must be root-pruned a minimum of 12 months before transplanting. All root pruning must be accomplished utilizing accepted horticultural practices for root pruning including staking and watering.

Supplement this Section with the following:

Boxed Plants:

Provide plants established and well rooted in removable wood containers.

Container class size must conform to ANSI Z60.1 for wooden box size for each size and type of plant.

Boxed and box grown stock must have been grown in a container long enough for the root system to have developed sufficiently to hold its potting medium together but not so long as to have developed stem girdling above the root collar or around the edge of the container.

All plants must be nursery-grown materials that have been held in a nursery for at least 1 year. Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise specified/indicated.

Stock furnished must be at least the minimum size indicated. Larger stock is acceptable at no additional cost, and providing that the larger plants will not be cut back to size indicated. Provide plants indicated by

two measurements so that only a maximum of 25 percent is of the minimum size indicated and at least 75 percent are of the maximum size indicated.

Plant Material Observation: Engineer may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Engineer retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected plants immediately from Project site.

Plant Selection: The Engineer must maintain strong control on all plant genus, species, cultivar, size, form and quality of selections when changes or substitutions are made due to unavailability of plant materials.

Plant Measurement Criteria: Measure plant materials per requirements of the Drawings according to ANSI Z60.1. Do not prune or over fertilize to obtain required sizes. A plant must be dimensioned as it stands in its natural position. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

Plants larger than specified may be used if acceptable to the Engineer. Use of such plants must not increase the contract price. If larger plants are accepted the root ball size must be increased in proportion to the size of the plant. Larger plants may not be acceptable if the resulting root ball cannot be fit into the required planting space.

Pruning: Pruning of plants is prohibited without direction and acceptance of the Engineer except to remove dead or broken branches and limbs. Confer with the Engineer before any pruning. Plants pruned without permission from the Engineer are subject to rejection and replacement. Refer to 8-02.3(7)A for additional details.

Preinstallation Conference: Conduct conference at Project site with the Contractor, and the City to review the requirements and expectations for the Project and to answer questions.

Nursery/Plant Supplier Qualification: Plant Nursery(ies) must have a nursery facility as an integral part of operation where majority of plants can be grown and reviewed, must be reputable, and must have been in continual operation with a minimum of 7 years' experience as a plant grower.

Nursery must be located within USDA Plant Hardiness Zones 5-8 unless otherwise approved by the Engineer.

Nursery must be capable of the following as a minimum:

Supplying plant material conforming to the quality standards, visual characteristics, sizes, species cultivars, and quantities indicated by the Drawings.

Conformance to cultural practices and maintenance procedures suitable for healthy plant material.

Other plant material suppliers such as plant wholesalers must be evaluated based on experience and plant quality/quantity and ability to meet requirements of the Drawings.

Plant Quality – Tree and Shrub:

Plant quality above the soil line:

Plants must be of exceptional quality with the color, shape, size and distribution of trunk, stems, branches, buds and leaves normal to the plant type specified.

Trees must not have co dominant leaders or significant branch unions with included bark between stems. All trees are assumed to be single leader plants unless a different form is specified in the plant list or Drawings.

Tree trunks must be reasonably straight with lateral limbs reasonably symmetrical and evenly distributed along the trunk.

The trunk and branches must be reasonably free of knots, scrapes, broken or split wood, fresh limb cuts, sunscald, injuries, and abrasions. All graft unions, where applicable, must be

completely healed without visible sign of graft rejection. All grafts must be visible above the soil line.

Plant quality at or below the soil line:

The roots must be reasonably free of scrapes, broken or split wood.

A minimum of three structural roots reasonably distributed around the trunk must be found in each plant. Plants with structural roots on only one side of the trunk (J roots) must be rejected.

The root crown must not be more than 2 inches below the soil line. The top two structural roots must be no more than 3 inches below the soil line and the rest of the structural roots must be no more than 5 inches below the soil line when measured 4 inches radial to the trunk. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all circling roots above the structural roots across the top of the root ball.

The root system must be reasonably free of stem girdling roots above the root collar, vertical roots and or kinked roots from nursery production practices. Stem girdling roots, vertical and kinked roots include roots on the interior of the root ball.

The final plant grower must be responsible to have determined that the plants have been root pruned at each step in the plant production process to remove stem girdling roots and kinked roots, or that the previous production system use Root Safe Containers or practices that produce a root system throughout the root ball that meets these Special Provisions. Regardless of the work of previous growers, the plant's root system must be modified at the final production stage to produce the required plant root quality. The final grower must certify in writing that all plants are reasonably free of stem girdling and kinked roots as defined in this Specification, and that the tree has been grown and harvested to produce a plant that meets these Specifications.

If formal arrangements or consecutive order of plants is shown in the Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

Plant Quality – Perennials:

Plant quality above the soil line:

Plants must be of exceptional quality with the color, shape, size and distribution of trunk, stems, branches, buds and leaves normal to the plant type specified.

Perennials plants must have multiple stem crowns and must not be a single leader plants unless form is specified in the plant list or Drawings.

Plant quality at or below the soil line:

Perennials must be healthy, vigorous, well-rooted plants grown in a container with a well-established root system reaching sides of container but not root bound.

Plant Quality – Bulbs:

Bulbs must be rated "A" quality, and Top Size for species specified as defined by ANSI Z60.1, firm of flesh, free from decay and disease. Bulbs must be certified as being grown for the season in which they will be installed and must be delivered in containers as specified on the planting Drawings.

Coordinate ordering with Landscape Construction Plan. Order bulbs 6 months in advance of planting.

Plant Quality – Specialty Plants and Contract Grown Material:

Specialty plants and contract grown material must meet all of the requirements in Section 9-14.6(2) Quality.

9-14.6(3) HANDLING AND SHIPPING (SP 03-07-16)

Replace paragraph 2: Plant Acclimation: Plants delivered from nurseries located outside of USDA Hardiness Zones 5 - 8 must be acclimatized prior to installation

Supplement this Section with the following:

Accessory and Packaged Materials

Deliver packaged materials (such as commercial fertilizer) in unopened standard size bags or containers, each clearly bearing the name, guarantee, and trademark of the producer, material composition, manufacturers' certified analysis, and the weight of the material.

Bulk Materials

Deliver bulk materials with each individual shipment accompanied by an affidavit or certification from the vendor (supplier), countersigned by the Contractor upon receipt, identifying the material type, composition, analysis, and weight and certifying that the material furnished complies with specification requirements of this Project.

Provide dry, loose soils for planting. Frozen or muddy soil is not acceptable.

Plant Material, Conditions of Moving and Delivery

Handle plants with care to prevent injury to trunks, branches, and roots.

Ship only plants to be installed that day except by written approval and consent of the City and the Engineer.

Deliver materials and plants only after preparations for planting have been completed and approved, including but not limited to: subdrainage system – where applicable, irrigation, rough grading, utilities, decompaction, or remediation of soils. The Engineer must determine if the site is acceptable for planting.

Heeling in of plants will not be allowed without approval of the Engineer.

Plants delivered by truck and plants requiring storage on site must be properly wrapped and covered to prevent wind-drying and desiccation of branches, leaves and buds; plant balls should be firmly bound, unbroken, reasonably moist to indicate watering prior to delivery and during storage, and tree trunks must be free from fresh scars and damage in handling.

Trees and Shrubs:

Do not prune prior to delivery. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Pack and ship to ensure arrival at site in good condition.

Assure the Engineer's presence on site upon delivery of trees. Trees must be laid out and installed immediately after delivery with the Engineer on site to direct placement in pre-staked locations and to orient trees and shrubs as they are planted.

The use of an antidesiccant will not be allowed except by written approval and consent of the Engineer. If approved, apply an adequate film over trunks, branches, twigs, and foliage, immediately before moving plant material from its source. Approval will be required for any subsequent instance of use.

Perennials, Grasses, Vines, and Groundcovers: Layout immediately upon delivery. Plant immediately after layout is approved. Trees and shrubs must be installed prior to installing perennials, grasses, and groundcovers.

Delayed Planting: If planting is delayed more than 6 hours after delivery, protect all container grown plant material in a Contractor's erected "shade house" from freezing, sun, drying winds, and/or mechanical damage. Water as necessary until planted. All plant material must be stored in an upright position with adequate irrigation. Set balled stock on ground and cover ball with soil, peat moss,

sawdust, wood chips, straw mulch, or other acceptable material. For plants stored on site more than 12 hours, the Contractor must keep a maintenance log. The log must include information on the watering, misting, and protection of plants. The date, time, type of maintenance, and name of maintenance personnel must be included in the log.

Immediately remove rejected or damaged plant material from the site and replace with selected material as approved by the Engineer. Prepare, maintain, and submit a list of such items removed to confirm replacement.

9-14.6(4) RECORDS

Add the following:

- e. Unique Tree Inspection ID Number– All trees specified on the plant list must be given a unique serial number and matching non-removable tag for project tracking.
- f. Specialty Plant Progress Report – The report must be provided to the Engineer and must include the following information and images of plant material.

Include names, addresses, and phone numbers of each nursery source associated with each plant item.

Include production schedule for each plant specified as a Specialty Plant

Include color digital photographs of plant materials for each report. Take photos from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. Include a minimum of three photographs showing average plant. Identify each photograph with the full scientific name of the plant, plant size, and name of growing nursery. Images must be at least 3" x 5" at 300 dpi and must be .jpeg format.

9-14.6(5) INSPECTION (SP 03-07-16)

Replace the first paragraph with the following:

Plant Sourcing, Selection and Inspections – Contractor's Preparation for Plant Selection:

Make all pre-selection arrangements with and at nursery supply source(s) to ensure a ready supply of materials, equipment, and manpower required for an efficient selection and tagging procedure.

Request visit of the Engineer at least 14 days in advance of the Contractor's desired inspection date for each type plant material.

Pay costs for the Engineer's travel for each inspection/tagging trip in accordance with Section 9-14.6(5) and the "Landscape Construction Phasing Plan", as described in Section 8-02.3(1)A. Anticipate travel arrangements for each phase of landscape construction for at least three persons with the Engineer unless otherwise advised.

Be present, together with plant installer's supervisor and nursery representative for plant inspection and tagging at the nursery source.

Plant Sourcing, Selection and Inspections – Plant Material Inspection and Selection at Nursery:

Trees: All trees must be inspected, selected, and tagged at the nursery sources by the Engineer, SDOT Urban Forestry, Seattle Parks and Recreation and a certified landscape architect for conformity to the specification requirements. Pre-dug plants will not be acceptable unless they are indicated and accepted as container stock or boxed stock in the plant list.

The Engineer may only require inspection, selection and tagging of representative samples of each species of shrubs, perennials, grasses, and ferns.

Plant Sourcing, Selection and Inspections – Contract Grown Plant Material Inspection at Nursery:

Specialty Shrubs and Perennials must be inspected at the nursery source by the Engineer and a certified landscape architect for conformity to the specification requirements in accordance with the "Landscape Construction Phasing Plan", as described in Section 8-02.3(1)A.

Add the following to the third paragraph:

4. Notify the Engineer 14 days in advance of any delivery of plant materials to the site. Inspection by the Engineer of stakeout for tree and shrub locations, groundcover massing layout must be complete prior to plant delivery.
5. Allow time duration on-site, as approved by the Engineer, for inspection and layout adjustment prior to installations.
6. Arrange for adequate manpower and equipment on-site at the time of plant material inspections and installation to provide a complete staked layout and to unload, open, and handle plant material during inspection.
7. Rejected plants must be removed immediately from site.

9-14.6(6) SUBSTITUTION OF PLANTS

Supplement this Section with the following:

The Contractor must provide plant materials to substitute the plant materials originally specified in the Drawings without any additional cost to the City.

The Contractor must clearly identify deviations from the specified plants and any approved substitutions in the "Plant Procurement List and Nursery Source Identification Log" as described in Section 8-02.3(1)A. Where deviations or other changes occur in the "Plant Procurement List and Nursery Source Identification Log," identify both the original specified plant item and the new plant item.

Maintain and re-submit updated "Plant Procurement List and Nursery Source Identification Log" as deviations or other changes occur until the Final Completion.

Submit as a Record Document at the Final Completion of each phase in accordance with the "Landscape Construction Phasing Plan", as described in Section 8-02.3(1)A.

No plant substitutions will be approved within 12 weeks of installation of plant materials.

9-14.6(7) TEMPORARY STORAGE (SP 03-07-16)

Supplement this Section by adding the following to the first paragraph:

4. Store bulbs, corms, and tubers in a dry place at 60 to 65 degrees F until planting. Bulbs must be maintained in gallon containers.

Supplement this Section with the following:

All accessory material (except soils) must be stored off the ground and covered in a manner to prevent materials from getting wet or damp and in such manner that material effectiveness will not be impaired in accordance with manufacturer's instructions and recommendations for storage.

Stockpiles of delivered bulk material must be as specified for handling soils in Section 9-14.1(B).

9-14.12 BOLLARDS

Supplement this Section with the following:

9-14.12(4) METAL BOLLARDS (SP 03-23-16)

Products: Metal Bollards must be "Morano 900" from Hess America or, upon approval by the Engineer, an accepted substitute. The Contractor must not mix multiple manufacturer's products for Metal Bollards unless approved by the Engineer.

Manufacturer: Hess America, P.O. Box 28 Gaffney, SC 29342-0028 USA Tel: (864) 487-3535 Fax: (864) 487-3175 E-Mail: info@hessamerica.com.

Distributors: Contact Miguel Velazquez, Pacific Lighting Systems, Inc., 6363 7th Avenue South, Suite 100, Seattle, WA 98108, tel: 206-436-8848.

Product Name: "Morano 900"

Dimensions: 35.4 inches high by 3.3-inch diameter.

Shaft: Straight round bollard shaft must be manufactured from cold drawn over mandrel, electric-weld, mechanical round steel tubing with nominal wall thickness of 0.126 inch. Steel shaft must be hot-dip galvanized prior to painting.

Top Element: Top element must be machined from 6082 aluminum and press fit securely into the shaft.

Mounting: To be anchored into concrete paving with flange and hardware as per the manufacturer's instructions.

Finish: Bollard must be finished in finely textured paint.

Finish Color: To be selected by the Engineer from manufacturer's full range, to match RAL 7024. Refer to Section 8-02.3(19)D1 SUBMITTALS, Samples.

Fasteners and Hardware: Stainless Steel.

Warranty: Minimum 3 years.

9-14.19 POLYACRYLAMIDE (PAM) (GSP 05-21-19)

PAM is used as a tie-down for soil, compost, or seed, and is also used as a flocculent. PAM products must meet ANSI/NSF Standard 60 for drinking water treatment with an AMD content not to exceed 0.05 percent. PAM must be anionic and must be linear, and not crosslinked. The minimum average molecular weight must be greater than 5-mg/mole. The charge density must be no less than 15 percent and no greater than 30 percent. The product must contain at least 80 percent active ingredients and have a moisture content not exceeding 10 percent by weight. PAM must be delivered in a dry granular or powder form.

9-15 IRRIGATION SYSTEM

9-15.1 PIPE AND FITTINGS

9-15.1(3) POLYVINYL CHLORIDE PIPE AND FITTINGS (SP 01-24-18)

Delete the second sentence and replace with the following:

PVC pipe downstream of the control valves must be schedule 40 and conform to ASTM D1785.

Supplement this Section with the following:

9-15.1(5) SUBSURFACE DRIP TUBING (SP 03-11-16)

Drip tubing must be 1/2 -inch nominal diameter pressure compensating emitter.

Spacing: 18 inches with nominal flow rate of 0.6 gph. Provide an additional 200 feet of drip tubing to Owner for future maintenance. Approved product: Netafim Techline TLCV6-18 or approved equal.

Fittings: In accordance with manufacturer's recommendations and detail drawings.

9-15.3 SLEEVE

9-15.4 IRRIGATION AUTOMATIC CONTROLLERS (SP 03-11-16)

Existing

Supplement this Section with the following:

9-15.4(1) VALVE DECODERS (SP 03-11-16)

The C1 (BL-5201 manufactured by Baseline Inc., in Boise, Idaho) must be fully sealed, submersion proof, and direct bury to effectively seal moisture from the electronics and must be installed as specified herein. The valve decoder must have true two-way communication and be capable of self-identifying to the two-wire controller and will report preconfigured unique serial numbers and zone addresses.

The valve decoder must have from one to four preconfigured serial numbers with the first address listed on the side of the decoder. Each valve decoder must come with 23 inches of 16-gauge PVC jacketed solid-core wire to connect to the two-wire and 23 inches of 18-gauge PVC jacketed stranded core wire-to-connect to the valve wire.

The valve decoder must have communication collision detection on the two-wire and will resend any message experiencing an error and be able to search for a solenoid and report whether or not a solenoid is present. The valve decoder must have a built-in amperage meter to accurately measure and diagnose valve solenoid electrical problems, such as "no current," "station short," and "over current," and carry a conditional 5-year warranty.

9-15.4(3) SOIL MOISTURE SENSORS (SP 03 11-16)

Controller C1 and C2 soil moisture sensor (BL-5315B manufactured by Baseline Inc., in Boise Idaho) must be fully sealed, submersion proof, direct bury that must effectively seal moisture from electronics and must be installed as specified herein. The soil moisture sensor must be constructed of a multi-layer fiberglass stick with a sensor blade that must be 14.95 inches by 2 inches by 0.075 inch.

The soil moisture sensor must provide automatic and continuous measurements of soil moisture. The biSensor must be capable of measuring volumetric soil moisture changes of less than 0.1 percent and within plus or minus 3 percent of the actual volumetric soil moisture content.

The soil moisture sensor must have a built-in temperature sensor (thermistor) that provides automatic and continuous measurements of temperature. The thermistor in the biSensor must be capable of reading temperatures between 33 degrees F and 120 degrees F and measuring temperature within plus or minus 1.12 degrees F of the actual temperature. The soil moisture sensors must include the following features:

1. The soil moisture sensor must have true two-way communication.
2. Capable of self-identifying itself to the two-wire controller and will report a preconfigured unique serial number.
3. Each soil moisture sensor decoder must come with 50 feet of 16-gauge PVC jacketed solid core wire to connect to the two-wire.
4. Soil moisture sensor must have collision detection on the two-wire and be able to resend messages if a collision is detected.
5. The soil moisture sensor must be a TDT (time domain transmissibility) technology sensor that accurately measures soil moisture.
6. Salinity or other minerals in the soil must not affect the soil moisture sensor readings.
7. Must carry a conditional 5-year warranty.

9-15.6 ELECTRICAL WIRE

Delete this Section and replace it with the following:

9-15.6 ELECTRICAL WIRE (SP 03-11-16)

Wire from C1, C2 and C3 controllers to valves must be two-wire cable with operating voltage: 600 V RMS max, temperature rating: 140 degrees F.

Conductor color coding: Primary two-wire path: Black and Red. Spare two-wire path: Blue and Red. PVC conforming to UL-493 or UL-719 for thermoplastic-insulated style UF (Underground Feeder).

Approved Wire: Coleman Cable #51452, Paige P7072D, P7296D, P7350D and P7354D, Regency 14/2 and 12/2 Maxi Cable, Toro Decoder Cable and Hunter Decoder Jacketed, Service Wire DEC 12/2BE and DEC 14/2 BE. Minimum gauge #14. Electrical splices: 3M-DBY/R.

Wire from Port of Seattle and Waterfront Landing Condominium controllers to valves and between valve decoders to valves must be #14-gauge UF direct burial (UL approved), red or black for the hot side, white for neutral (solid copper). The spare wires must be any third color (except green). UF and UL designations must be clearly marked on the insulation jackets of all wires.

9-15.7 IRRIGATION VALVES

9.15.7(2B) AUTOMATIC CONTROL VALVES

9-15.7(4) DRAIN VALVES

9-15.8 VALVE BOXES (SP 03-11-16)

Delete the last two sentences and replace with the following:

Install valve boxes and extensions as shown on detail Drawings. Valve box and lid must be black with standard "Irrigation Control Valve" marking on lid from manufacturer.

Supplement Section 9-15 with the following

9-15.12 SUBSURFACE DRIP TUBING AND ACCESSORIES (SP 03-11-16)

1. Filter: 1-inch screen filter with flush valve. Filter element 155 mesh. Filter flow range between 0 and 28 gpm. Approved Manufacturer: Amiad, Rainbird, Hunter.
2. Pressure Regulator: Toro DL2000 PMR-25 series; 2 to 20 gpm, 25-psi outlet pressure or approved equal.
3. Air/Vacuum Relief Valve: Toro DL2000 YD-500-34, 0.5-inch MIPT air vent and vacuum relief valve or approved equal.
4. Flush valve manifold: Toro DL2000 CEFCH-H flushing cap. Assembly also includes BU-1/2 ball valve and "Cobra" 0.5-inch by 24-inch flex tubing.

9-15.13 VALVE MARKERS (SP 03-11-16)

Valve tags manufactured from polyurethane Behr Desopan, incorporating an integral attachment neck and reinforced attachment hole capable of withstanding 180 pounds pull force. Tag must be approximately 2.25 inches by 2.75 inches in size. All lettering must be hot stamped in black and capable of withstanding outdoor usage. The standard alpha-numeric designations must incorporate lettering 1-1/8 inch in height. Tag color must be yellow. Marking tag must be double side stamped with zone valve number. Install one tag on valve wires as shown on Drawings and install identical tag with valve number on valve box lid with rivet or bolt.

9-29 PAVEMENT MARKING

9-29.2 PAINT

9-29.2(2) PROHIBITED MATERIALS (GSP 10-09-17)

Delete the contents of this Section and replace it with the following:

Traffic paint must not contain mercury, lead, chromium, toluene, chlorinated solvents, hydrolysable chlorine derivatives, polychlorinated biphenyls (PCBs), ethylene-based glycol ethers and their acetates, nor any other EPA hazardous waste material over the regulatory levels per CFR 40 Part 261.24.

9-31 ILLUMINATION AND ELECTRICAL MATERIALS

9-31.1 LUMINAIRES

9-31.1(2) ROADWAY LIGHTING LUMINAIRE

Delete this Section and replace with the following:

9-31.1(2) PEDESTRIAN BRIDGE LIGHTING LUMINAIRES

All luminaires specified in the Drawings as "U1" must meet the following requirements:

- Intended Use: Bridge Deck and Stair Illumination
- Manufacturer and Model: KLIK LEDpod LP-40-30K-A-X, or approved equal
- Light Source: 3000K CCT LED, 80+ CRI
- Output: 2 system watts per pod; 107 delivered lumens
- Electrical: 24 VDC, remote LED driver 120-277 VAC
- Light Distribution: Asymmetric
- Mounting: Integral to handrail
- Materials: Anodized aluminum body, silicone gasket
- Dimensions: 1" diameter x 1.8" depth
- Color Finish: Standard: aluminum
- Ratings: UL listed for wet location (IP66)

All luminaires specified in the Drawings as "U2" must meet the following requirements:

- Intended Use: Artwork Uplight
- Manufacturer and Model: Lumascape LS362LED-20H6-A-finish-84-NM-housing depth-09, or approved equal
- Light Source: 3000K CCT LED, 80 CRI
- Output: 21 system watts; 1150 nominal lumens
- Electrical: 120-277VAC, integral electronic LED driver
- Light Distribution: 25°, adjustable up to 15 degree vertical tilt
- Mounting: Stanchion mounted; detail to be determined
- Materials: 316 marine grade stainless steel, borosilicate clear lens, Teflon coated cover screws, MicroAntiLeach wire entry
- Dimensions: 8.36" diameter outside trim, 5.4" diameter lens, height to be determined
- Color Finish: To be determined
- Accessories: Cross Hatch Louver LS646
- Ratings: UL listed for wet location (IP68)

All luminaires specified in the Drawings as "U3" must meet the following requirements:

- Intended Use: Elevator Hoist way Illumination
- Manufacturer and Model: Qtran SW24/5.0-30 - TALO-ST-HSS-ENC/TL, or approved equal
- Light Source: 3000K CCT LED, 98 CRI
- Output: 5 system watts per linear foot; 367 delivered lumens per linear foot
- Electrical: 24 VDC, remote LED driver
- Light Distribution: Wide
- Mounting: Surface mounted to elevator hoistway structure
- Materials: Aluminum extrusion, stainless steel mounting clips, LED tapelight encapsulated in extrusion with a combination of polyurethane and ceramic materials
- Dimensions: 0.74" wide, 0.56" tall cross section
- Color Finish: Satin Aluminum
- Accessories: Leader and jumper cables as required

Ratings: UL listed for wet location

All luminaires specified in the Drawings as "U4" must meet the following requirements:

Intended Use: Under Pedestrian Bridge Illumination

Manufacturer and Model: Bega 66 981 LED, or approved equal

Light Source: 3000K CCT LED, 85+ CRI

Output: 12 system watts; 1009 delivered lumens

Electrical: 120-277 VAC, integral LED driver

Light Distribution: 12°

Mounting: Surface mounted to underside of bridge at flat location

Materials: Copper free A360.0 aluminum alloy housing, clear safety glass lens, pure anodized aluminum reflector, silicone gasket

Dimensions: 5-7/8" diameter, 5" tall

Color Finish: Silver

Accessories: Solite Lens (SLL)

Ratings: UL listed for wet location (IP65)

All luminaires specified in the Drawings as "U5" must meet the following requirements:

Intended Use: Under Bridge Illumination at Planting Area

Manufacturer and Model: Bega 22 385 LED, or approved equal

Light Source: 3000K CCT LED, 80+ CRI

Output: 16 system watts; 939 delivered lumens

Electrical: 120-277 VAC, integral LED driver

Light Distribution: Lambertian

Mounting: Surface mounted to underside of stair structure

Materials: Copper free A360.0 aluminum alloy housing, matte safety glass lens, silicone gasket

Dimensions: 3" wide, 11-3/4" long, 4-3/4" tall

Color Finish: Silver

Ratings: UL listed for wet location (IP65)

Replace the 6th paragraph with the following:

All luminaires specified in the Drawings as "U6" will be Owner furnished.

~~All luminaires specified in the Drawings as "U6" must meet the following requirements:~~

~~Intended Use: Art Screen along Bridge Deck~~

~~Manufacturer and Model: Qtran ZALA-SW-RLC-WET-30-VHO-ENC/TL-length, or approved equal~~

~~Light Source: 3000K CCT LED, 95+ CRI~~

~~Output: 5 system watts per linear foot; 247 delivered lumens per linear foot~~

~~Electrical: 24 VDC, remote LED driver~~

~~Light Distribution: Lambertian~~

~~Mounting: Surface mounted at backside of front artwork panel with 832 Silicone per manufacturers requirements.~~

~~Materials: Stainless steel rigid lock channel mounting clips, LED tapelight encapsulated in polyurethane and ceramic materials~~

~~Dimensions: flexible tapelight – 0.72" wide, 0.53" tall, length to be determined; mounting clips – 1" wide, 1" long, 0.84" tall~~

~~Color Finish: Standard~~

~~Ratings: UL listed for wet location (IP65)~~

All luminaires specified in the Drawings as "U7" must meet the following requirements:

Intended Use: Back of house lighting in Electrical Rm, Elevator Machine Rm and Pit

Manufacturer and Model: Day-Brite / CFI Vaporlume LED V2WLB51L830-4-UNV, or approved equal

Light Source: 3000K CCT LED, 80+ CRI

Output: 46 system watts; 5100 delivered lumens

Electrical: 120-277 VAC, integral LED driver

Light Distribution: 180°X180°

Mounting: Surface mounted

Materials: Molded fiberglass reinforced polyester body, LED acrylic lens with continuous closed cell gasket, stainless steel cam action latches

Dimensions: Overall fixture 7" wide, 5" tall, 50" long

Color Finish: Standard
Ratings: UL listed for wet location (IP65)

All luminaires specified in the Drawings as "U8" must meet the following requirements:

Intended Use: Elevator Threshold Illumination
Manufacturer and Model: Bega 55 828, or approved equal
Light Source: 3000K CCT LED, 85+ CRI
Output: 22 system watts; 1405 delivered lumens
Electrical: 120-277 VAC, integral LED driver
Light Distribution: 88° - wide beam
Mounting: Recessed within elevator canopy
Materials: Die-cast marine grade, copper free A360.0 aluminum alloy housing, 316 grade machined stainless steel trim, safety glass lens, anodized aluminum reflector, high temperature silicone
Dimensions: 6-7/8" diameter, 3-1/2" x 18" housing
Color Finish: #4 brushed stainless steel
Accessories: Solite Lens (SLL)
Ratings: UL listed for wet location (IP65)

Supplement Section 9-31.1 with the following:

9-31.1(6) LUMINAIRES AND DRIVERS

General Requirements

Luminaires must comply with UL 1598 and be listed and labeled for installation in wet locations by NRTL acceptable to authorities having jurisdiction.

Exposed hardware material must be stainless steel.

Gaskets for lenses and refractors must be heat and aging resistant.

Lenses, diffusers, covers, and globes must be 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.

Plastic must have high resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.

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.

Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.

Painted Finish: Polyester powder coat.

LED Luminaires

LED luminaires must be UL Listed and be furnished complete with LEDs and drivers at locations indicated on the Drawings. Each fixture must bear the UL Label, and must comply with code requirements.

LED luminaire manufacturer must provide the name of the LED source manufacturer incorporated into the luminaire.

LED luminaires must be designed with heat sinking adequate such that the junction temperature of the LEDs is maintained to meet the rated life as published by the LED manufacturer. Luminaire manufacturer must provide validation documentation.

LED light sources must have a CRI greater than or equal to 80, unless noted otherwise.

LED Drivers

LED drivers must operate LEDs within the current limit specifications of the manufacturer.

LED drivers must operate from 60-Hz input source and have input power factor above 90 percent and a minimum efficiency of 70 percent at full rated load of the driver.

LED drivers must have short circuit and overload protection.

LED drivers must have a minimum starting temperature of minus 20 degrees F.

LED drivers must have a maximum case temperature rating of at least 70 degrees C.

LED drivers must be regulated to plus or minus 5 percent across published load range.

LED driver must have a class A sound rating.

Thermal Protectors

Provide thermal protectors in fixtures where required by Code.

9-31.1(7) LIGHTING CONTACTORS

General Requirements

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Allen-Bradley/Rockwell Automation

ASCO Power Technologies, LP

Eaton | Dutleer-Hammer Corporation

General Electric Company; GE Consumer & Industrial - Electrical Distribution; Total Lighting Control

Square D

Description: Electrically operated and electrically held, 2-12 pole, 30amp combination-type lighting contactors, complying with NEMA ICS 2 and UL 508

Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current)

Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation

Enclosure: Comply with NEMA 250

Provide with control and pilot devices as indicated on Contract Drawings, matching the NEMA type specified for the enclosure

9-31.2 WIRE (SP 06-21-16)

Supplement this Section with the following:

Electrical service wire between the SCL vault and the electrical service utility meter must be type RHH RHHW-2 Type USE-2 in accordance with SCL Material Standard 6010.00

Union Street Bridge electrical wire must be Type XHHW.

9-31.3 WIRE SPLICES (SP 06-21-16)

Supplement this Section with the following:

All underground wire splices must be submersible type 600V rated and UL listed for direct burial. This includes wire splices at in-grade junction boxes and embedded curb boxes on bridge.

Supplement Section 9-31 with the following:

9-31.8 REMOTE 24VDC POWER SUPPLY (SP 09-18-17))

Remote power supplies used for **Type U1** luminaire fixtures:

Input Voltage 120-240VAC

Output Voltage – Class 2, 24VDC constant voltage output, 90W fully rated

Voltage regulation to 5% or less of rated output voltage

Built in short circuit and overload protection

Din rail mounted within lighting control cabinet.

Remote power supplies used for **Type U3 and Type U6** luminaire fixtures:

Input Voltage 120-240VAC

Output Voltage – 24VDC constant voltage output, 400W fully rated

Voltage regulation to 5% or less of rated output voltage

Built in short circuit and overload protection

Capable for parallel connection for n+1 redundancy

Integrated decoupling MOSFET for n+1 redundancy

Din rail mounted within lighting control cabinet.

9-31.9 PANELBOARDS

Enclosure:

NEMA 250 Type 3R fabricated from galvanized steel, surface-mounted unless otherwise indicated, tamperproof, with the following additional requirements:

Gutter size:

Main Bus	End Gutter	Side Gutter
<u>Rating Amperes</u>	<u>Size (Inches)</u>	<u>Size (Inches)</u>
225 and below	6	5

Provide back plate of reinforced steel for mounting of interior components.

Provide device or mechanism for enclosure grounding.

Cover and Trim

Designed for surface or flush mounting as indicated.

Adjustment: Provide flush-mounted panelboards with means to plumb and align the front of the panel with respect to the adjacent finished surfaces.

Door:

Hinged, fitted with a combination latch and door lock, accommodating a master key. Provide one flat key tumbler cylinder-type, nickel-plated door lock conforming to the COS master key system, two keys per lock.

Circuit Directory:

Provide a directory frame with acrylic plastic face mounted on the back of the door.

Finish: metallic surface thoroughly cleaned, degreased, primed with an approved corrosion-inhibitive primer, and then finished with heavy-duty, industrial-grade polyurethane enamel.

Bus Bars:

ASTM B187, 98 percent conductivity copper, with tin-plated contact surface.

Provide neutral bus of the same rating as that of phase bus.

Provide a grounding bus.

Plating must be 12 microns thick

Plating must be inspected after shipment to confirm that no corrosion occurred during shipping.

MOLDED-CASE CIRCUIT BREAKERS

General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

- A. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- B. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - 1. Instantaneous trip
 - 2. Long- and short-time pickup levels
 - 3. Long- and short-time time adjustments
 - 4. Ground-fault pickup level, time delay, and I²t response
- D. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.

9-31.10 TRANSFORMERS

General Construction:

All three phase transformers must be encapsulated type. Transformers must be constructed with three coils and a single 3- leg core. The primary side of each transformer must, if applicable, be provided with taps that align with NEMA ST-20.

Transformers must be designed, constructed and rated in accordance with UL, CSA, and NEMA standards. If shipping to Europe, transformer will carry a CE mark.

If transformer is to be used for non-linear load applications, the transformer must be de-rated as per ANSI/IEEE C57.110.

Voltage and kVA Requirements:

Primary: 3 phase, 480V

Secondary: 3 phase, 208Y/120V

kVA Rating: As indicated on contract Drawings.

System Frequency:

60 Hertz

General Requirements:

Typical impedance at 60Hz: 1.8% to 6.5%

Nameplate Rating: Linear load, 60Hz.

In-rush currents not to exceed 20 x RMS.

Insulation Class: 180°C system (dependent on kVA)

Temperature Rise: 115°C

Core construction: high grade non-aging, fully processed silicon steel laminations or better.

Coil conductors: copper windings, with terminations brazed, welded or bolted.

Electrostatic Shielding on all three phase units

Excitation current: 3% of full load current rating (max.)

Sound level: NEMA ST-20.

Enclosure: non-ventilated; Type 4

Enclosure Finish: ANSI 61 Grey textured powder coating suitable for UL50 outdoor applications

Transformers must terminate in mounting pads. Primary and secondary terminations are to have terminals on the same side of the transformer mounted on separate insulated supports, with the LV terminations in the upper half of the enclosure and HV terminations in the lower half. Contractors must provide all necessary lugs.

cUL listed, [CE Mark]

10 kV BIL for both HV and LV coils.

Built to NEMA ST-20 and in accordance with all applicable UL, CSA and ANSI/IEEE standards.

9-31.11 ENCLOSED SWITCHES

Fusible Switches:

Type hd, heavy duty, single throw, 600-v ac, 1200 a and smaller: ul 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position. Capable of being locked in open and closed positions, NEMA 250 Type 3R enclosure.

Non-fusible Switches:

Type hd, heavy duty, single throw, 600-v ac, 1200 a and smaller: ul 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position. Capable of being locked in open and closed positions, NEMA 250 Type 3R enclosure.

9-31.12 CONTROL AND COMMUNICATIONS PANELS

Control enclosures: Provide wall-mounted, single door, enclosures rated ICS 6, NEMA Type 3R, Asas a minimum, be constructed of 16 gauge steel with all seams continuously welded and smoothly finished, and must possess integral, rolled lip framing around the door to prevent dirt, water, and other debris from falling into the cabinet when the door is opened. Enclosure door must be fully gasketed with glued-in-place oil resistant gaskets and must be equipped with a screwed-down door clamp mechanism and pad lockable hasp assembly. Exterior finish must be cabinet manufacturer's standard corrosion inhibiting, baked-on enamel finish over phosphatized surfaces. The enclosure interior surfaces and back panels must be finished with the cabinet manufacturer's standard corrosion-inhibiting, white high-gloss baked-on enamel finish.

9-31.13 CONTROL AND COMMUNICATIONS PANEL INTERNAL COMPONENTS

Ethernet Switches: Provide managed field switches with capabilities for both Fiber Optic Cable Type ST Connections and RJ-45 10/100 copper cabling.

Switches must have a port count to accommodate Contractor equipment that requires Ethernet connectivity plus have 25 percent spare ports at each Ethernet switch location.

Terminal Blocks: Provide channel mounted, impact and combustion resistant, self-extinguishing type terminal blocks. Terminal blocks must be rated, as a minimum, for continuous operation at 30 amps at 600 VAC. Furnish all required end plates, channel clamps, separators and other components required for installation in accordance with the manufacturer's recommendations.

Channel Mounted Circuit Breakers: Provide units equipped with "tripped" indication, rated as specified in the Plans. Channel mounted breakers must mount on the same size and type of mounting channel as the terminal blocks specified herein and must possess terminals each capable of accommodating one #10 AWG wire of the type specified herein. Each breaker must be equipped with an appropriate label and labeling space large enough to legibly accommodate a three-digit identifying number. Provide thermal-magnetic type circuit breakers with a "normal blow" tripping characteristic curve.

Wire way: Provide slotted type plastic wire ways, with covers, of the size as required for neat installation of interconnecting conductors. Wire ways be restricted slot type to prevent accidental removal of wires and be constructed of rigid, non-flammable polyvinyl chloride (PVC). Wire way be UL recognized for continuous operation at 120 degrees F.

24VDC Power Supplies: Provide power supplies as described in Section 9-31.8, and as indicated in the Plans.

Lighting Contactors: Provide lighting contactors as described in Section 9-31.1(7) and as indicated in the Plans.

9-33 POLES, PEDESTALS, AND FOUNDATIONS

9-33.1 GENERAL (GSP 10-01-18)

9-33.1(1) POLES, MAST ARMS, AND BRACKET ARMS

Replace the second sentence with the following:

All load requirements must be accommodated as shown on the Standard Plans and the Drawings.

9-33.1(2) ANCHOR BOLTS

Replace the second sentence of the first paragraph with the following:

Anchor bolts for steel strain and mast arm poles must be designed and fabricated per AASHTO and conform to ASTM F 1554-99, Grade 105, Class 2A including supplementary requirements S2, S3 and S5.

9-33.2 STEEL POLES, MAST ARMS, BRACKET ARMS, AND LUMINAIRE EXTENSIONS (GSP 10-01-18)

9-33.2(2) STRENGTH AND DEFLECTION REQUIREMENTS

Replace the last sentence of second paragraph with the following:

Mast arms must be of such size and gauge as to resist the bending moment.

Replace the fifth and sixth paragraphs with the following:

The total deflection at the top of metal poles must not exceed 2.5 percent of pole height.

The deflection of the mast arm after loading must not cause the end of the mast arm to extend below a horizontal line from the center of the arm flange. The maximum of the mast arm rise from a horizontal line must not be more than 0.35"/ft after moment load is applied.

9-34 ELECTRICAL AND SIGNAL CONDUITS

9-34.6 HANDHOLES (GSP 2-7-17)

Add the following:

The word "SDOT" for all SDOT handhole covers must be cast or otherwise permanently affixed to the cover and must be easily readable. Lettering must be fixed in such a manner as to avoid being a tripping hazard or causing any damage to the integrity of the handhole cover.

9-36 DETECTABLE WARNING

9-36.1 GENERAL (GSP 10-09-17)

Delete the third paragraph of this Section and replace it with the following:

See Standard Plan 422k for truncated domes detail.

9-38 TEMPORARY TRAFFIC CONTROL MATERIALS

9-38.0 GENERAL REQUIREMENTS (GSP 02-28-19)

In the first paragraph, delete "8. Barrier Drums" and renumber the list.

9-38.8 BARRIER DRUMS (GSP 02-28-19)

Replace this title and section with the following:

9-38.8 RESERVED

9-39 SHAFT-RELATED MATERIALS (GSP 05-21-19)

9-39.1 SHAFT CASING

9-39.1(1) PERMANENT CASING

Permanent casing must be of steel base metal conforming to ASTM A36, ASTM A 252 Grades 2 or 3, ASTM A572 Grade 50, or ASTM A588.

9-39.1(2) TEMPORARY CASING

Temporary casing must be a smooth wall structure of steel base metal, except where corrugated metal pipe is shown in the Drawings as an acceptable alternative material.

9-39.2 SHAFT SLURRY

9-39.2(1) MINERAL SLURRY

Mineral slurry must conform to the following requirements:

Property	Test	Requirement
Density (pcf)	Mud Weight (Density) API 13B-1, Section 1	63 to 75
Viscosity (seconds/quart)	Marsh Funnel and Cup API 13B-1, Section 2.2	26 to 50
pH	Glass Electrode, pH Meter, or pH Paper	8 to 11
Sand Content (percent)	Sand API 13B-1, Section 5	
Prior to final cleaning		4.0 max.

Immediately prior to placing concrete		4.0 max.

Use of mineral slurry in saltwater installations will not be allowed.

Slurry temperature must be at least 40 degrees F when tested.

9-39.2(2) SYNTHETIC SLURRY

Synthetic slurries must be used in conformance with the manufacturer's recommendations and must conform to the quality control plan specified in Section 6-19.3(2)B, item 4. The synthetic slurry must conform to the following requirements:

Property	Test	Requirement
Density (pcf)	Mud Weight (Density) API 13B-1, Section 1	64 max.
Viscosity (seconds/quart)	Marsh Funnel and Cup API 13B-1, Section 2.2	32 to 135
pH	Glass Electrode, pH Meter, or pH Paper	6 to 11.5
Sand Content (percent)	Sand API 13B-1, Section 5	
Prior to final cleaning		1.0 max.
Immediately prior to placing concrete		1.0 max.

The Contractor must submit a request for approval of slurry material with the following information:

1. Test data showing conformance to the properties in the table above, and
2. Documentation showing that the synthetic slurry (with load-tested additives) has been approved by the California Department of Transportation (Caltrans).

9-39.2(3) WATER SLURRY

Water without site soils may be used as slurry when casing is used for the entire length of the drilled hole. Water slurry without full length casing may only be used with the approval of the Engineer.

Water slurry must conform to the following requirements:

Property	Test	Requirement
Density (pcf)	Mud Weight (Density) API 13B-1, Section 1	65 max.
Sand Content (percent)	Sand API 13B-1, Section 5	1.0 max.

Use of water slurry in saltwater installations will not be allowed.

Slurry temperature must be at least 40 degrees F when tested.

9-39.3 STEEL REINFORCING BAR CENTRALIZERS

Steel reinforcing bar centralizers must be steel, conforming to the details shown in the Drawings. The Contractor may propose the use of alternative steel reinforcing bar devices as part of the shaft installation narrative as specified in Section 6-19.3(2)B, item 9, subject to the Engineer's review and approval of such devices.

9-39.4 ACCESS TUBES AND CAPS

Access tubes for QA and QV testing must be steel pipe of 0.145-inch minimum wall thickness and at least 1-1/2-inch inside diameter.

The access tubes must have a round, regular inside diameter free of defects and obstructions, including all pipe joints, in order to permit the free, unobstructed passage of 1.3-inch maximum diameter source and receiver probes used for the crosshole sonic log tests or the probes for the thermal probe method of TIP testing.

The access tubes must be watertight and free from corrosion, with clean internal and external faces to ensure a good bond between the concrete and the access tubes. The access tubes must be fitted with watertight threaded PVC caps on the bottom, and must be fitted with watertight PVC caps, secured in position by means as approved by the Engineer, on the top.

9-39.5 GROUT FOR ACCESS TUBES

Grout for filling the access tubes at the completion of the shaft QA and QV tests must be a homogeneous mixture of neat cement grout and potable water, conforming to Section 9-20.3(4), except that the maximum water/cement ratio must be 0.45.

