

**COVERSHEET
DOCUMENTS POSTED ON BUILDER'S EXCHANGE OF WASHINGTON**



Project Name	Everett Mall Bus Platform, City of Everett, WA #MALLSTN/24462
Contractor Name	Colacurcio Brothers
Bid Opening Date	2/18/2025 @ 2:00 pm PST
City Clerk's Digital Certification Stamp	

CITY OF EVERETT
DEPARTMENT OF PUBLIC WORKS
SPECIFICATIONS, PROPOSAL AND CONTRACT
DOCUMENTS
for
EVERETT MALL BUS PLATFORM
WO NO – MALLSTN/24462



PREPARED BY:

PACE Engineers
11255 Kirkland Way, Suite 300
Kirkland, Washington 98033-3417
425.827.2014

CERTIFICATE OF ENGINEER

EVERETT MALL BUS PLATFORM

City of Everett

December 2024

These bidding and contract documents have been prepared by, or under the direction of, the following registered professional engineer, licensed in accordance with the laws of the State of Washington to practice in the State of Washington:



Darrell Smith, PE

PACE Engineers
11255 Kirkland Way, Suite 300
Kirkland, Washington 98033-3417
425.827.2014

PACE Project No. 24462

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CITY OF EVERETT, WASHINGTON
EVERETT MALL BUS PLATFORM
WO NO. – MALLSTN/24462
NOTICE TO CONTRACTORS
ADVERTISEMENT FOR BIDS

Notice is hereby given that sealed bids/proposals for the **Everett Mall Bus Platform** will be received at the City Clerk, 1st Floor Everett Municipal Building, 2930 Wetmore, Everett, WA, 98201, until 2:00 p.m. on Tuesday, February 18th, 2025. At this appointed time, all bids/proposals will be opened and read aloud publicly via live streaming, or bidders may attend the bid opening in person at 2930 Wetmore Ave, Suite 9E, Everett, WA 98201. The link to view the live streaming bid opening can be found at: <https://everettwa.gov/319/Procurement>.

The engineer's estimate for this project is **\$1,512,032.00**

The project includes, is not limited to, furnishing all labor, materials, and equipment necessary to construct 400 linear feet of concrete transit platform, concrete pavement loading zone, HMA pavement, restroom building, related transit center improvements, and other such appurtenances, and performing all Work as required by the Contract, in accordance with the Contract Plans and Contract Provisions.

The Project is in Everett, Washington, and is generally located at Everett Mall South parking lot, at 1202 SE Everett Mall Way, and performing all other work as required by the contract.

Free-of-charge access to project bidding documents (plans, specifications, addenda, bidders list, and other documents, if any) is provided to bidders, subcontractors, and vendors at www.bxwa.com by clicking on "Posted Projects," "Public Works," and "City of Everett." This online plan room provides bidders with fully usable online documents with the ability to: download, view, print, order full/partial plan sets from numerous reprographic sources, and a free online digitizer/take-off tool. It is recommended that Bidders "Register" in order to receive automatic e-mail notification of future addenda and to place themselves on the "Self-Registered Bidders List." Bidders that do not register will not be automatically notified of addenda and will need to periodically check the on-line plan room for addenda issued on this project. Contact Builders Exchange of Washington at (425) 258-1303 should you require assistance with access or registration.

All bids/proposals must be made upon the City forms provided in the bidding documents and must be accompanied by a bid bond or certified check or cashier's check in an amount not less than five percent (5%) of the total amount of the bid/proposal, all in accordance with the bidding documents. A one hundred percent (100%) performance bond (and a one hundred percent (100%) payment bond, as may be required in the bidding documents), on form(s) provided by the City, will be required of the successful bidder to guarantee faithful performance of the Contract.

The City reserves the right to reject any and all bids/proposals and to waive any irregularities or informalities. Except as may be provided in the bidding documents, no bidder may withdraw its bid/proposal after the hour set for the opening thereof.

The City further reserves the right to make the award as deemed in the best interest of the City. The right is reserved by the City to postpone the award for a period of 45 days after bid opening.

The Contractor will be required to comply with all local, state, and federal laws and regulations pertaining to equal employment opportunities.

The City, in accordance with Title VI of the Civil Rights Act of 1964, (78 Stat. 252, 42 U.S.C. 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that, in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

By order of the City Council, Everett, Washington.

PROPOSAL

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DIVISION P - PROPOSAL
CITY OF EVERETT, WASHINGTON
EVERETT MALL BUS PLATFORM
WORK ORDER #MALLSTN/24462

To the City Council
Everett, Washington

The undersigned Bidder declares that it has carefully examined the Notice to Contractors and the Contract Documents (including without limitation Plans and Specifications, Standard Specifications, Special Provisions, Appendix, Proposal, and Contract) for the construction of 400 linear feet concrete transit platform, concrete pavement loading zone, HMA pavement, restroom building, and related transit center improvements. and other such Work as may be necessary, in accordance with the Contract. The undersigned Bidder declares that the Bidder has made such investigations as are necessary to determine the conditions to be encountered, and that, if this Proposal is accepted, the undersigned will enter into a contract with the City of Everett, Washington, in the form of Contract hereto annexed, the undersigned will, to the extent required, provide the necessary equipment, tools, apparatus, and other means of construction, and the undersigned will furnish all labor and materials necessary to complete the Work in the manner herein specified and according to the requirements of the Engineer.

The undersigned Bidder certifies that this Proposal is in all respects fair and is made without collusion on the part of any person, firm or corporation mentioned below, and no officer or employee of the City of Everett is personally or financially interested, directly or indirectly, in the Proposal or in any purchase of or sale of any materials or supplies for the Work to which it relates, or any portion of the profits thereof.

The undersigned Bidder agrees that the undersigned will complete the Work in all respects as required by **Division C, Section 2. Contract Time** and that the Bidder will pay liquidated damages to the City in the amount specified in the Contract Documents.

Accompanying this Proposal is a bid bond or certified check or cashier's check in the amount of five percent (5%) of the Proposal according to the conditions of the "Notice to Contractors" and "Division 1 - General Requirements" hereby incorporated. If this Proposal shall be accepted by the City of Everett, Washington, and the undersigned shall fail to execute a satisfactory contract and bond, as stated in the Division 1 – General Requirements hereto incorporated, within 14 calendar days after the Award Date, then the City may, at its option, determine that the undersigned has abandoned the Contract and the amount of the bid bond or certified check or cashier's check accompanying this Proposal shall be forfeited and become the property of the City of Everett, Washington.

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Note: Unit prices for all items, all extensions, and the total amount bid must be shown. Where conflict occurs between the unit price and the total amount named for any item, the unit price shall prevail, and totals shall be corrected to conform thereto. All entries must be typed or entered in ink.

BID SCHEDULE**BIDDER:** _____

Item No.	Item Description	Unit	Bid Qty.	Unit Price	Total Amount
1	Mobilization	LS	1		
2	Minor Changes	FA	20,000	\$1.00	\$20,000.00
3	Surveying	LS	1		
4	Record Drawings	LS	1		
5	Maintenance and Protection of Traffic Control	LS	1		
6	SPCC Plan	LS	1		
7	Temporary Construction Fencing	LF	1,210		
8	Potholing	FA	3,500	\$1.00	\$3,500.00
9	Type B Progress Schedule - Min Bid Req - \$1,500	LS	1		
10	Clearing and Grubbing	AC	0.1		
11	Sawcutting Asphalt Concrete Pavement, Final Joint Cut up to 6-inch	LF	1,075		
12	Sawcutting Concrete Curb, Gutter and Sidewalk	LF	65		
13	Removing Cement Concrete Extruded Curb	LF	836		
14	Removing Asphalt Concrete Pavement	SY	3,090		
15	Roadway Excavation Incl. Haul	CY	1,133		
16	Gravel Borrow	TN	121		
17	Site Grading	LS	1		
18	Crushed Surfacing Base Course	TN	840		
19	Crushed Surfacing Top Course	TN	30		
20	HMA CL. ½-inch PG 58H-22	TN	310		
21	HMA CL. ½ inch PG 64H-22 for Pavement Repair	TN	50		
22	Cement Concrete Pavement (12-inch Thick)	SY	1,256		
23	Transit Shelter	EA	4		
24	Restroom Building Complete	LS	1		
25	Corporation Stop w/ Service Saddle, ¾-inch	EA	2		
26	Assist COE in Connecting to Existing Watermain	EA	2		
27	Double Check Valve Assembly, ¾-inch	EA	2		
28	Water Service Connection, ¾-in.	EA	2		
29	Side Sewer - 4-inch. Diam PVC	LF	8		
30	Storm Drainpipe, 8-inch Diam.	LF	87		
31	Testing Storm Sewer Pipe	LF	87		
32	Structure Excavation Cl. B Including Haul	CY	9		
33	Catch Basin - Type 2 - 48- inch Diam.	EA	1		
34	Clean Out - Type 2 with Cast Iron Bolted Ring and Cover	EA	1		
35	Trench Excavation Safety Systems	LS	1		

Item No.	Item Description	Unit	Bid Qty.	Unit Price	Total Amount
36	Street Cleaning and Sweeping	HR	80		
37	Erosion/Water Pollution Control	LS	1		
38	Inlet Protection	EA	2		
39	Topsoil Type A	CY	155		
40	Compost	CY	5		
41	Mulch	CY	10		
42	PSIPE Plantings	LS	1		
43	Root Barrier	LF	270		
44	Irrigation System Complete	LS	1		
45	4-inch Irrigation Casing PVC Sch 80	LF	295		
46	Cement Concrete Seat Wall	LF	60		
47	Cement Concrete Sidewalk – 4-inch Thickness	SY	767		
48	Cement Concrete Curb & Gutter, Type A-1	LF	494		
49	Cement Concrete Pedestrian Curb	LF	27		
50	Cement Concrete Curb, Type E-1	LF	52		
51	Integral Cement Concrete Curb	LF	367		
52	Cement Concrete Curb Ramp	EA	2		
53	Permanent Signing	LS	1		
54	Detectable Truncated Dome Warning Strip	SF	535		
55	Transit Bay Flag Posts & Foundation	EA	5		
56	Transit Shelter Bench	EA	4		
57	Kiosk Foundation & Installation	LS	1		
58	Big Bally Solar Garbage Compactor	EA	2		
59	Bike Rack	EA	6		
60	Painted Double Yellow Line	LF	370		
61	Plastic Stop Line	LF	94		
62	Plastic Crosswalk Line	SF	100		
63	Conduit Pipe 2-inch Diam.	LF	350		
64	Conduit Pipe 4-inch Diam.	LF	350		
65	Security Camera System Complete	LS	1		
66	PUD Service Connection, Transformer and Connection to the Building	LS	1		
67	Communication Utility Connections	LS	1		
TOTAL AMOUNT BID					

The work is subject to State Sales Tax – Rule 171. The bidder shall include Washington State Retail Sales Tax on the individual unit prices.

PROPOSAL SIGNATURE SHEET

The undersigned Bidder understands that the quantities mentioned herein are approximate only and are subject to increase or decrease, and hereby proposes to perform all quantities of Work as either increased or decreased in accordance with the provisions of the Contract Documents and at the unit prices bid in the Bid Schedule, unless such schedule designates lump sum bids, or force account items.

The full names and residences of all persons and parties interested in the foregoing Bid as principals are as follows:

Name	Title	Address

Bidder acknowledges receipt of Addenda _____
through _____

Bidder has reviewed the insurance provisions of the Contract and hereby certifies that coverage will be provided as required. ☐ Yes ☐ No

In preparing this Bid, Bidder is especially directed to consider **[1-07.1(7) NOISE, 1-07.23(1) CONSTRUCTION UNDER TRAFFIC, 1-08.4(2) SPECIAL CONSTRUCTION CONSTRAINTS]**, which contain information that must be taken into consideration when preparing this bid. This notice is only a convenience to the Bidder during bidding and in no way relieves the Bidder from fully reading and taking into account all Contract Documents when preparing its Bid.

The undersigned Bidder also hereby certifies that, within the three-year period immediately preceding the bid solicitation date for this Project, the Bidder has not been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW. The undersigned hereby declares under penalty of perjury under the laws of the State of Washington that the foregoing sentence is true and correct.

Name of Bidder: _____

State of Washington Contractor's License No. _____

Signature of Bidder's Authorized Agent: _____

City and State Where Signed: _____

Email Address of Bidder's Authorized Agent: _____

This email address may be used by the City to provide notice of any kind to the Bidder. A notice is considered delivered to the Bidder on the date it is emailed to the email address.

Dated at: _____ Date: _____

SUBCONTRACTORS FORM

1. For heating, ventilation, air conditioning, plumbing (as defined by RCW Chap. 18.106) and electrical work (as defined by RCW Chap. 19.28), and structural steel installation and rebar installation, Bidder **MUST** either identify itself or Subcontractors in the chart below. If Bidder believes such work is not part of the scope of Work, Bidder shall write "NO WORK".
2. Bidder shall not list more than one Subcontractor for each category of work identified, unless Subcontractors vary with bid alternates, in which case the Bidder must indicate which Subcontractor will be used for which alternate.
3. **Bidder's bid shall be deemed nonresponsive and void if:**
 - A. For heating, ventilation, air conditioning, plumbing, electrical, structural steel installation and rebar installation, Bidder fails (1) to submit as part of the Bid the names of such Subcontractors, (2) to name itself to perform such Work, or (3) to write "No Work"; or
 - B. Bidder names two or more Subcontractors to perform the same work.
4. The requirement to name the Bidder's proposed heating, ventilation and air conditioning, plumbing, electrical, structural steel installation and rebar installation subcontractors applies only to proposed heating, ventilation and air conditioning, plumbing, electrical, structural steel installation and rebar installation subcontractors who will contract directly with the general contractor submitting the Bid to the City.
5. The heating, ventilation and air conditioning, plumbing, electrical portions of the chart below must be submitted with the bid proposal or within one hour of the published bid submittal time.
6. The structural steel installation and rebar installation portions of the chart below must be submitted with the bid proposal or within forty-eight hours of the published bid submittal time.

Type/Scope of Work	Name and Address of Subcontractor Or Bidder
HEATING Subcontractor, bidder or "no work" MUST be stated	
VENTILATION AND AIR CONDITIONING Subcontractor, bidder or "no work" MUST be stated	
PLUMBING (as described in RCW Chap. 18.106) Subcontractor, bidder or "no work" MUST be stated	
ELECTRICAL (as described in RCW Chap. 19.28) Subcontractor, bidder or "no work" MUST be stated	
STRUCTURAL STEEL INSTALLATION Subcontractor, bidder or "no work" MUST be stated	
REBAR INSTALLATION Subcontractor, bidder or "no work" MUST be stated	

SECTION 00 4539 – RCW 35.22.650 CERTIFICATION

A set percentage of minority group member employees or minority business subcontracts is not required in the performance of the Work under this Contract. However, RCW 35.22.650 requires bidders (a) to actively solicit (i) employment of minority group members and (ii) subcontract bids from minority businesses, and (b) to submit evidence of its compliance with these requirements for active solicitations:

RCW 35.22.650

All contracts by and between a first-class city and contractors for any public work or improvement exceeding the sum of ten thousand dollars, or fifteen thousand dollars for construction of water mains, shall contain the following clause:

"Contractor agrees that the contractor shall actively solicit the employment of minority group members. Contractor further agrees that the contractor shall actively solicit bids for the subcontracting of goods or services from qualified minority businesses. Contractor shall furnish evidence of the contractor's compliance with these requirements of minority employment and solicitation. Contractor further agrees to consider the grant of subcontracts to said minority bidders on the basis of substantially equal proposals in the light most favorable to said minority businesses. The contractor shall be required to submit evidence of compliance with this section as part of the bid."

As used in this section, the term "minority business" means a business at least fifty-one percent of which is owned by minority group members. Minority group members include, but are not limited to, blacks, women, native Americans, Asians, Eskimos, Aleuts, and Hispanics.

- I. Bidder confirms that it actively solicits employment of minority group members.
_____ *[yes or no]*

- II. Please estimate the percentage of Bidder's employees on this Project that will be made up of minority group members: _____ *[state estimated percentage]*

Please estimate the percentage of goods and services that will be subcontracted to minority businesses on this Project: _____ *[state estimated percentage]*

- III. List all minority businesses from whom bids or quotes for goods or services on this Project have been solicited (attach additional sheet if necessary):

Minority Business Name	Address	Goods or Services Involved	Certification Number*

*Certification numbers (for MBE, MWBE, DBE, etc.) are found at Office of Minority & Women's Business Enterprises: <https://omwbe.diversitycompliance.com/FrontEnd/SearchCertifiedDirectory.asp>. If a minority business does not have a certification number, the Bidder must provide with this certification form evidence that the business is at least fifty-one percent owned by minority group members.

During Contract performance, or in any event prior to final payment, Bidder shall provide the City with the names and addresses of all minority businesses actually awarded subcontracts under the Contract. In the event that a subcontract bid or quote is solicited and listed above and a subcontract is not awarded to the minority business so listed, Contractor shall state the reasons such subcontract was not awarded to the minority business and shall provide the minority business quote together with the actual subcontract price paid and the name of the subcontractor to whom the subcontract was subsequently awarded.

FAILURE TO PROPERLY COMPLETE AND SUBMIT THIS CERTIFICATION FORM WITH THE BID WILL RESULT IN REJECTION OF BID. THE BIDDER CERTIFIES UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF WASHINGTON THAT THE ABOVE IS TRUE AND COMPLETE CORRECT TO THE BEST OF ITS KNOWLEDGE AND BELIEF AND FURTHER AGREES TO PROVIDE INFORMATION AS REQUESTED BY THE CITY REGARDING MINORITY BUSINESS SUBCONTRACTS AND EMPLOYMENT OF MINORITY GROUP MEMBERS.

Signature: _____ Date: _____

NON-COLLUSION AFFIDAVIT

STATE OF WASHINGTON)
) ss
COUNTY OF SNOHOMISH)

The Undersigned, being first duly sworn, on oath says that the Bid above submitted is a genuine and not a sham of collusive bid, or made in the interest or on behalf of any person not therein named; and the undersigned further says that the Bidder has not directly or indirectly induced or solicited any Bidder on the above Work or supplies to put in a sham bid, or any person or corporation to refrain from bidding; and that said Bidder has not in any manner sought by collusion to secure an advantage over any other Bidder or Bidders.

FIRM NAME

AUTHORIZED SIGNATURE

SUBSCRIBED AND SWORN TO BEFORE ME THIS ____ DAY OF _____, 20____.

NOTARY PUBLIC IN AND FOR THE STATE OF
WASHINGTON, RESIDING AT _____

MY COMMISSION EXPIRES:_____

NOTICE TO ALL BIDDERS

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (USDOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., Eastern Time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

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BID DEPOSIT

Bidder herewith guarantees its Bid by depositing one of the following with its Proposal in an amount of five percent (5%) or more of the Bidder's total Bid:

- ☐ Certified check
- ☐ Cashier's check
- ☐ Bid Bond

Signature

BID BOND

Bond No. _____

Project: Everett Mall Bus Platform

W.O. #: MALLSTN/24462

KNOW ALL MEN BY THESE PRESENTS,
that _____ [Contractor], a
corporation organized under the laws of the State of _____, and
registered to do business in the State of Washington as a contractor, as Principal,
and

_____ [Surety], a
corporation organized under the laws of the State of _____ and registered
to transact business in the State of Washington, as Surety, their heirs, executors,
administrators, successors and assigns, are jointly and severally held and bound
to the City of Everett, Washington, hereinafter called "City", and are similarly held
and bound unto the City in the sum of _____ and ___/100's
Dollars (\$_____), the payment of which, well and truly to be paid, we
bind ourselves, our heirs, executors and successors, jointly and severally, formally
by these presents.

NOW, THEREFORE, the condition of this obligation is such that the Surety is held
and bound to the City to pay and forfeit to the City the amount of this bond as
provided herein, upon the conditions contained herein, unless the conditions for
release contained herein are satisfied or expressly waived in a writing signed by
the City Attorney.

It is expressly understood and agreed that:

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to the City upon default of Bidder the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the bidding documents the executed Contract required by the bidding documents, any performance and payment bonds required by the bidding documents and Contract Documents, and evidence of insurance required by the bidding documents and Contract Documents.
3. This obligation shall be null and void if:
 - 3.1. City accepts Bidder's bid and Bidder delivers within the time required by the bidding documents (or any extension thereof agreed to in writing by City) the executed Contract required by the bidding documents, any performance and payment bonds required by the bidding documents and Contract Documents, and evidence of insurance required by the bidding documents and Contract Documents, or
 - 3.2. All bids are rejected by City, or
4. Payment under this Bond will be due and payable upon default of Bidder and within thirty (30) calendar days after receipt by Bidder and Surety of written notice of default from the City, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by City and Bidder, provided that the time for issuing notice of award including extensions shall not in the aggregate exceed one hundred twenty (120) days from Bid Due Date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to thirty (30) calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety. Any suit or action under this bond must be instituted within the time period provided by applicable law.
7. The laws of the State of Washington shall apply to the determination of the rights and obligations of the parties hereunder. Venue for any dispute or claim hereunder shall be the state courts of Washington in Snohomish County, Washington.
8. Notice required hereunder shall be in writing sent to Bidder and Surety. Such notices may be sent by personal delivery, commercial courier or United States Registered or Certified Mail, return receipt requested, postage prepaid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond current and effective Power of Attorney evidencing authority of the officer, agent or representative to execute this Bond on behalf of Surety to execute and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of the Bond conflicts with any applicable provision of any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "bid" as used herein includes a bid, offer or proposal as applicable.

BIDDER	SURETY
<hr/>	<hr/>
Bidder's Name	Surety's Name and Corporate Seal (seal)
By: <hr/>	By: <hr/>
Signature, Title, and Date	Signature, Title, and Date
Address: <hr/>	Address: <hr/>
<hr/>	<hr/>
Attest: <hr/>	Attest: <hr/>
Signature, Title and Date	Signature, Title and Date

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CERTIFICATE OF COMPLIANCE WITH WAGE PAYMENT STATUTES

The bidder hereby certifies that, within the five-year period immediately preceding the bid solicitation date, the bidder is not a “willful” violator, as defined in RCW 49.48.082, of any provision of Chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

Bidder's Business Name

Signature of Authorized Official*

Printed Name

Title

Date

City

State

Check One:

Sole Proprietorship ☐Partnership ☐Joint Venture ☐Corporation ☐

State of Incorporation, or if not a corporation, State where business entity was formed:

If a co-partnership, give firm name under which business is transacted:

**If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*

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DIVISION B
BID ITEM DESCRIPTIONS

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DIVISION B - BID ITEM DESCRIPTIONS**Bid Item 1 - Mobilization**

Measurement and Payment: Lump Sum (LS)

The lump sum bid for mobilization shall constitute complete compensation for all of Contractor's preconstruction costs of preparatory work and operations including, but not limited to, those necessary for the movement of the Contractor's personnel, equipment, supplies and incidentals to the Project; for the establishment of its offices, buildings and other facilities necessary for Work on this Project; for premiums on bonds and insurance for the Project, and for Work and operations that the Contractor must perform or costs it must incur before beginning production work on the various items on the Project. Mobilization also includes, but is not limited to, posting construction identification signs, securing permits, establishing safety and security measures, preparing a traffic control plan(s), preconstruction photographs, developing a Schedule of Values for lump sum bid items, submitting the project schedule and providing product and material submittals, and posting of notices and jobsite posters as required by WSDOT 1-07.9(2). Also include mobilization costs for all subcontracted work along with all costs for utility coordination noted on the Plans and in the Specifications.

Items not included in this item include, but are not limited to:

- (a) Work covered by a specific bid item or Work that is to be included in a bid item or items.
- (b) Profit, interest on borrowed money, overhead or management costs.

Partial payments will be made for the lump sum contract price for "Mobilization" as follows:

- (a) When 5% of the total original contract amount is earned from other bid items, 50% of the amount bid for mobilization, or 5% of the total original contract amount, whichever is the least, will be paid.
- (b) When 10% of the total original contract amount is earned from other bid items, 100% of the amount bid for mobilization, or 10% of the total contract amount, whichever is the least, will be paid.

Upon substantial completion, payment of any amount bid for mobilization in excess of 10% of the total original contract amount will be paid.

Bid Item 2 - Minor Changes

Measurement and Payment: Force Account (FA)

Payments for credits will be determined in accordance with Section 1-09.4. For the purpose of providing a common Proposal for all Bidders, The Contracting Agency has entered an amount for "Minor Changes" in the Proposal to become a part of the total Bid by the Contractor.

Bid Item 3 - Surveying

Measurement and Payment: Lump Sum (LS)

The lump sum bid for surveying includes, but is not limited to, all costs associated with furnishing all labor, tools, survey instruments, materials, and other equipment necessary for the setting and monitoring the location, elevation, alignment and grade of the Work as specified in 1-05.4 CONFORMITY WITH AND DEVIATIONS FROM PLANS AND STAKES and the Plans.

The lump sum bid item also includes, but is not limited to, all costs associated with furnishing all labor, tools, survey instruments, materials and other equipment necessary for verifying the rim and invert elevations, prior to construction, of all existing manholes and pipes where connections are to be made.

The lump sum bid also includes, but is not limited to, all costs associated with furnishing all labor, tools, survey instruments, materials and other equipment necessary for obtaining the “as constructed” location and elevations of the Work, in particular, sewer pipe invert elevations and other information necessary for production of the Record Drawing (As Constructed) documents meeting the requirements defined in RECORD DRAWINGS of these Special Provisions.

Partial payments will be made for the lump sum contract price for “Surveying” as follows:

- (a) When 10% of the total original contract amount is earned from other bid items, 50% of the amount bid for surveying will be paid.
- (b) When redlines are received for preparing RECORD DRAWINGS, including all information described above, 100% of the amount bid for surveying will be paid.

Bid Item 4 - Record Drawings

Measurement and Payment: Lump Sum (LS)

The lump sum bid for record drawings will be made to the Contractor at the end of the contract once record drawings in PDF and in CAD format have been submitted to the Contracting Agency for review and approval. Contractor is also required to provide redlines of any construction changes to the Contracting Agency on a monthly basis at time of their submitting monthly pay application request. Monthly pay applications will not be approved for payment without receipt of redline construction changes and other required documentation.

Bid Item 5 - Maintenance and Protection of Traffic Control

Measurement and Payment: Lump Sum (LS)

Measurement for Maintenance and Protection of Traffic Control shall be the ratio of the number of working days completed to the total number of working days authorized in the Contract.

This lump sum bid item includes the maintenance and protection of traffic control materials, tools, and equipment necessary to accomplish the Work in accordance with 1-10.3(2) MAINTENANCE AND PROTECTION OF TRAFFIC CONTROL, including yet not limited to, signs, barricades, cones, flashers, reader boards, and temporary pavement markings. This Lump Sum bid item shall also include all Traffic Control labor, Flagging labor and spotter labor costs.

Bid Item 6 - SPCC Plan

Measurement and Payment: Lump Sum (LS)

The lump sum bid for the Spill Prevention, Control and Countermeasures (SPCC) Plan includes, but is not limited to, all costs associated with complying with the requirements of Section 1-07.15(1) of the Standard Specification.

Bid Item 7 - Temporary Construction Fencing

Measurement and Payment: Linear Foot (LF)

The measurement and payment per linear foot of “Temporary Construction Fencing” will be made for providing and or renting, delivering, installing, maintaining and removing at end of project “Temporary Construction Fencing” around the work site and designate material laydown space.

Bid Item 8 - Potholing

Measurement and Payment: Force Account (FA)

The Potholing Force Account bid item will be measured and paid for per the Standards Specification Section 1-09.6.

Bid Item 9 - Type B Progress Schedule – Min Bid Req - \$1,500

Measurement and Payment: Lump Sum (LS)

The lump sum bid for Type B Progress Schedule includes, but is not limited to, all costs associated with complying with the requirements of Section 1-08.3(2)B of the Standard Specification. At a minimum, the Contractor will place a bid of \$1,500 or include a bid greater bid amount.

Bid Item 10 - Clearing and Grubbing

Measurement and Payment: Acre (AC)

The measurement and payment for the clearing of landscape islands will be by the Acre (AC) for clearing, grubbing, removal and disposal of landscaping materials within existing landscaped island that have been designated to be removed and will be performed in conformance with Section 2-01 of the Standard Specifications:

Bid Item 11 - Sawcutting Asphalt Concrete Pavement, Final Joint Cut up to 6-inch.

Measurement and Payment: Linear Foot (LF)

Measurement for saw-cutting will be per linear foot along the true length of the surface cut.

The unit price per lineal foot for the final Sawcutting of Asphalt Concrete Pavement, up to 6-inch thickness, shall be full compensation for all labor, material, tools, and equipment necessary to satisfactorily complete the Work as specified in Section 2-02.3(3)B1 of Special Provisions and as shown on the Plans. The unit price per lineal foot for the final sawcutting of asphalt concrete pavement, up to 6-inch thickness includes, but is not limited to, the sawcutting necessary for the final joint between existing pavement and permanent HMA pavement.

Include cost of cleanup by vacuum collection and disposal of the cuttings slurry with this bid item as there will be no separate payment for cleanup.

Bid Item 12 - Sawcutting Concrete Curb, Gutter and Sidewalk

Measurement and Payment: Linear Foot (LF)

Measurement for sawcutting will be per linear foot along the true length of the surface cut.

The unit price per lineal foot for the final Sawcutting of Concrete Curb, Gutter and Sidewalk, shall be full compensation for all labor, material, tools, and equipment necessary to satisfactorily complete the Work as specified in Section 2-02.3(3)C1 of these Special

Provisions and as shown on the Plans. The unit price per lineal foot for the final sawcutting of concrete curb, gutter and sidewalk includes, but is not limited to, the sawcutting necessary for the final joint between existing concrete sidewalk or curb and permanent concrete repair.

Include cost of cleanup by vacuum collection and disposal of the cutting's slurry with this bid item as there will be no separate payment for cleanup.

Bid Item 13 - Removing Cement Concrete Extruded Curb

Measurement and Payment: Linear Foot (LF)

The measurement and payment for the Removing Cement Concrete Extruded Curb shall be for the removal of and disposal of existing Cement Concrete Extruded Curb per linear foot in accordance with Specification 2-02 of the Standard Specifications.

Bid Item 14 - Removing Asphalt Concrete Pavement

Measurement and Payment: Square Yard (SY)

The measurement and payment for the Removing Asphalt Concrete Pavement shall be for the removal of and disposal of existing Asphalt Concrete Pavement with a thickness of up to six inches per Square Yard in accordance with Specification 2-02 of the Standard Specifications.

Bid Item 15 - Roadway Excavation Incl. Haul

Measurement and Payment: Cubic Yard (CY)

The measurement and payment for Roadway Excavation Incl. Haul shall be for removing excavated materials, hauling off site and disposing of per cubic yard in accordance with Specification 2-03 of the Standard Specifications.

Bid Item 16 - Gravel Borrow

Measurement and Payment: (TON)

Measurement for Gravel Borrow shall be by the ton, recorded on certified weight tickets in accordance with 1-09.2 WEIGHING EQUIPMENT, and placed within the limits of dimensions defined in the Work, descriptions for other bid items, shown on the Plans, or COE Standard Drawings, or as otherwise approved by the Engineer.

Measurement for gravel borrow shall be limited to maximum trench widths defined in the work descriptions for other bid items.

The unit price per ton, based on certified weight tickets, for gravel borrow shall be full compensation for all labor, material, tools and equipment necessary to furnish imported gravel borrow for trench backfill where Engineer has determined native soils are not suitable for backfill, and other Work as required, from a Contractor-supplied source in accordance with 2-03.3(14)J of the Standard Specifications and these Special Provisions.

The unit price for gravel borrow shall include all costs of furnishing, hauling, stockpiling, placing, grading and compacting the material in place.

The unit price for this bid item includes all costs for removing, loading and disposing of displaced unsuitable material, including haul.

Bid Item 17 - Site Grading

Measurement and Payment: Lump Sum (LS)

No specific unit of measurement will be made for Site Grading, which consists of rough grading, smoothing and compacting the limits of the site to receive specified roadway, sidewalk and bus platform building materials.

Bid Item 18 - Crushed Surfacing Base Course

Measurement and Payment: TON

Measurement for Crushed Surfacing Base Course will be by the ton as recorded on certified weight tickets in accordance with 1-09.2 WEIGHING EQUIPMENT and limited to dimensions defined in the Work, descriptions for other bid items, shown on the Plans, details or COE Standard Drawings or as otherwise approved by the Engineer. In addition to surfacing, this product will be paid by the ton for sewer and storm pipe bedding. Crushed Surfacing Base Course material placed exceeding “neatline” quantities without advance authorization by the Inspector will not be paid for.

The unit price per ton shall be full compensation for all labor, compaction, material, tools, and equipment necessary to furnish, haul, stockpile, place, grade, and compact imported crushed surfacing base course for the Work as required, from a Contractor-supplied source in accordance with the Standard Specifications and these Special Provisions.

The unit price for crushed surfacing base course also includes all costs for controlling moisture content and all costs for dewatering.

Also included in this bid item shall be the cost of all equipment required to remove existing soils to attain proper elevations, compaction of native subgrade soils, as well as to uniformly spread and compact the crushed surfacing material. The unit price for this bid item includes all costs for removing, loading and disposing of displaced unsuitable material, including haul.

Included in this bid item the cost of sprinkling during dry periods prior to placement of the crushed surfacing and while spreading and compacting the material.

Payment for crushed surfacing base course will be by the ton of material placed and approved by the Inspector.

Bid Item 19 - Crushed Surfacing Top Course

Measurement and Payment: TON

Measurement for Crushed Surfacing Top Course will be by the ton as recorded on certified weight tickets in accordance with 1-09.2 WEIGHING EQUIPMENT and limited to dimensions defined in the Work, descriptions for other bid items, shown on the Plans, details or COE Standard Drawings or as otherwise approved by the Engineer. Crushed Surfacing Top Course material placed exceeding “neatline” quantities without advance authorization by the Inspector will not be paid for.

The unit price per ton shall be full compensation for all labor, compaction, material, tools, and equipment necessary to furnish, haul, stockpile, place, grade, and compact imported crushed surfacing top course for the Work as required, from a Contractor supplied source in accordance with the Standard Specifications and these Special Provisions.

The unit price for Crushed Surfacing Top Course also includes all costs for controlling moisture content.

Also included in this bid item shall be the cost of all equipment required to remove existing soils to attain proper elevations, compaction of native subgrade soils, as well as to uniformly spread and compact the crushed surfacing material.

The unit price for this bid item includes all costs for removing, loading and disposing of displaced unsuitable material, including haul.

Included in this bid item is the cost of sprinkling during dry periods prior to placement of the crushed surfacing and while spreading and compacting the material.

Payment for crushed surfacing top course will be by the ton of material placed and approved by the Inspector.

Bid Item 20 - HMA CL. ½ inch PG 58H-22

Measurement and Payment: TON

The measurement and payment for HMA CL. ½ inch PG 58H-22 will be by the ton. HMA place and compacted to Plans specified depth per Section 5-04 of the Standard Specifications.

Bid Item 21 - HMA CL. ½ inch PG 64H-22 for Pavement Repair

Measurement and Payment: TON

The measurement and payment for HMA CL. ½ inch PG 64H-22 for Pavement Repair will be by the ton. HMA place and compacted in trench repair areas to Plans specified depth per Section 5-04 of the Standard Specifications.

Bid Item 22 - Cement Concrete Pavement (12-inch Thick)

Measurement and Payment: Square Yard (SY)

The measurement and payment for Cement Concrete Pavement (12-inches Thick) shall be measured by the finished square yard for providing, placing, finishing and curing Cement Concrete Pavement per the Plans, details and Sections 5-05 of the Standard Specifications. This work also includes procuring and placing dowel bars, rebar and dowel bar baskets and any necessary form work including stripping of forms.

Bid Item 23 - Transit Shelter

Measurement and Payment: Each (EA)

The measurement and payment for Transit Shelter shall be for procuring, transporting, pouring six inch concrete foundation pad as notes in the Plans and assembling and installing Transit Shelter per each per technical specifications.

Bid Item 24 - Restroom Building Complete

Measurement and Payment: Lump Sum (LS)

There will be no specific unit of measurement for constructing a fully functional Restroom Building Complete. The contractor will receive a lump sum payment for constructing a complete and fully functioning Restroom Building which includes foundation, utility connections, building, roofing, interior and exterior finishes, two fully furnished restrooms, furnished breakroom, heating, air conditioning, interior and exterior light fixtures, hardware and locks, utility room with separately secured security/computer rack system, electrical, plumbing, ventilations, flooring and other necessary components and furnishings to make

the building fully functional and ready for occupancy in accordance with the plan set and contract specifications.

Bid Item 25 - Corporation Stop w/ Service Saddle, ¾-inch

Measurement and Payment: Each (EA)

The unit contract price for Corporation Stop w/ Service Saddle, ¾-inch shall be full compensation for supplying and installing Corporation Stop w/ Service Saddle, ¾ inch.

Bid Item 26 - Assist COE in Connecting to Existing Water Main

Measurement and Payment: Each (EA)

The unit contract price to Assist COE in Connecting to Existing Water Main shall constitute full compensation for all labor, materials, tools and equipment necessary for connection to the existing system, in accordance with 7-09.3(19)A including, yet not limited to; all costs for traffic control, excavation, shoring, dewatering, haul and disposal of excavated materials, furnishing, installing and compacting bedding and backfill materials; labor and equipment required for the complete installation of the connection as specified.

Unit contract price shall include all coordination efforts with the City and assistance as City forces make the actual connection. Connection of a water service line to the water main and connection of new water service line to existing water service line will not be considered a connection to the existing system.

Bid Item 27 - Double Check Valve Assembly ¾-inch.

Measurement and Payment: Each (EA)

The unit contract price for Double Check Valve Assembly ¾-inch will be full compensation for supplying and installing Double Check Valve Assembly ¾-inch and connecting per the City standard detail, Plans and specifications.

Bid Item 28 - Water Service Connection, ¾-inch

Measurement and Payment: Each (EA)

The unit contract price for Water Service Connection, ¾-inch, shall constitute full compensation for all labor, materials, tools and equipment necessary to connect new ¾-inch PE service lines off new 2-inch PE and reconnecting with the existing service line in accordance with Detail 4, Drawing D1. Work includes, yet not limited to, tee, trench excavation, backfill and compaction; street pavement, concrete curb, concrete curb and gutter, concrete driveway and concrete sidewalk removal; clearing and grubbing; testing; lawn restoration including seeding or sodding; dewatering; and removal or abandonment of existing service connection.

Bid Item 29 - Side Sewer – 4-inch Diam. PVC

Measurement and Payment: Linear Foot (LF)

The unit price per linear foot Side Sewer – 4-inch Diam. PVC shall be full compensation for all labor, material, tools and equipment necessary to satisfactorily complete the work as defined in Section 7-17 and 7-18 of these Special Provisions and as shown on the Plans.

Included in this bid item is locating the existing sewer, the side sewer as shown on the Contract Plans, connection to the main pipe and proposed building, fittings per COE Standard Drawings. Included in this bid item is the work to locate side sewers near the property line, including depth of utility, prior to installing tees at the main.

Included in this bid item are all costs for trench excavation, removing and disposing of pavement sidewalk, curb, miscellaneous surfacing, landscape materials or sod, removing and disposing of existing side sewer pipe; hauling and disposing of surplus or unsuitable materials; excavation; backfill; dewatering; sewage bypassing; stockpiling, hauling, cleaning and flushing pipes; testing and inspecting and replacing; protecting and maintaining adjacent utilities.

Included in this bid item is installation of backwater valves where shown on the Plans. Backwater valves will be furnished by the City for installation by the contractor.

All costs in jointing dissimilar side sewer pipe with a coupling shall be included in the unit price for this bid item.

Restoration of private improvements in streets and private property affected by side sewer construction and not otherwise included in other bid items, shall be considered incidental to this bid item.

Bid Item 30 - Storm Drain Pipe, 8-inch Diam.

Measurement and Payment: Linear Foot (LF)

The measurement and payment for Storm Drain Pipe, 8-inch Diam. will be measured by the linear foot and payment for the number of linear feet of completed installation measured along the invert and will include the length through elbows, tees, and fittings. The number of linear feet will be measured from the center of manhole to center of manhole or to the inside face of catch basins and similar type Structures. Refer to Section 7-04 of the Standard Specifications.

Bid Item 31 - Testing Storm Sewer Pipe

Measurement and Payment: Linear Foot (LF)

The measurement and payment for Testing Storm Sewer Pipe will be measured by the linear foot of pipe testes in accordance to Section 7-04 of the Standard Specifications.

Bid Item 32 - Structure Excavation Cl. B. Including. Haul

Measurement and Payment: Cubic Yard (CY)

Excavation of the trench will be measured and paid as Structure Excavation Class B or Structure Excavation Class B Including Haul by the cubic yard as specified in Sections 2-09 and 7-01 of the Standard Specifications.

Bid Item 33 - Catch Basin – Type 2 – 48-inch Diam.

Measurement and Payment: Each (EA)

The unit price per each for the catch basin – Type 2 – 48 inch Diam. shall be full compensation for all labor, material, incidentals, tools and equipment necessary to satisfactorily complete the work as defined in these Contract Documents.

The unit price for each catch basin – Type 2 – 48 inch Diam. shall be full compensation for furnishing, hauling, and assembling in place the completed installation including inlets, catch basins, frames and grates, adjustment sections, pipe connections, special fittings, and joint materials up to a depth of 10-feet as measured from the flowline of the outlet pipe to the surface of the Work measured to the nearest foot.

The unit price for each catch basin – Type 2 – 48 inch Diam. shall also include, but not be limited to, all costs for excavation; hauling and disposing of surplus or unsuitable material;

dewatering; storm water flow bypassing, furnishing and installing couplings; furnishing and installing steps or ladder; placing and compacting of suitable native backfill; furnishing, placing, and compacting foundation material as required; cleaning and flushing catch basins; reconnecting existing storm drainage connections; furnishing and installing gas traps; and replacing, protecting, and maintaining utilities.

All costs associated with abandoning, and/or removing and disposing of existing catch basins and inlets, salvaging frame and grate or cover, as shown on the Plans shall be included in the unit price for this bid item.

Adjusting new catch basin inlets to final grade is incidental and shall be included in the unit price for this bid item.

The cost of connection of pipes, including existing pipes, to the inlet or catch basin is incidental and shall be included in the unit price for this bid item.

Measurement and payment shall be per each catch basin installed as measured upon completion.

Bid Item 34 - Clean Out – Type 2 with Cast Iron Bolted Ring and Cover

Measurement and Payment: Each (EA)

The measurement and payment for Clean Out – Type 2 with Cast Iron Bolted Ring and Cover for each. Clean Out – Type 2 with Cast Iron Bolted Ring and Cover provided and installed flush to the finished grade in accordance with the Plans, standard Plans and specifications.

Bid Item 35 - Trench Excavation Safety Systems

Measurement and Payment: Lump Sum (LS)

The Lump Sum bid item includes the costs directly allocated to the safety system for trenches and all other excavations including, but not limited to, shoring, benching, bracing, excavation, sheeting, and trench box. This Work shall be accomplished in accordance with Divisions 1, 2, 7, and 8 of the Standard Specifications and these Special Provisions.

Payment per lump sum includes all equipment, materials, labor, installation, and removal, and all other work required to meet the trench excavation and safety system requirements.

Bid Item 36 - Street Cleaning and Sweeping

Measurement and Payment: Unit Price per Hour (HR)

The unit price per hour for Street Cleaning & Sweeping shall be full compensation for all labor, tools, incidentals, and equipment necessary to provide the street sweeping, cleaning, and dust control water required for this project.

Measurement for street sweeping and cleaning will be by the hour for the actual time consumed in pavement sweeping, cleaning and debris removal. No allowance will be made for time consumed in making repairs to the equipment or for moving the equipment to or from the site on which the street cleaning is ordered. No separate payment will be made for water required for dust control and the normal operation of the pickup sweepers.

Bid Item 37 - Erosion/Water Pollution Control

Measurement and Payment: Lump Sum (LS)

Measurement and payment will be made for Erosion/Water Pollution Control, lump sum, shall constitute full compensation for all labor, materials, tools and equipment necessary

and incidental for the installation, maintenance and removal of the Temporary Erosion and Sedimentation Control (TESC) facilities to prevent pollution, erosion, siltation, and damage to any wetland, stream, other watercourse, or surrounding property throughout the life of the Contract. TESC facilities shall include, but not be limited to, any cover measures, runoff control measures, soil and site stabilization measures, silt fencing as shown on the Plans, and inlet protection measures for the work area and downstream areas.

The TESC measures shall limit the erosion possibility by covering disturbed soils, preventing sloughing or raveling of cut and natural slopes, and controlling surface runoff from flowing into excavations using measures such as curbs, berms, dikes, rock-lined ditches, and other approved measures. Filter fabric fence shall be used to treat small areas of non-concentrated runoff prior to discharge from the site.

Bid Item 38 - Inlet Protection

Measurement and Payment: Each (EA)

Measurement and payment of Inlet Protection shall be for each Inlet Protection device installed per Section 8-01 of the Standard Specification, plan and standard details. Maintenance of Inlet Protection devices will be paid for under the bid item Erosion/Water Pollution Control.

Bid Item 39 - Topsoil Type A

Measurement and Payment: (CY)

The contract bid price for “Topsoil Type A” per cubic yard, shall be full compensation for all labor, material, tools, equipment, and supplies necessary to fine grade, place, cultivate, and cleanup for the depth of topsoil called for in the Plans.

Bid Item 40 - Compost

Measurement and Payment: (CY)

The contract bid price for “Compost” per cubic yard, shall be full compensation for all labor, material, tools, equipment, and supplies necessary to fine grade, place, cultivate, and cleanup for the depth of compost called for in the Plans.

Bid Item 41 - Mulch

Measurement and Payment: (CY)

The contract bid price for “Arborist Wood Chip Mulch” per cubic yard, shall be full compensation for all labor, material, tools, equipment, and supplies necessary to fine grade, place, cultivate, and cleanup for the particular item called for in the Plans.

Bid Item 42 - PSIFE Plantings

Measurement and Payment: Lump Sum (LS)

The unit Contract price Lump Sum (LS) for “PSIFE Plantings” (Plant Selection Including Plant Establishment) will be full pay for all Work to perform as specified within the planting area for weed control and planting area preparation, planting, staking, cleanup, and water necessary to complete planting operations as specified to the end of first year plant establishment.

As the plants that include plant establishment are obtained, propagated, and grown, partial payments will be made as follows after inspection by the Engineer:

Payment of 5 percent of the unit Contract price, per each, when the plant materials have been contracted, propagated, and are growing under nursery conditions. The

Contractor shall provide the Engineer with certification that the plant material has been procured or contracted for delivery to the project for planting within the time limits of the project. The certification shall state the location, quantity, and size of all material.

- Payment will be increased to 15 percent of the unit Contract price, per each, upon completion of the initial weed control and planting area preparation Work.
- Payment will be increased to 60 percent of the unit Contract price per each for the contracted plant material in a designated unit area when planted.
- Payment will be increased to 70 percent of the unit Contract price per each for contracted plant material at the completion of the initial planting.

Payment will be increased to the appropriate percentage upon reaching the following plant establishment milestones:

June 30	80 percent
September 30	90 percent
Completion of first-year plant establishment or after all replacement plants have been installed, whichever is later	100 percent

Plant establishment milestones are achieved when planting areas meet conditions described in WSDOT Standard Specifications Section 8-02.3(13).z

Bid Item 43 - Root Barrier

Measurement and Payment Linear Foot (LF)

The contract bid price for “Root Barrier” per lineal foot, shall be full compensation for all labor, material, tools, equipment, and supplies necessary to provide and install the particular item called for in the Plans and COE Standard Drawings.

Bid Item 44 - Irrigation System Complete

Measurement and Payment: Lump Sum (LS)

The unit Contract price Lump Sum (LS) for Irrigation System Complete shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, COE Standard Drawings, Standard Specifications and these Special Provisions, including all irrigation components indicated in the contract Plans, as-builts, and 1-year warranty corresponding with the beginning and ending dates for the 1-year of plant establishment.

Bid Item 45 - 4-inch Irrigation Casing PVC Sch 80

Measurement and Payment Linear Foot (LF)

The unit contract price per linear foot will be full pay for 4-inch Irrigation Casing PVC Sch 80 to perform work as described in Plans and Contract Specification.

Bid Item 46 - Cement Concrete Seat Wall

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot Cement Concrete Seat Wall will be made for supplying cement concrete, rebar, forming, constructing, providing textured finish Cement Concrete Seat Wall in accordance with the Plans and Contract Specifications.

Bid Item 47 - Cement Concrete Sidewalk – 4-inch Thickness

Measurement and Payment: Square Yard (SY)

The measurements and payment for Cement Concrete Sidewalk – 4-inch Thickness shall be measured by the square yard of finished cement concrete sidewalk and fully compensated for forming, supplying cement concrete, finishing, adding joints and joint filler and stripping forms in accordance Plans, COE Standard Drawings, Standard Specifications and these Special Provisions. Refer to Section 8-14 of Contract Specifications. For sections of the bus platform that require additional thickness of cement concrete, that additional thickness cost will be compensated under their respect bid items such as bid items Bike Rack and Transit Shelter.

Bid Item 48 - Cement Concrete Curb & Gutter, Type A-1

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot for Cement Concrete Curb & Gutter, Type A-1 shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, COE Standard Drawings, Standard Specifications and these Special Provisions, including forming, supplying cement concrete, finishing and stripping forms.

Bid Item 49 - Cement Concrete Pedestrian Curb

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot for Cement Concrete Pedestrian Curb shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, COE Standard Drawings, Standard Specifications and these Special Provisions, including forming, supplying cement concrete, finishing and stripping forms.

Bid Item 50 - Cement Concrete Curb, Type E-1

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot for Cement Concrete Curb, Type E-1 shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, COE Standard Drawings, Standard Specifications and these Special Provisions, including forming, supplying cement concrete, finishing and stripping forms.

Bid Item 51 - Integral Cement Concrete Curb

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot for Integral Cement Concrete Curb shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, COE Standard Drawings, Standard Specifications and these

Special Provisions, including reinforcement rebar, epoxy, forming, supplying cement concrete, finishing and stripping forms.

Bid Item 52 - Cement Concrete Curb Ramp

Measurement and Payment: Each (EA)

The unit contract price per each for Cement Concrete Curb Ramp shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, WSDOT Standard Plans, Standard Specifications, and these Special Provisions, including sawcutting, removal, loading, hauling and disposal, and including Detectable Warning Surface.

Bid Item 53 - Permanent Signing

Measurement and Payment: Lump Sum (LS)

The unit contract price per lump sum will be full pay for supplying signs, posts, and constructing foundations for all project related project signing identified in the plan set. This also includes installing signs per COE and WSDOT standard plans and providing sign post sleeves and other necessary hardware.

Bid Item 54 - Detectable Truncated Dome Warning Strip

Measurement and Payment: Square Foot (SF)

The unit contract price per square foot for Detectable Truncated Dome Warning Strip shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, COE Standard Drawings, Standard Specifications and these Special Provisions, This pay items is intended for the placement of Detectable Truncated Dome Warning Strips at the five bus bays along the bus platform. Detectable Truncated Dome Warning Strips are incidental when placed at ADA curb ramp locations.

Bid Item 55 - Transit Bay Flag Posts & Foundation

Measurement and Payment: Each (EA)

The unit contract price per each for Transit Bay Flag Posts and Foundation shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, WSDOT and COE Standard Drawings, Standard Specifications and these Special Provisions, including constructing a cement concrete foundation and supplying and installing steel post and connection sleeve.

Bid Item 56 - Transit Shelter Bench

Measurement and Payment: Each (EA)

The unit contract price per each for Transit Shelter Bench shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, Standard Specifications and these Special Provisions, including supplying, assembling, and installing transit shelter bench and misc. parts.

Bid Item 57 - Kiosk Foundation & Installation

Measurement and Payment: Lump Sum (LS)

The unit contract price will be lump sum, and no measurement of payment will be made for supplying cement concrete, rebar, forming and constructing Kiosk Foundation & Installation in accordance with the Plans and Contract Specifications. This work also includes conduit

and wire installation. Electronic Kiosk will be owner-supplied materials that the contractor is required to install as part of this pay item work.

Bid Item 58 - Big Belly Solar Garbage Compactor

Measurement and Payment: Each (EA)

The unit contract price per each for Big Belly Solar Garbage Compactor shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, Standard Specifications and these Special Provisions, including supplying, assembling and installing Big Belly Solar Garbage Compactor and misc. parts.

Bid Item 59 - Bike Rack

Measurement and Payment: Each (EA)

The unit contract price per each for Bike Rack shall be full compensation for all materials, tools, labor and equipment necessary to complete the Work in accordance with the Plans, Standard Specifications and these Special Provisions, including supplying and constructing added concrete for foundations system, supplying and installing bike rack and misc. parts.

Bid Item 60 - Painted Double Yellow Line

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot will be full pay for Painted Double Yellow Line to perform work as described in Section 8-22 of the Standard Specifications and per the plan set.

Bid Item 61 - Plastic Stop Line

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot will be full pay for Plastic Stop Line to perform work as described in Section 8-22 of the Standard Specifications and per the plan set.

Bid Item 62 - Plastic Crosswalk Line

Measurement and Payment: Square Foot (SF)

The unit contract price per square foot will be full pay for Plastic Crosswalk Line to perform work as described in Section 8-22 of the Standard Specifications and per the plan set.

Bid Item 63 - Conduit Pipe 2-inch Drain

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot will be full pay for Conduit Pipe 2-inch Diam. to perform work as described in Section 8-20 of the Standard Specifications and per the plan set.

Bid Item 64 - Conduit Pipe 4-inch Drain

Measurement and Payment: Linear Foot (LF)

The unit contract price per linear foot will be full pay for Conduit Pipe 4-inch Diam. to perform work as described in Section 8-20 of the Standard Specifications and per the plan set.

Bid Item 65 - Security Camera System Complete

Measurement and Payment: Lump Sum (LS)

The unit contract price per lump sum will be full pay for installing Owner supplied security cameras, installing conduit, conductors, cabling, brackets, power source on pedestrian pole with foundation and other necessary equipment so a fully functioning security camera system is operational by providing real-time monitoring and recording data collected.

Bid Item 66 - PUD Service Connection, Transformer, and Connection to Building

Measurement and Payment: Lump Sum (LS)

The unit contract price per lump sum will be full pay to bring PUD power to the site, trenching conduit, conductor, secure, and install a transformer, and connect power to the building. This will also include coordination efforts with Snohomish PUD No.1 and restoring trenched pavement surface.

Bid Item 67 - Communications Utility Connections

Measurement and Payment Lump Sum (LS)

The unit contract price per lump sum will be full pay to bring communications to the site and connect to the platform. Conduit and undergrounding will be necessary and will be part of this work.

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DIVISION C CONTRACT

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CITY OF EVERETT, WASHINGTON

CONTRACT

THIS CONTRACT is made and entered into by and between the City of Everett, Washington, a municipal corporation existing under the laws of the State of Washington (the "**City**") and _____ (the "**Contractor**").

In consideration of the sums to be paid to it by the City, Contractor hereby covenants and agrees to furnish all labor, tools, materials, equipment, and supplies required to complete in a workmanlike manner the work, improvements, and appurtenances in accordance with the Specifications and Plans and all other Contract Documents entitled: "Everett Mall Bus Platform" (the "**Project**").

1. Contract Documents. This Contract is the written agreement signed between the City and Contractor and includes Division C – CONTRACT, Division P - PROPOSAL, Division B – BID ITEM DESCRIPTIONS, Special Provisions, Contract Plans, Standard Specifications, Standard Plans in effect as of the date Bids are opened, Addenda, supplemental agreements, change orders, certifications and affidavits required by this Contract and by law, and Federal requirements that apply to this Contract and Project, all of which are referred to as the "Contract Documents" and all of which are hereby incorporated by reference. A copy of the Contract Documents that were posted for the Project on Builder's Exchange of Washington (www.bxwa.com) as of Bid Opening Date is maintained by the City Clerk's Office as a single pdf and is available as follows:

--	--

Contractor acknowledges that Contractor has downloaded and reviewed this pdf prior to signing this Contract. City and Contractor agree that this pdf contains all posted Contract Documents as of the Bid Opening Date. City and Contractor further agree that this pdf may contain some other documents (such as Reference Information) that are not Contract Documents.

2. Contract Time. Substantial completion shall be achieved within One Hundred (100) working days after the effective date of the Notice to Proceed. Physical completion shall be within Fifteen (15) working days after the actual date of issuance of substantial completion.

3. Liquidated Damages. The parties agree the City will suffer damage and be put to additional expense in the event that the Contractor does not complete the work in all respects and have it ready for use by the substantial completion date stated. Because it is difficult to accurately compute the amount of such costs and damages, the Contractor hereby covenants and agrees to pay to the City liquidated damages as computed in Section 1-08.9 of the Standard Specifications, as may be amended by the Special Provisions, for each and every working day required to accomplish substantial completion of the work in excess of the period established above for substantial completion. For overruns in contract time occurring after the physical completion date, liquidated damages shall be assessed at the rate computed in Section 1-08.9 of the Standard Specifications, as may be amended by the Special Provisions, until the work is physically complete.

4. Contract Sum. The Contract Sum of this Contract is:

Contract Sum	
--------------	--

This is based on the proposal/bid submitted by Contractor dated _____. A copy of such proposal/bid is attached hereto. The basis for final payment will be the actual amount of

work performed according to the Contract Documents and payments, whether partial or final, shall be made as specified therein.

5. Withholding. Five percent (5%) of amounts due Contractor shall be retained and withheld to comply with RCW Chap. 60.28. Retained amounts shall only be released: (A) as required by law or (B) sixty (60) days after completion of all contract work if there are no claims against the retained funds. In addition to the amounts required by RCW 60.28 to be withheld from the progress or retained percentage payments to the Contractor, the City may, in its sole discretion, withhold any amounts sufficient to pay any claim against the Contractor of which the City may have knowledge and regardless of the informalities of notice of such claim arising out of the performance of this Contract. The City may withhold the amount until either the Contractor secures a written release from the claimant, obtains a court decision that such claim is without merit, or satisfies any judgment in favor of the claimant on such claim. The City shall not be liable for interest during the period the funds are so held.

6. Compliance with Employment and Wage Laws. Contractor agrees to comply with all state and federal laws relating to the employment of labor and wage rates to be paid.

7. Vacant

8. Indemnification.

- A.** Contractor will defend, indemnify and hold harmless the City from any and all Claims arising out of or relating to any acts, errors, omissions, or conduct by Contractor in connection with its performance of this Contract, including without limitation (and without limiting the generality of the foregoing) all Claims resulting from Contractor's performance of, or failure to perform, its express and implied obligations under the Contract. The Contractor will defend and indemnify and hold harmless the City whether a Claim is asserted directly against the City, or whether a Claim is asserted indirectly against the City, e.g., a Claim is asserted against someone else who then seeks contribution or indemnity from the City. The amount of insurance obtained by, obtainable by, or required of the Contractor does not in any way limit the Contractor's duty to defend and indemnify the City. The City retains the right to approve Claims investigation and counsel assigned to said Claim and all investigation and legal work regarding said Claim shall be performed under a fiduciary relationship to the City. This Section 8 is in addition to any other defense or indemnity or hold harmless obligation in the Contract Documents.
- B.** The Contractor's obligations under this Section 8 shall not apply to Claims caused by the sole negligence of the City. If (1) RCW 4.24.115 applies to a particular Claim, and (2) such Claim is caused by or results from the concurrent negligence of (a) the Contractor and (b) the City, then the Contractor's liability under this Section 8 shall be only to the extent of the Contractor's negligence.
- C.** As used in this section: (1) "City" includes the City's officers, employees, agents, and representatives; (2) "Claims" include all losses, claims, demands, expenses (including, but not limited to, attorney's fees and litigation expenses), suits, judgments, or damage, whether threatened, asserted or filed against the City, whether such Claims sound in tort, contract, or any other legal theory, whether such Claims have been reduced to judgment or arbitration award, irrespective of the type of relief sought or demanded (such as money or injunctive relief), and irrespective of the type of damage alleged (such as bodily injury, damage to property, economic loss, general damages, special damages, or punitive damages); and (3) "Contractor" includes Contractor, its employees, agents, representatives and subcontractors. If, and to the extent, Contractor employs or engages subcontractors, then Contractor shall ensure that each such subcontractor (and subsequent tiers of subcontractors) shall expressly agree to defend and indemnify and

hold harmless the City to the extent and on the same terms and conditions as the Contractor pursuant to this section.

9. Insurance. The Contractor shall purchase and maintain such insurance as set forth in the Contract Documents. Failure to maintain such insurance shall be a material breach of the Contract. The City shall be entitled to damages for such a breach that include, but are not limited to, any loss (including, but not limited to, third party litigation expenses and professional fees) suffered by the City if the City is determined to be solely or concurrently negligent, and if the City suffers any loss or must pay or defend against any such claim, suit, demand or damage as a result of such breach.

10. Waiver of Industrial Insurance Immunity. Contractor waives any right of contribution against the City. It is agreed and mutually negotiated that in any and all claims against the City, its agents or employees, the Contractor, a subcontractor, anyone directly or indirectly employed by the Contractor or subcontractor, or anyone for whose acts any of them may be liable, the defense and indemnification obligations hereunder shall not be limited in any way by any limitation on the amount of damages, compensation, or benefits payable by or for the Contractor or any subcontractor under industrial worker's compensation acts, disability benefit acts, or other employees' benefit acts. Contractor's and City's signatures hereto indicate specific waiver of Contractor's industrial insurance immunity in order to fulfill the indemnities hereunder. Solely for the purpose of indemnification and defense as provided in this Contract, the Contractor specifically waives any immunity under the State Industrial Insurance Law, Title 51 RCW. The Contractor expressly acknowledges that this waiver of immunity under Title 51 RCW was the subject of mutual negotiation and was specifically entered into pursuant to the provisions of RCW 4.24.115.

11. Repair of Damage. The Contractor agrees to repair and replace all property of the City and all property of others damaged by it, its employees, subcontractors, suppliers and agents.

12. Pre-Bid Inspection and Risk of Loss. It is understood that the whole of the work under this contract is to be done at the Contractor's risk and that: (1) prior to submitting its proposal or bid, it became familiar with the conditions of excavation, subsurface, backfill, materials, climatic conditions, location, traffic, and other contingencies that may affect the work and has made its bid or proposal accordingly and (2) that it assumes the responsibility and risk of all loss or damage to materials or work that may arise from any cause whatsoever prior to completion.

13. Headings for Convenience Only. The headings in this document are for convenience only, and shall not be used or considered to interpret or construe this document.

14. Effective Date. This Contract is effective as of the date of the last person to sign it, and may be executed in multiple counterparts, each of which shall be deemed an original. This Contract may be signed with AdobeSign, and any such signature is fully binding.

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**CITY OF EVERETT
WASHINGTON**

ATTEST:

By: _____
Cassie Franklin, Mayor

Office of the City Clerk

Date



STANDARD DOCUMENT
APPROVED AS TO FORM
OFFICE OF THE CITY
ATTORNEY
OCTOBER 31, 2023

CONTRACTOR: Please fill in the spaces and sign in the box appropriate for your business entity.

CORPORATION

**LIMITED LIABILITY
COMPANY**

PARTNERSHIP

[CONTRACTOR'S COMPLETE LEGAL NAME]

BY: _____
SIGNATURE

Typed/Printed Name of Signer: _____

Title of Signer: _____

Date: _____

**Sole
Proprietorship**

[Typed/Printed Name]

Signature

Date: _____

PAYMENT BOND**Bond No.** _____

The City of Everett has awarded to _____ (Principal), a contract for the construction of the project designated as **Everett Mall Bus Platform**, Project No. **[MALLSTN/24462]**, in **Everett**, Washington (Contract), and said Principal is required under the terms of that Contract to furnish a payment bond in accord with Title 39.08 Revised Code of Washington (RCW) and (where applicable) 60.28 RCW.

The Principal, and _____ (Surety), a corporation organized under the laws of the State of _____ and licensed to do business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Dept., are jointly and severally held and firmly bound to the City of Everett in the sum of _____ US Dollars (\$ _____), which is the Contract Sum, subject to the provisions herein.

This statutory payment bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall pay all persons in accordance with RCW Titles 39.08 and 39.12 including all workers, laborers, mechanics, subcontractors, and material suppliers, and all persons who shall supply such contractor or subcontractor with provisions and supplies for the carrying on of such work, and all taxes incurred on said Contract under Title 50 and 51 RCW and all taxes imposed on the Principal under Title 82 RCW; and if such payment obligations have not been fulfilled, this bond shall remain in full force and effect.

The Surety agrees to indemnify, defend, and protect the City of Everett against any claim of direct or indirect loss resulting from the failure of the Principal, its heirs, executors, administrators, successors, or assigns, (or the subcontractors or lower tier subcontractors of the Principal) to pay all laborers, mechanics, subcontractors, lower tier subcontractors materialpersons, and all persons who shall supply such contractor or subcontractors with provisions and supplies for the carrying on of such work.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, and waives notice of any change, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

This bond may be executed in two (2) original counterparts and shall be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed and original power of attorney for the officer executing on behalf of the surety. The Surety agrees to be bound by the laws of the state of Washington and subjected to the jurisdiction of the state of Washington.

PRINCIPAL

SURETY

Printed Name: _____

Printed Name: _____

Title: _____

Title: _____

STANDARD BOND FORM
OFFICE OF THE CITY ATTORNEY
APPROVED AS TO FORM
APPROVED AS TO CITY CHARTER § 4.1

Local Office/ Agent of Surety:
Name: _____
Address: _____
Phone Number: _____
Email: _____

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PERFORMANCE BOND**Bond No.:** _____

The City of Everett has awarded to _____ (Principal), a contract for the construction of the project designated as **Everett Mall Bus Platform**, Project No. **[MALLSTN/24462]**, in **Everett**, Washington (Contract), and said Principal is required to furnish a bond for performance of all obligations under the Contract.

The Principal, and _____ (Surety), a corporation organized under the laws of the State of _____ and licensed to do business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Dept., are jointly and severally held and firmly bound to the City of Everett in the sum of _____ US Dollars (\$ _____), which is the Contract Sum, subject to the provisions herein.

This statutory performance bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall well and faithfully perform all of the Principal's obligations under the Contract and fulfill all the terms and conditions of all duly authorized modifications, additions, and changes to said Contract that may hereafter be made, at the time and in the manner therein specified; and if such performance obligations have not been fulfilled, this bond shall remain in full force and effect.

The Surety agrees to indemnify, defend, and protect the City of Everett against any claim of direct or indirect loss resulting from the failure of the Principal, its heirs, executors, administrators, successors, or assigns (or any of the employees, subcontractors, or lower tier subcontractors of the Principal) to faithfully perform the Contract.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, and waives notice of any change, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

This bond may be executed in two (2) original counterparts, and shall be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed and original power of attorney for the officer executing on behalf of the surety. The Surety agrees to be bound by the laws of the state of Washington and subjected to the jurisdiction of the state of Washington.

PRINCIPAL

SURETY

Printed Name: _____

Printed Name: _____

Title: _____

Title: _____

STANDARD BOND FORM
OFFICE OF THE CITY ATTORNEY
APPROVED AS TO FORM
APPROVED AS TO CITY CHARTER § 4.1

Local Office/ Agent of Surety:

Name: _____

Address: _____

Phone Number: _____

Email: _____

DIVISION SP
SPECIAL PROVISIONS

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DIVISION 1. GENERAL REQUIREMENTS

Supplement Division 1 by adding the following:

General Description and Location of Project

(*****)

Work being performed includes furnishing all labor, materials and equipment necessary to construct 400 linear feet concrete transit platform, concrete pavement loading zone, HMA pavement, restroom building, related transit center improvements, and other such appurtenances and performing all Work as required by the Contract, in accordance with the Contract Plans and Contract Provisions.

The Project is in Everett, Washington, and is generally located at Everett Mall South parking lot, located south of SE Everett Mall Way.

Design Engineer

(*****)

Questions and inquiries about these Contract Documents should be directed in writing to the attention of Sabina Araya, City Project Manager, SARaya@everettwa.gov.

Standard Specifications

(*****)

All Work under this Contract shall be performed in accordance with the following Specifications except as may be exempted or modified by other sections of these Contract Documents. These Specifications are incorporated by reference, made a part of this Contract and shall control and guide all activities within this Project whether referred to directly, paragraph by paragraph.

WSDOT/APWA "2025 Standard Specifications for Road, Bridge and Municipal Construction", hereinafter referred to as the "Standard Specifications."

The Standard Specifications, as modified or supplemented by these Special Provisions, all of which are made a part of the Contract Documents, shall govern all of the Work. The following latest edition of other specifications and standard plans shall apply to the extent to which they are called out in the Contract Documents:

1. City of Everett "Design and Construction Standards and Specifications", latest edition as found on the Web at "<http://everettwa.gov/DocumentCenter/View/243>".
2. "Standard Plans for Road and Bridge Construction", as prepared by WSDOT.
3. "Manual on Uniform Traffic Control Devices (MUTCD)."
4. APWA Standards.
5. AWWA Standards.

Each Provision of these Special Provisions either supplements, modifies, or replaces the comparable Standard Specification, or is a new Provision. The deletion, amendment, alteration, or addition to any subsection or portion of the Standard Specifications is meant to pertain only to that particular portion of the section, and in no way should it be interpreted that the balance of the section does not apply.

Sections and subsections in the Special Provisions labeled under the headers with (*****) indicate City of Everett Provisions.

1-01 DEFINITIONS AND TERMS**1-01.3 Definitions**

Delete the three paragraphs under the heading Completion Dates, and substitute the following:

Substantial Completion Date: The day the Engineer determines the City has full and unrestricted use and benefit of the facilities, both from the operational and safety standpoint, any remaining traffic disruptions will be rare and brief, and only minor incidental work, replacement of temporary substitute facilities, plant establishment periods, or correction or repair remains for the Physical Completion of the total Contract.

Physical Completion Date: The day all of the Work is physically completed on the project. All documentation required by the Contract and required by law does not necessarily need to be furnished by the Contractor by this date.

Completion Date: Date on which Project is ready for Final Acceptance. All physical work, including Punch List, is complete and Contractor has completed and fulfilled all contractual obligations except any maintenance of landscaping. Contractual obligations that must be fulfilled prior to achievement of the Completion Date include, and are not limited to; the Contractor's furnishing all documentation, including correct, complete and accurate as-built or record drawings and operation and maintenance manuals and transfer of warranties.

(This definition replaces the definition in WSDOT 1-01.3 for Completion Dates.)

Revise the following definitions to read as follows:

Award: The decision by Everett City Council to award a contract and authorize the Mayor to sign the Contract. No contract is formed until the Mayor signs the contract. (This definition replaces the definition in WSDOT 1-01.3 for Bid Documents.)

Bid Documents: The component parts of the proposed Contract which may include, but are not limited to, the Proposal Form, the proposed Contract Provisions, the proposed Contract Plans, and Addenda. (This definition replaces the definition in WSDOT 1-01.3 for Bid Documents.)

Contract: Written agreement signed between the City and Contractor and includes Division C – CONTRACT, Division P - PROPOSAL, Division B – BID ITEM DESCRIPTIONS, Special Provisions, Contract Plans, Standard Specifications and amendments, Standard Plans in effect as of the date Bids are opened, Addenda, supplemental agreements, change orders, certifications and affidavits required by this Contract and by law, and Federal requirements that apply to this Contract and Project. (This definition replaces the definition in WSDOT 1-01.3 for Contract.)

Contract Bond(s): The separate performance bond and payment bond, as set forth in and required by the Contract Documents. (This definition supplements the definition in WSDOT 1-01.3 for Contract Bond.)

Engineer: The City's representative who administers the construction program for the City. Provisions in the Contract Documents that state the Engineer "shall" or "will" shall be deemed to mean that the Engineer shall or will take such action if requested in writing by the Contractor. (This definition replaces the definition in WSDOT 1-01.3 for Engineer.)

Specifications: Includes 2025 WSDOT/APWA Standard Specifications and latest Amendments, and all other specifications (including these Special Provisions) for the

prescribed Work in this Contract. (This definition replaces the definition in WSDOT 1-01.3 for Specifications.)

Working Drawings: Drawings, shop drawings, plans, diagrams, or calculations, including a schedule of submittal dates for Working Drawings where specified, which the Contractor must submit to the Engineer. (This definition replaces the definition in WSDOT 1-01.3 for Working Drawings.)

Supplement Section 1-01.3 by adding the following:

All references in the Standard Specifications to the terms “State”, “Department of Transportation”, “Washington State Transportation Commission”, “Commission”, “Secretary of Transportation”, “Secretary”, “Headquarters”, and “State Treasurer” shall be revised to read “City.”

All references to the terms “State” or “state” shall be revised to read “City” unless the reference is to an administrative agency of the State of Washington, a State statute or regulation, or the context reasonably indicates otherwise.

All references to “State Materials Laboratory” shall be revised to read “City designated location.”

All references to “final contract voucher certification” shall be interpreted to mean the City form(s) by which final payment is authorized, and final completion and acceptance granted.

Additive: A supplemental unit of work or group of bid items, identified separately in the Proposal, that may, at the discretion of the City, be awarded in addition to the base Bid.

Alternative or Alternate: One of two or more units of Work or groups of bid items, identified separately in the Proposal, from which the City may make a choice between different methods or material of construction for performing the same Work.

Award Date: The date of the formal action by the Everett City Council to accept the lowest responsible and responsive Bidder for the Work.

Bid Opening Date: The date the Everett City Clerk publicly opens and reads the Bids.

Business Day: A business day is any day from Monday through Friday except holidays as listed in 1-08.5.

Change Order: Reference to Change Order shall include all rights of the City and Contractor under 1-04.4 CHANGES. Agreed Change Orders shall be in the form attached as Appendix C. Unilateral Change Orders shall be in the form attached as Appendix C.

City: The City of Everett, Washington. “City” and “Owner” and “Contracting Agency” mean the same.

City's Representative: The person designated in writing by the City to act as its representative at the construction site and to perform construction inspection service and administrative functions relating to this Contract. The terms “Engineer”, “Architect”, or “Owner’s Representative” shall be interchangeable with City's Representative.

Contract Claim: Any request by the Contractor for additional time or money resulting in adjustment of Contract Sum or Contract Time irrespective of the cause or reason for the request. Contract Claims include, but are not limited to, requests by the Contractor for additional time or money due to Extra Work, inefficiencies, Delays, interferences, and problems with the design. Contract Claim includes, but is not limited to, claims or

requests by Subcontractors for extensions of Contract Time, adjustment of Contract Sum, additional compensation that the Contractor attempts to pass through or assert against the City, or claims against the City arising out of a third party's claim against the Contractor. Certified Claim means the same as Contract Claim.

Contract Documents: All of the items that together make up the complete Contract. See definition for "Contract."

Contract Execution Date: The date the Mayor of the City of Everett signs the Contract or the date that the Contractor signs the Contract, whichever date is later. This officially binds the Contractor to the Contract.

Contract Sum: The price in dollars stated in the Contract to be paid by the City to the Contractor for the Work described in the Contract Documents, as modified by Change Orders.

Contract Time: The period of time established by the terms and conditions of the Contract within which the Work must be physically completed.

Delay: Any increase in the duration of the critical path of the Project.

Dispute: Any controversy or disagreement.

Equipment: Mechanical, electrical, instrumentation, or other devices with one or more moving parts, or devices requiring an electrical, pneumatic, electronic, or hydraulic connection.

Extended Overhead: The increase in Overhead costs attributable to an extension of Contract Time.

Extra Work: Providing materials and Equipment and the performance of Work not directly called for in, or implied by, the Contract Documents, such that Contractor would be entitled to an adjustment of Contract Sum and possibly an extension of Contract Time.

Final Acceptance: Formal action by Everett City Council determining that all of the Contractor's Work has been completed, except for any landscaping maintenance.

Float: The amount of time between the early start date and the late start date, or the early finish date and the late finish date of an activity in the Project schedule.

Force Account: Costs of performing Work as defined in 1-09.6 FORCE ACCOUNT.

Furnish: To deliver items, Equipment, or material to the job site or other specified location.

Install: Placing, erecting, or constructing complete in place items, Equipment, or material.

May: Conduct that is permitted, but not required.

Notice: A signed, written communication by the Contractor to the City as described in 1-04.5 NOTICE BY CONTRACTOR of these Special Provisions.

Notice of Award: The written notice from the City of Everett to the successful Bidder signifying the City's acceptance of the Bid. No Contract is formed until the Contract Execution Date.

Notice to Proceed: The written Notice from the City or City's Representative to the Contractor authorizing and directing the Contractor to proceed with the Work and

establishing the date on which the Contract Time begins. Multiple and partial Notices to Proceed may be issued on a single Project.

Over absorbed Overhead: Over recovery of fixed indirect costs that occurs when a Contractor performs more overall Work than it otherwise would have performed.

Overhead

In general, Overhead for the purpose of calculating additional compensation under this section of the Contract shall include only those costs that are expended for the administration of the business as a whole. Such costs usually accrue or are incurred due to the passage of time, or cannot be traced to a particular project or contract, or both.

Examples of possible Overhead costs include, but are not limited to, General and Administrative salaries and benefits, rent, general company insurance, exclusive of insurance on owned equipment that is directly job costed, depreciation on office facilities, utilities, maintenance, office supplies, general company accounting and legal fees, exclusive of amounts expended directly on any specific project, personal property taxes, general company business licenses, dues and subscriptions.

The following costs and expenses are excluded from the definition and calculation of Overhead. Overhead costs that vary substantially with the volume of Work performed, as measured by billings, shall not be included in Overhead for the purpose of determining additional compensation for Extended or Unabsorbed Home Office Overhead, or both.

Examples of costs that are not included in Overhead include: travel and business meetings, telephones, professional fees expended for the benefit of a specific project, union welfare benefits, payroll taxes and equipment rental.

If related party transactions are included in a Contractor's Overhead, they must be explicitly identified as related party transactions and must not exceed amounts that would be incurred in an arms-length transaction for the provision of the same or similar goods and services. If such transactions exist and the amounts paid by the Contractor and included in Overhead are in excess of that which would normally be expended in an arms-length transaction, an adjustment, in the form of a reduction in the amount for calculation purposes, must be included in any calculation in determining the amount of Allocable Overhead.

Overhead shall not include any cost directly attributable to a particular project. If a cost can be traced to a particular contract, the Contractor may not classify the cost as Overhead.

Indirect or home office costs that vary substantially with the amount of Work performed shall not be included in the group of costs comprising Overhead.

Overhead shall not include any costs specifically disallowed by Federal Acquisition Regulations, Subpart 31.2 – Contracts with Commercial Organizations, or its successor. Further, "Overhead" shall not include the costs of any "field support services" that are more closely direct costs in nature, regardless of the manner in which the Contractor normally accounts for such costs. An example of such disallowed cost would be for material handling and expediting, which are costs incurred for the direct support and benefit of any specific project(s).

In addition to compliance with Federal Acquisition Regulations, Subpart 31.2 examples of specific costs not allowed in a calculation under this Section of the Contract are Incentive Compensation paid to personnel classified as Overhead and otherwise includable under this Section of the Contract, travel and business meetings, employer

paid benefits and taxes on direct payroll costs of any project, insurance costs directly identifiable to any specific project, penalties, and any costs incurred regarding company owned equipment normally classified as a direct project costs,.

Person: Includes individuals, associations, firms, companies, corporations, partnerships, and joint ventures.

Project: The undertaking to be performed under the provisions of the Contract.

Provide: Furnish and Install, complete in place.

Punch List: List of incomplete items of Work and of items of Work that do not conform to the requirements of the Contract Documents. The Punch List is prepared after Substantial Completion.

RCW: Means the Revised Code of Washington

Schedule of Values: Allocation of Contract Sum to items of Work as described in 1-09.9 PAYMENTS of these Special Provisions.

Shall: Required conduct.

Shown: Refers to information presented on the Plans, with or without reference to the Plans.

Specify: Refers to information described, shown, noted or presented in any manner in the Contract.

Submittals: The information required by the Contract Documents provided by Contractor to the City's Representative or City.

Total Float: The amount of time a given activity or path of activities may be delayed before it will affect the Completion Date.

Traffic: Both vehicular and non-vehicular traffic, such as pedestrians, bicyclists, wheelchairs, and equestrian traffic.

Unabsorbed Overhead: The reduction or loss of contribution to recovery of the Contractor's Overhead costs realized by the result of reduced Project or Contractor billings, or both, due to any reason whatsoever, including a Project extension.

Unit Price Work: Refers to items of Work identified by unit prices in the Proposal.

1-02 BID PROCEDURES AND CONDITIONS

1-02.1 *Prequalification of Bidders*

Delete 1-02.1 and substitute the following:

1-02.1 *Bidder Responsibility Criteria*

(***)**

1-02.1(1) Mandatory Bidder Responsibility Criteria

(***)**

Bidder shall meet mandatory responsibility criteria in accordance with RCW 39.04.350(1). The City may require Bidder to submit documentation demonstrating compliance with the criteria under this 1-02.1(1). Bidder must:

1. Registration. At the time of bid submittal, have a certificate of registration in compliance with chapter 18.27 RCW, a plumbing contractor license in compliance with chapter 18.106 RCW, an elevator contractor license in compliance with chapter

- 70.87 RCW, or an electrical contractor license in compliance with chapter 19.28 RCW, as required under the provisions of those chapters; and
2. UBI. Have a current Washington Unified Business Identifier (UBI) number; and
 3. State Requirements. If applicable:
 - a. Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
 - b. Have a Washington Employment Security Department number, as required in Title 50 RCW; and
 - c. Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW.
 4. Disqualification. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
 5. Prevailing Wage Training. Unless Bidder has completed three or more public works projects and had a valid business license for three or more years, Bidder must have received Department of Labor and Industries training on the requirements related to public works and prevailing wage under RCW 39.12 and RCW 39.04.
 6. Certification of Wage Compliance. Within the five-year period immediately preceding the date of the bid solicitation, not have been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW.
 7. Apprentices. If the Project is subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the bid solicitation.

1-02.1(2) Supplemental Bidder Responsibility Criteria

(*****)

The following Supplemental Bidder Responsibility Criterion applies to this Project:

Extended Certification of Wage Compliance. Within the five-year period immediately preceding the date of the bid solicitation, the Bidder must not have been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW.

The Bidder must sign and submit a wage certification as provided by the City in the bidding documents (which is usually included in the Bid Form) before Project award. The City may also use independent sources of information that may be available to demonstrate whether the Bidder is in compliance with this criterion. A Bidder may request that City modify the supplemental bidder responsibility criterion listed above. This request must be in writing to the City project manager and must be received by the City project manager at least ten business days before the bid opening. If the City determines the Bidder does not meet the bidder responsibility criterion above

and is therefore not a responsible bidder, the City will notify the Bidder in writing with the reasons for its determination. If the Bidder disagrees with this determination, the Bidder may appeal to the director of the City department responsible for this Contract (the "Director") by presenting additional information to the Director in writing within two (2) business days after receipt of the City's determination. The Director will consider the appeal and any additional information and will issue a decision regarding the appeal. Any protest by Bidder of the Director decision must be in strict conformity to Everett Municipal Code Chapter 3.46, Bid Protest Procedures.

1-02.2 *Plans and Specifications*

Delete all paragraphs in 1-02.2 and substitute the following:

Information as to where Bid Documents can be obtained or reviewed will be found in the Call for Bids (Advertisement for Bids) for the Work.

After Award of the Contract, the Contractor will receive up to six sets of the reduced Plans (11" x 17") and accompanying Special Provisions. In addition, the City will supply up to three sets of full size plans (22" x 34"). All Plans and Special Provisions will be conformed with addenda unless Contractor requests otherwise.

Additional Plans and Special Provisions may be purchased by payment of the current printing costs.

1-02.4 *Examination of Plans, Specifications, and Site of Work*

1-02.4(1) General

Delete the fifth paragraph of 1-02.4(1), beginning with "Bid prices shall reflect", and substitute the following:

Bid prices shall include everything necessary for the completion of the Work including, but not limited to, providing the materials, equipment, tools, plant and other facilities, and the management, superintendence, labor, and all necessary testing services.

Revise the first sentence in the paragraph that begins with "Any prospective Bidder desiring an explanation" to read as follows:

Any prospective Bidder desiring an explanation or interpretation of the Bid Documents, shall request the explanation or interpretation in writing by close of business three business days preceding the bid opening to allow a written reply to reach all prospective Bidders before the submission of their Bids.

Supplement 1-02.4(1) by adding the following:

Bidder acknowledges that Bidder has not relied on representation or warranty of the City not expressly included in the Contract Documents.

The information provided by the City is not intended to be a substitute for, or a supplement to, the independent verification by Bidder to the extent such independent investigation of the Drawings and Specifications or Site conditions is deemed necessary or desirable by the Bidder. Bidder acknowledges that they have not relied upon City or Engineer furnished information regarding site conditions in preparing and submitting a Bid.

Further supplement 1-02.4(1) by adding the following:

1-02.4(1)A Interpretation of Contract Documents**(*****)**

Should a Bidder find what is believed to be discrepancies in or omissions from the Plans, Specifications, or Special Provisions, or should the Bidder be in doubt as to their meaning, Bidder may submit to the Engineer a written request for an interpretation thereof. The Bidder submitting the request will be responsible for its prompt delivery. Any interpretation of the documents, if made, will be made only by addendum duly issued and a copy of such addendum will be mailed or delivered to each Bidder receiving a set of such documents. All requests for interpretations must be received by the City or Engineer no later than 7 calendar days prior to the Bid Opening Date. All questions regarding the Contract Documents shall be referred to the City or Engineer at the address provided in the Contract Documents.

1-02.4(1)B Prevailing Wages**(*****)**

Bidder is directed to 1-07.9(1) of these Special Provisions for requirements regarding applying payment of prevailing wage rates for employment of labor on within Snohomish County.

1-02.4(2) Subsurface Information

Delete the first paragraph and substitute the following:

If the City has made subsurface investigation of the site of the proposed Work, the boring log data and soil sample test data accumulated by the City will be made available for inspection by the Bidders. The boring logs and soil sample test data shall NOT be considered as part of the Contract or the Contract Documents, regardless of whether such data is supplied as an Appendix to the Special Provisions or not. In addition, the City makes no representation or warranty expressed or implied that:

1. The Bidders' interpretations from the boring logs are correct,
2. Moisture conditions and indicated water tables will not vary from those found at the time the borings were made, and
3. The ground at the location of the borings has not been physically disturbed or altered after the boring was made.

The City specifically makes no representations, guarantees, or warranties as to the condition, materials, or proportions of the materials between the specific borings regardless of any subsurface information the Contracting Agency may make available to the prospective Bidders.

Supplement 1-02.4(2) by adding the following:

The boring log data and soil sample data, if any, can be found in Appendix E.

If there is a geotechnical report made by the City, Bidder may contact City of Everett Project Manager to arrange to view the geotechnical report.

The availability of subsurface information from the City shall not relieve the Bidder or the Contractor from risks or of their duty to make examinations and investigations as required by Section 1-02.4(1) or other responsibility under the Contract or as may be required by law.

1-02.5 Proposal Form

Delete this section and substitute the following:

The Proposal Form identifies the project and its location and describes the Work. It also lists estimated quantities, units of measurement, the items of work, and the materials to be furnished at the unit bid prices. Bidder shall complete spaces on the proposal form that call for, and are not limited to, unit prices; extensions; summations; the total bid amount; signatures; date; and, where applicable, retail sales taxes and acknowledgment of addenda; bidder's name, address, bidder's email address, telephone number, and signature; bidder's UDBE/DBE/M/WBE commitment, if applicable; a State of Washington Contractor's Registration Number; and a Business License Number, if applicable. Bids shall be completed by typing or shall be printed in ink by hand, preferably in black ink. The required certifications are included as part of the Proposal Form.

Bidder shall submit Bidder's Proposal on the Proposal Form provided in the Contract Documents.

The City reserves the right to arrange the proposal forms with alternates and additives, if such be to the advantage of the City. Bidder shall bid on all alternates and additives set forth in the Proposal Form unless otherwise specified.

1-02.6 *Preparation of Proposal*

Delete "unless it approves in writing" from the second sentence of the first paragraph of 1-02.6.

Revise the fourth paragraph of 1-02.6, beginning with "The Bidder shall submit with the Bid a completed Disadvantaged Business Enterprise (DBE) Utilization Certification", to read as follows:

Contractor agrees that the Contractor shall actively solicit the employment of minority group members. Contractor further agrees that the Contractor shall actively solicit Bids for the subcontracting of goods or services from qualified minority businesses. Contractor shall furnish evidence of the Contractor's compliance with these requirements of minority employment and solicitation. Contractor further agrees to consider the grant of subcontracts to said minority bidders on the basis of substantially equal proposals in the light most favorable to said minority businesses. The Contractor shall be required to submit evidence of compliance with this section as part of the Bid by submitting the RCW 35.22.650 Certification.

Delete the sixth paragraph of 1-02.6, which begins with "The Bidder shall submit with their Bid a completed Contractor Certification Wage Law Compliance form (WSDOT Form 272-009)."

Supplement 1-02.6 by adding the following:

In the event that the product of a unit price and an estimated quantity does not equal the extended amount quoted, the unit price shall govern, and the correct product of the unit price and the estimated quantity shall be deemed to be the amount bid. If the sum of two or more items in a bidding schedule does not equal the total amounts quoted, the individual item amounts shall govern and the correct total shall be deemed to be the amount bid. Do not qualify Proposal, since this will automatically be cause for rejection of the Proposal.

Bidders are warned against making erasures or alterations of any kind to the Proposal Form, and proposals that contain omissions, erasures, or irregularities of any kind may be rejected. No oral, electronic, fax, telegraphic, or telephonic proposals or modifications will be considered.

1-02.7 Bid Deposit

Supplement 1-02.7 by adding the following:

Bid deposit shall serve as evidence of good faith and as a guarantee that if awarded the Contract the Bidder will execute the Contract and provide bonds as required by the Bid. Should the successful Bidder fail to enter into the Contract, furnish a satisfactory performance and payment bond, and furnish evidence of insurance within 14 calendar days after the Award Date, the certified check, cashier's check or bid bond shall, unless otherwise provided in the Contract Documents, be forfeited as liquidated damages.

Bid bonds shall contain the following:

1. City-assigned number for the Project;
2. Name of the Project;
3. The City of Everett named as obligee;
4. The amount of the bid bond stated either as a dollar figure or as a percentage that represents five percent of the maximum bid amount that could be awarded;
5. Signature of the Bidder's officer empowered to sign official statements. The signature of the person authorized to submit the Bid should agree with the signature on the bond, and the title of the person must accompany the said signature;
6. The signature of the surety's officer empowered to sign the bond and the power of attorney.

Bidder shall use the bond form included in the Bid Documents.

1-02.8 Non-collusion Declaration and Lobbying Certification**1-02.8(1) Non-collusion Declaration**

Delete the last paragraph of 1-02.8(1) and supplement by adding the following:

The City has determined every Bidder must submit a Non-Collusion Affidavit for every Project. Accordingly, the Bidder shall submit a signed and notarized "Non-Collusion Affidavit", contained in the Contract Documents, as part of the Proposal package. If the City has reason to believe that collusion exists among Bidders, the City will reject the Bids of the known participants in such collusion and may, at its option, require that all Bidders certify under penalty of perjury, that no collusion has occurred or exists.

1-02.9 Delivery of Proposal

Delete all of 1-02.9 and substitute the following:

Bidder shall submit Bidder's Proposal in a sealed opaque envelope that clearly and legibly notes the Project Name, the time and date of the bid opening, and the Bidder's name and address on the outside of the envelope.

The City will not open or consider any Proposal or any supplement to a Proposal that is received after the time specified for receipt of Proposals, or received in a location other than that specified for receipt of Proposals.

1-02.10 *Withdrawing, Revising, or Supplementing Proposal*

Delete 1-02.10 and substitute with the following:

After submitting a physical Proposal to the City, the Bidder may withdraw, revise, or supplement its Proposal if:

1. The Bidder submits a written request signed by an authorized person and physically delivers it to the place designated for receipt of Proposals, and
2. The City receives the request before the time set for receipt of Bid Proposals, and
3. The revised or supplemented Proposal (if any) is received by the City before the time set for receipt of Proposals.

The original physical Bid Proposal may be supplemented, or revised and resubmitted as the official Proposal if the City receives it before the time set for receipt of Proposals. If the Bidder does not submit a revised or supplemented package in time, then its bid shall be considered withdrawn.

Email, fax or telephone requests to withdraw, revise, or supplement a Proposal are not acceptable.

Resubmitted Proposals shall be in full compliance with the bidding requirements. Bid deposit shall be in an amount sufficient for the Proposal as resubmitted.

After the scheduled time for opening Proposals, no Bidder will be permitted to withdraw Bidder's Proposal unless the award of contract is delayed for a period exceeding 45 calendar days. Proposals received after the scheduled closing for opening Proposals will be returned unopened to the Bidder.

1-02.12 *Public Opening of Proposals*

Supplement 1-02.12 by adding the following:

**1-02.12(1) Postponement of Opening
(*****)**

The City reserves the right to postpone the date and time for receiving or opening of Bids, or both, at any time prior to the date and time established in the Notice to Bidders. Postponement notices shall be provided to Bidders in the form of addenda.

Supplement 1-02.12 by adding the following:

**1-02.12(2) Video Conferencing
(*****)**

The City reserves the right to open and publicly read Bids by use of video-conferencing, such as by Microsoft Teams, Zoom or other application.

1-02.13 *Irregular Proposals*

Revise item 1 and 2 of 1-02.13 to read as follows:

1. A Proposal will be considered irregular and will be rejected if:
 - a. The authorized proposal form furnished by the City is not used or is altered;
 - b. The completed proposal form contains any unauthorized additions, deletions, alternate Bids, or conditions;
 - c. The Bidder adds provisions reserving the right to reject or accept the Award, or enter into the Contract;

- d. A price per unit cannot be determined from the Bid Proposal;
 - e. The Proposal form is not properly executed;
 - f. The Bidder fails to submit or properly complete, on the form provided by the City, the Subcontractor list, if applicable, as required in 1-02.6;
 - g. The Bidder fails to submit or properly complete, on the form provided by the City, the RCW 35.22.650 Certification, as required in 1-02.6;
 - h. The Proposal does not constitute a definite and unqualified offer to meet the material terms of the Bid invitation;
 - i. More than one proposal is submitted for the same project from a Bidder under the same or different names; or
 - j. The Bidder fails to submit or properly complete, on the form provided by the City, the Non-Collusion Affidavit, as required in 1-02.8(1).
2. A Proposal may be considered irregular and may be rejected if:
- a. The Proposal does not include a unit price for every Bid item;
 - b. Any of the unit prices are excessively unbalanced (either above or below the amount of a reasonable Bid) to the potential detriment of the City, as determined by the City;
 - c. Receipt of Addenda is not acknowledged;
 - d. A member of a joint venture or partnership and the joint venture or partnership submit Proposals for the same project (in such an instance, both Proposals may be rejected); or
 - e. Proposal form entries are not made in ink.

1-02.14 *Disqualification of Bidders*

Revise 1-02.14 to read as follows:

A Bidder will be deemed not responsible if the Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1), as amended, and noted in 1-02.1(1).

The City will verify that the Bidder meets the mandatory bidder responsibility criteria in RCW 39.04.350(1). To assess bidder responsibility, the City reserves the right to request documentation as needed from the Bidder and third parties concerning the Bidder's compliance with the mandatory bidder responsibility criteria.

If the City determines the Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1) and is therefore not a responsible Bidder, the City shall notify the Bidder in writing, with the reasons for its determination. If the Bidder disagrees with this determination, it may appeal the determination within two business days of the City's determination by presenting its appeal and any additional information to the City. The City will consider the appeal and any additional information before issuing its final determination. If the final determination affirms that the Bidder is not responsible, the City will not execute a contract with any other Bidder until at least two business days after the Bidder determined to be not responsible has received the City's final determination.

If the Contract Documents contain supplemental responsibility criteria, then a Bidder will be deemed not responsible if the Bidder does not meet those criteria:

1-02.15 Pre-Award Information

Revise 1-02.15 to read as follows:

Before awarding any contract, the City may require one or more of these items or actions of the apparent lowest responsible Bidder:

1. A complete statement of the origin, composition, and manufacture of any or all materials to be used,
2. Samples of these materials for quality and fitness tests,
3. A progress schedule, in a form the City requires, showing the order of and time required for the various phases of the Work,
4. A breakdown of costs assigned to any bid item,
5. Attendance at a conference with the Engineer or representatives of the Engineer,
6. Obtain, and furnish a copy of, a business license to do business in the City of Everett.
7. A copy of State of Washington Contractor's Registration, or
8. Any other information or action taken that is deemed necessary to ensure that the Bidder is the lowest responsible bidder.

1-03 AWARD AND EXECUTION OF CONTRACT

1-03.1 Consideration of Bids

Revise the first paragraph to read:

After opening and reading Proposals, the City will check them for correctness of extensions of the prices per unit and the total price. If a discrepancy exists between the price per unit and the extended amount of any bid item, the price per unit will control. If a minimum bid amount has been established for any item and the Bidder's unit or lump sum price is less than the minimum specified amount, the City will unilaterally revise the unit or lump sum price to the minimum specified amount and recalculate the extension. The total of extensions, corrected where necessary, including sales taxes where applicable and such additives and/or alternates as selected by the City, will be used by the City for Award purposes and to fix the awarded Contract Sum and the amount of the Contract Bond(s).

Revise the third and fourth paragraphs of 1-03.1 to read as follows:

Within 5 days after the opening of Proposals (or such longer time as the City may grant in writing), a Bidder who wishes to claim error shall submit a notarized affidavit signed by the Bidder, accompanied by original work sheets used in the preparation of the Proposal, requesting relief from the responsibilities of Award.

The affidavit shall describe the specific error(s) and certify that the work sheets are the originals used in the preparation of the Proposal. The Engineer will review the certified work sheets to determine the validity of the claimed error and make recommendation to the City. If the City concurs in the claim of error, the Bidder will be relieved of responsibility, and the bid deposit of the Bidder will be returned. Thereafter, at the discretion of the City, all Bids may be rejected or Award made to next lowest and responsive Bidder.

Supplement 1-03.1 by adding the following:

1-03.1(2) Preference for Resident Contractors
(*****)

In accordance with RCW 39.04.380, if a Bid is received from a nonresident contractor from a state that provides a percentage bidding preference and does not have an office located in Washington, then a comparable percentage disadvantage will be applied to the Bid of that nonresident contractor.

1-03.2 Award of Contract

Revise 1-03.2 to read as follows:

Within 45 days after the opening of Bids, the City will act either to accept the Bid from the lowest responsive, responsible Bidder, or to reject all Bids. The City reserves the right to request extensions of such Bid acceptance period. If the lowest responsible Bidder and the City cannot agree on an extension by the 45 day deadline, the City reserves the right to award the Contract to the next lowest responsible Bidder or reject all Bids.

The acceptance of a Bid will be evidenced by a written Notice of Award of Contract delivered in person or by certified mail to the Bidder whose Bid is accepted, together with a request to furnish a Contract Bond and evidence of insurance and to execute the Contract set forth in the Contract Documents. No Contract is formed until the Contract Execution Date.

1-03.3 Execution of Contract

Revise 1-03.3 to read as follows:

Within 3 calendar days after receiving the Notice of Award (not including Saturdays, Sundays and Holidays), the successful Bidder shall provide to the City the information necessary to execute the Contract electronically. This information shall include contact information, including the full name, title, email address, and phone number for the authorized signer of the Bidder.

Successful Bidder has 14 calendar days after receiving the Notice of Award to complete the following:

- ♦ Execute the Contract upon receipt from the City's AdobeSign System.
- ♦ Submit to the City two original paper payment bonds and two original paper performance bonds submitted on forms contained in Contract Documents and fully executed, with proper power of attorney document(s).
- ♦ Submit to the City in pdf format certificate of Insurance and additional insured endorsements in accordance with the Contract Documents.

Until the City executes the Contract, no Bid shall bind the City nor shall any Work begin within the project limits or within City-furnished sites. The Bidder shall bear all risks for any Work begun outside such areas and for any materials ordered before the Contract is executed by the City.

If the Bidder experiences circumstances beyond its control that prevents return of the Contract, bonds, and insurance documents within 14-calendar days after receipt of the Notice of Award, the City may grant more time, provided the City deems the circumstances warrant it.

A Contract shall not be formed until the Contract is signed by the Mayor.

1-03.4 Contract Bond

Revise 1-03.4 to read as follows:

The Contractor shall provide a separate payment bond and performance bond, each in the amount of 100 percent of the Contract Sum and each in the form contained in the Contract Documents. These bonds shall serve as security for the faithful performance of the Work and as security for the faithful payment and satisfaction of the persons furnishing materials and performing labor on the Work. The bonds shall be issued by a corporation duly and legally licensed to transact surety business in the State of Washington. Such bonds shall remain in force throughout the period required to complete the Work, and thereafter for a period of 365 calendar days after Final Acceptance. The bonds must be executed by a duly licensed surety company, which is listed in the latest Circular 570 of the United States Treasury Department, as being acceptable as surety on federal bonds. No surety's liability on the bond shall exceed the underwriting limitations for the respective surety specified in Circular 570. The bonds must be signed by an officer of the Contractor empowered to sign binding instruments. The bonds must be accompanied by a fully executed and original power of attorney for the officer executing on behalf of the surety. The scope of the bonds or the form thereof prescribed in these Contract Documents shall in no way affect or alter the liabilities of the Contractor to the City as set forth in the Contract Documents.

1-03.5 Failure to Execute Contract

Supplement 1-03.5 by adding the following:

In addition to the items listed in the first paragraph of 1-03.5, failure to have or obtain a City of Everett business license prior to executing the Contract, unless immediately cured by Bidder after notice from the City, shall result in forfeiture of the proposal bond or deposit of this Bidder.

1-03.6 Return of Bid Deposit

Supplement 1-03.6 by adding the following:

Within 15 calendar days after the Bids are opened, the City will return the bid deposit accompanying the Bids that are not to be considered in making the Award.

1-03.7 Judicial Review

Revise 1-03.7 to read as follows:

All protests by Bidders must be in accordance with Chapter 3.46 of the Everett Municipal Code, "Bid Protest Procedures."

The exclusive venue of all lawsuits shall be in Snohomish County Superior Court.

1-04 SCOPE OF THE WORK**1-04.1 Intent of the Contract**

Supplement 1-04.1 by adding the following:

**1-04.1(3) Specifications and Plans
(*****)****1-04.1(3)A Interpretation of Specifications and Plans**

The Specifications and Plans are intended to be explanatory and supportive of each other. Work specified on the Plans and not in the Specifications, or vice versa, shall

be executed as if specified in both. In the event the Work to be done or matters relative thereto are not sufficiently detailed or explained in the Contract Documents, the Contractor shall immediately ask the City's Representative for further explanation and shall comply with such explanation. In the event of doubt or question arising respecting the true meaning of the Specifications or Plans, Contractor shall refer to the City's Representative for its decision.

1-04.1(3)B Division of Specifications and Plans

Specifications and Plans are divided into groups for convenience. These divisions are not for the purpose of apportioning Work or responsibility for Work among Subcontractors, Suppliers and manufacturers. The Contractor is responsible for all Work shown or described, regardless of location(s) in the Contract Documents.

1-04.1(3)C Discrepancies in Specifications and Plans

1-04.1(3)C(1) Errors and Omissions

If the Contractor becomes aware of any errors or omissions in the Contract Documents or in the City's field work, it shall immediately inform the City's Representative in writing. The City's Representative will promptly review the matter and if it finds an error or omission has been made; it will determine the corrective actions and advise the Contractor accordingly. If the corrective work associated with an error or omission increases or decreases the amount of Work called for in the Contract, the City will issue an appropriate Change Order. After discovery by the Contractor of an error or omission, related Work performed by the Contractor shall be done at its risk unless authorized by the City's Representative and approved by the City.

1-04.1(3)C(2) Conflicting Provisions

In the event an item of Work is described differently in two or more locations on the Plans, in the Specifications and Special Provisions, the Contractor shall, upon request of the City's Representative, submit in writing to the City's Representative the description upon which the Contractor relied in preparing its Bid or laying out the Work.

1-04.1(3)D Utilities

1-04.1(3)D(1) General

The City has endeavored to determine the existence of public and private utilities at the site of the Work from the records of the owners of known utilities in the vicinity of the Work. The positions of these utilities as derived from such records are shown on the Plans. Unless otherwise noted, no excavations were made to verify the locations shown for underground utilities. The service connections to the gas, electric, cable TV and communication utilities are not shown on the Plans. Refer to 1-07.17 UTILITIES AND SIMILAR FACILITIES regarding Contractor's responsibility for locating and verifying underground public and private utilities.

1-04.1(3)D(2) Unknown/Incorrectly Marked Utilities

When a utility interferes with the Work and is either (1) not identified on the Plans or (2) located in a position significantly different from that specified on the Plans or in accordance with a particular utility's standard depth and location, Contractor shall follow the procedures of 1-04.7 DIFFERING SITE CONDITIONS (CHANGED CONDITIONS). Interference with the Work is defined as a utility that

crosses or projects into the plane of the Work at an elevation between the top and bottom of the Work.

1-04.2 *Coordination of Contract Documents, Plans, Special Provisions Specifications, and Addenda*

Revise the first and second paragraphs of 1-04.2 to read as follows:

The complete Contract includes Division C – CONTRACT, Division P - PROPOSAL, Division B – BID ITEM DESCRIPTIONS, Special Provisions, Contract Plans, Standard Specifications, Standard Plans in effect as of the date Bids are opened, Addenda, supplemental agreements, change orders, certifications and affidavits required by this Contract and by law, and Federal requirements that apply to this Contract and Project. These parts complement each other in describing a complete Work. Any requirement in one part binds as if stated in all parts. The Contractor shall provide any Work or materials clearly implied in the Contract even if the Contract does not mention it specifically.

Any inconsistency in the parts of the Contract shall be resolved by following this order of precedence:

1. Change Orders,
2. Addenda,
3. Division C – CONTRACT,
4. Division P - PROPOSAL,
5. Division B – BID ITEM DESCRIPTIONS
6. Special Provisions,
7. Contract Plans,
8. City's Standard Drawings (if any)
9. WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction,
10. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction.

Revise the seventh paragraph of 1.04.2 to read as follows:

In case of any ambiguity or dispute over interpreting the Contract, the Engineer's decision will be final as provided in 1-05.1 AUTHORITY OF THE ENGINEER.

1-04.3 *Reference Information*

Revise 1-04.3 to read as follows:

Reference Information provided to the Contractor is not part of the Contract. The City of Everett does not guarantee the accuracy of the Reference Information and is not responsible for the content of the Reference Information in any manner. Any use of Reference Information by the Contractor is done solely at the Contractor's risk.

1-04.4 *Changes*

Delete 1-04.4 and substitute the following:

1-04.4 Changes**1-04.4(1) City's Right to Direct Changes to the Work****(*****)**

The City reserves the right to change the Work at any time. Such changes shall not invalidate the Contract nor release the Surety, and the Contractor agrees to perform the Work as changed. Among others, these changes and alterations may include:

1. Deleting or omitting any part of the Work, Equipment or material to be provided under this Contract,
2. Increasing or decreasing quantities,
3. Altering Specifications, designs, or both,
4. Altering the way the Work is to be done,
5. Adding new Work or Extra Work,
6. Altering facilities, Equipment, materials, services, or sites, provided by the City, and
7. Ordering the Contractor to accelerate or Delay the Work.

If the Contractor and City do not agree upon scope of Work changed or adjustment to the Contract Sum and Contract Time, the City may, at its sole option, unilaterally direct the Contractor to implement City directed change by notice. The City shall not pay or be responsible or liable for changes implemented by the Contractor without explicit notice from the City to proceed.

1-04.4(2) Extra Work**(*****)**

At its sole option, the City may (1) perform Extra Work itself, (2) employ others to do it, (3) direct the Contractor to perform the Extra Work at existing unit Bid price, (4) direct the Contractor to perform the Extra Work at a mutually agreed upon price, or (5) direct the Contractor to perform the Extra Work on a Force Account basis.

1-04.4(3) Change Orders**(*****)**

Changes to the Work may result in an increase or decrease in Contract Sum, as provided in 1-09.4 Equitable Adjustment. Requests for an increase in Contract Time shall be made as provided in 1-08.3 PROGRESS SCHEDULE as applicable. Substantial changes in Contract Time, Contract Sum or Work will often be negotiated and agreed between the Contractor and City before the City directs the Contractor to proceed with the change.

If the Contractor and City agree on the scope of Work and any changes to Contract Sum and Contract Time, the Contractor and City shall execute an agreed Change Order. However, if the Contractor and City do not agree, the City may, in its sole discretion, issue a unilateral Change Order in the form attached to the Contract Documents changing the scope of Work and making any adjustments to the Contract Sum pursuant to 1-09.4 EQUITABLE ADJUSTMENT and Contract Time pursuant to 1-08.8 EXTENSIONS OF TIME in such amount and for such time as the City believes appropriate. Contractor agrees to use the agreed Change Order form attached to the Contract Documents. The Contractor accepts all requirements, terms and conditions of a Change Order by: signing it; writing a separate acceptance; or by failing to notify the City

immediately in writing that Contractor disagrees with the Change Order and does not intend to be bound by its terms.

The Contractor waives and is estopped from denying its agreement with any unilateral Change Order for which the Contractor does not immediately give Notice to the City as provided in 1-04.5 NOTICE BY CONTRACTOR in these Special Provisions and submitting a Contract Claim as provided in 1-09.11(2) CONTRACT CLAIMS in these Special Provisions. A unilateral Change Order that is not timely protested as provided in this section shall be full payment and final settlement of all asserted and unasserted Contract Claims for Contract Time and all costs of any kind, including costs of Delays, inefficiencies and impacts, related to, arising out of, or resulting from, any Work described in the Change Order.

The Contractor shall obtain written consent of the Surety or Sureties if the City's Representative requests such consent.

1-04.4(4) Value Engineering and Cost Sharing
(*****)

The Contractor may submit proposals for changing the Plans, Specifications, or other requirements of the Contract Documents and the City, in its sole discretion, may accept or reject such proposals. If accepted by the City and if the proposal decreases the direct, actual costs of constructing the Work, the Contract Sum shall be reduced by fifty percent (50%) of the direct, actual construction cost saved. Because the City has the sole discretion whether to consider, accept or reject the Contractor's proposal and the Contractor has no right to require the City to consider or accept such proposals, the City's decision is not reviewable by any court. This subsection applies only to change proposals initiated solely by the Contractor, or its Subcontractors and suppliers, and does not apply to change proposals requested or initiated by the City or the City's Representative. The City is not obligated or required to consider any Contractor initiated change proposals and may, in its sole discretion, refuse to do so. Under no circumstances shall the Contractor be entitled to additional compensation arising out of, or related to, the City's refusal to consider or approve a Contractor initiated change proposal. The Contractor shall do none of the following without the express written agreement of the City: fail to perform any Work; commence Work on proposed change; reduce its resources assigned to performance of the Work in order to prepare a change proposal or in anticipation of approval of a change proposal; adjust or change the project schedule or take action or fail to take action that would affect the Completion Date of the Work; take action or fail to take action arising out of the Contractor's change proposal that would result in the Contractor seeking an adjustment upward of the Contract Sum.

1-04.5 Procedure, Protest, and Dispute by the Contractor

Delete all of 1-04.5 and substitute the following:

1-04.5 Notice by Contractor
(*****)

1-04.5(1) When Notice Must Be Given

Whenever:

1. The Contractor disagrees with any requirement, direction, interpretation or determination by the City or City's Representative;

2. The Contractor disagrees with anything required in a change order, or the Engineer's Written Determination or decision for which the Contractor believes it is entitled to an increase in the Contractor price or time;
3. The Contractor knows, or should with the reasonable exercise of ordinary care know, of a differing site condition as provided in 1-04.7 DIFFERING SITE CONDITIONS (CHANGED CONDITIONS);
4. The Contractor knows, or should with the reasonable exercise of ordinary care know, of a Delay or an event that may cause a Delay;
5. The Contractor believes, or with the reasonable exercise of ordinary care should believe, it is entitled to an adjustment of Contract Sum or Time, even if the total or exact amount or impact cannot yet be determined;
6. The Contractor believes it is required or directed to perform work that is outside the scope of the Contract Documents; or
7. An event occurs, or fails to occur, that the Contractor believes, or should reasonably foresee, may result in a Contract Claim; or
8. The actual quantities of Unit Price Work vary sufficiently from the original estimate that Contractor may be entitled to an equitable adjustment of Contract Sum as provided in 1-04.6 VARIATION IN INCREASED OR DECREASED QUANTITIES;

The Contractor shall immediately give Notice to the City or City's Representative as provided in this section and elsewhere in the Contract Documents and Specifications.

Timely and adequate Notice is a condition precedent to a Contract Claim.

Requests for extensions of Contract Time shall be made and evaluated in accordance with 1-08.3 PROGRESS SCHEDULE and 1-08.8 EXTENSIONS OF TIME.

Irrespective of any request for additional compensation or Contract Time or a Contract Claim that Work is extra and not part of the original scope of Work, the Contractor shall proceed expeditiously and promptly with the Work as the City orders.

If the Contractor fails to follow the procedures of this Contract, including failing to give Notice, the Contractor completely waives any Contract Claims. In its sole discretion, the City may waive strict compliance with procedures, but any such waiver of one or more items or elements does not waive the necessity for Contractor's strict compliance with any other item or element, nor shall such waiver be admissible in any legal proceeding for any reason.

1-04.5(2) Form of Notice

The Notice shall be in writing and include the following minimum information:

1. A complete and accurate description of the event(s) giving rise to the Notice, including dates, times, and locations;
2. A preliminary list of persons involved in such event;
3. A statement whether the Contractor believes the event may result in a Contract Claim for additional Contract Time or adjustment of the Contract Sum;
4. A date by which Contractor shall begin providing Supplemental Information as provided in this section.

1-04.5(3) Supplemental Information

Contractor shall supplement the written Notice as soon as possible with a written statement providing the following:

1. The date of the event, incident, direction, instruction, interpretation or determination;
2. The nature and circumstances giving rise to the Notice;
3. The contract provisions relating to the event, incident, direction, instruction, interpretation or determination;
4. The estimated dollar cost, if any, of the Extra Work, Delay, change or disruption and detailing how the dollar amount estimate was determined; and
5. An analysis of the progress schedule showing the impact to the schedule resulting from the change or disruption, if the Contractor is asserting a schedule change or disruption;

Throughout any work related to a Notice, the Contractor shall keep complete and accurate records of costs, expenses, and time incurred for which Contractor will or may seek an adjustment. Contractor waives and is estopped from seeking an adjustment of Contract Sum or Contract Time where Contractor fails to keep and maintain cost, timekeeping, and scheduling records segregated and contemporaneously allocated to the subject work for which an adjustment is sought. For example, failure to keep contemporaneous labor and equipment time records specifically and only allocated to each item of claimed Extra Work shall constitute a waiver of any Contract Claim for reimbursement or additional Contract Time for each such item of Extra Work. The Contractor shall permit the City access to these and any other records needed for evaluating requests for additional Contract Time or Contract Sum.

1-04.5(4) Contract Claim

A Contractor dissatisfied with the City's response or (non-response) to a Notice provided under Section 1-04.5 completely waives any claims related to such Notice unless the Contractor submits a Contract Claim in accordance with Section 1-09.11.

1-04.7 Differing Site Conditions (Changed Conditions)

Delete all of 1-04.7 and substitute the following:

Upon discovery and before such conditions are disturbed, the Contractor shall promptly provide Notice to the City's Representative of:

Pre-existing subsurface or latent physical conditions at the site differing materially from those indicated in this Contract, or

Pre-existing unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this Contract.

Upon written request, the City's Representative shall determine whether the actual conditions encountered by the Contractor conditions are materially different and, if so, are the cause of a material increase or decrease in the Contractor's cost of performance of the Work, or extend the duration of the critical path of the schedule. Upon such determination, the City's Representative will make an adjustment of Contract Sum or Contract Time, as appropriate. Extensions of Contract Time will be evaluated in accordance with 1-08.3 PROGRESS SCHEDULE.

The City's Representative's determination that differing site conditions do not exist and/or the appropriate adjustment in Contract Sum or Contract Time (if any) shall be final. If there is a decrease in the cost or time required to perform the Work, failure of the Contractor to notify the City's Representative of the differing site condition shall not affect the City's right to make an adjustment in the Contract Sum or Contract Time. Additionally, no Contract Claim or adjustment of Contract Sum or Contract Time shall be allowed unless the Contractor has followed the procedures provided for in this Contract, including, but not limited to, furnishing timely Notice of the event and its effect on Contract Time and Contract Sum as required herein.

Contractor shall in no event be entitled to a Contract Claim or adjustment of Contract Sum or Contract Time based on an allegation that the pre-existing subsurface or latent physical conditions at the site differ materially from those indicated in this Contract unless Contractor establishes that it reasonably relied on the conditions indicated in this Contract when making its bid, that the actual conditions encountered on the site differed materially from those indicated in this Contract, and that such materially-different conditions were not foreseeable at the time of its bid.

1-05 CONTROL OF WORK

1-05.1 Authority of the Engineer

Delete 1-05.1 and substitute the following:

1-05.1 City **(*****)**

The City, and the City's Representative, shall have the authority to act as the sole judge of the Work and materials with respect to both quantity and quality as set forth in the Contract. It is expressly stipulated that the Plans, Specifications and other Contract Documents set forth the requirements as to the nature of the completed Work and do not purport to control the method of performing Work except in those instances where the nature of the completed Work is dependent on the method of performance.

The City has the authority to act, do, perform, and make all decisions and actions authorized by the Contract Documents, including, but not limited to, Change Orders, progress payments, contract decisions, acceptability of the Contractor's Work, and early possession. The City has the authority to accept or reject requests for progress payments that have been submitted by the Contractor and recommended by the City's Representative. The City has the authority to make determinations of the acceptability of the Work. The City also has the authority to accept or reject the City's Representative's recommendations regarding retention of defective Work.

1-05.1(2) Requests for Information (RFI)

No Claim shall be allowed because of ambiguities in the Contract if:

1. The Contractor discovers an ambiguity but fails to notify the City, or
2. The Contractor failed to discover a patent ambiguity that would be discovered by a reasonably prudent Contractor.

If the Contractor discovers an ambiguity in the Contract or desires an explanation or interpretation of the Contract, the Contractor shall request the explanation or interpretation in writing by way of a Request for Information (RFI). The RFI shall clearly define the ambiguity and have enough detail for the Engineer to provide an explanation or interpretation. If such detail is not provided, the Engineer will return the RFI as

incomplete. Should the RFI require a change to the Contract, the Contractor will indicate in the RFI that it includes a request for change (RFC).

A RFI shall not be used nor constitute a notice required in accordance with Sections 1-04.5 and 1-04.7. The Contractor may submit an RFI for the one of following reasons:

1. The Contractor believes there is information missing from the Contract Documents (Missing Information).
2. The Contractor believes a clarification of one or more of the Contract requirements is necessary (Clarification).
3. The Contractor needs to repair or otherwise correct a deficiency in the Work that requires a Change to the Contract to be acceptable (RFC – Construction Deficiency/ Repair procedure). Requests submitted for this reason shall be submitted in accordance with Section 1-05.7(1).
4. The Contractor needs to substitute a material that provides an equal or better level of performance as the one specified in the Contract (RFC – Material Substitution). Requests shall indicate the location(s), quantity, and shall describe how the material provides an equal or better level of performance as the material originally specified.
5. The Contractor may submit a RFI that requests a change to the Contract requirements for a reason other than one listed in items 1-4 of this section (RFC – Other). To be considered, the request must not meet the requirements of a Value Engineering Change Proposal. To be considered, the request shall describe how the change is beneficial to the project

Unless otherwise determined by the City in writing, the Engineer will respond, in writing, to RFIs within 14 calendar days in the order they are received. If the Engineer cannot respond within 14 calendar days due to the nature and complexity of the RFI, the Engineer will respond to the RFI stating how many additional days are needed for a full response. This does not relieve the Contractor of its responsibility to request a time extension in accordance with Section 1-08.8. If the Contractor needs to prioritize a RFI it shall indicate so as part of the RFI. Oral explanations, interpretations, or instructions given by anyone other than the Engineer will not be binding on the Contracting Agency. A response to a RFI shall be considered a Written Determination.

If the Contractor's Request for Information requires a change order, the Engineer's response will indicate whether they are authorizing the Contractor to proceed with the changed work prior to an executed change order. Without this authorization, the Contractor shall not proceed with the changed work until a Change Order has been processed. If the Contractor believes the response requires a change order and the Engineer does not specifically state that a change order is necessary, the Contractor shall submit its Notice in accordance with Section 1-04.5. Proceeding without Notice shall waive the Contractor's rights to Claim.

The Contractor shall bear all risk and all costs of any Work delays caused by rejection or non-approval of any RFI that Requests a Change (RFC). The Contractor agrees the Engineer is under no obligation to accept an RFC. The Engineer's decision to accept or reject all or part of a RFI that requests a change is final and not subject to protest.

Unit Bid prices shall cover all costs of submitting RFIs.

1-05.2 Authority of Assistants and Inspectors

Delete 1-05.2 and substitute the following:

1-05.2 City's Representative
(***)**

The City's Representative shall be satisfied that all the Work is being done in accordance with the requirements of the Contract. The Contract and Specifications give the City's Representative authority over the Work. Whenever it is so provided in this Contract, the decision of the City's Representative shall be final.

The City's Representative's decisions will be final on all questions including, but not limited to, the following:

1. Quality and acceptability of materials and Work;
2. Measurement of Work, whether lump sum, Force Account, or unit price;
3. Acceptability of rates of progress on the Work;
4. Interpretation of Plans and Specifications;
5. Determination as to the existence of changed or differing site conditions;
6. Fulfillment of the Contract by the Contractor;
7. Payments under the Contract including adjustment;
8. Suspension(s) of Work;
9. Termination of the Contract for default or public convenience; and
10. Approval of working or detail Plans and Submittals.

If the Contractor fails to respond promptly to the requirements of the Contract or orders from the City's Representative:

1. The City's Representative may use the City's resources, other contractors, or other means to accomplish the Work, and
2. The City will not be obligated to pay the Contractor, and will deduct from the Contractor's payments, costs that result when other means are used to carry out the Contract requirements or City's Representative's orders.

At the Contractor's risk, the City's Representative may suspend all or part of the Work if:

1. The Contractor fails to fulfill Contract terms, to carry out the City's Representative's orders, or to correct unsafe conditions of any nature; or
2. It is in the public interest.

The City's Representative and City shall have complete access to the Work and to the site of the Work and to the places where Work is being prepared or where materials, Equipment, and machinery are being obtained for the Work. If requested by the City's Representative or City, the Contractor shall provide the assistance necessary for obtaining such access, and shall provide information related to the inspection of construction. Absence of such access or information, as needed, may result in the City's refusal to accept the Work.

The City's Representative has the authority to recommend Change Orders, but does not have authority to approve Change Orders. Proposed Change Orders are subject to review and approval by the City. No proposed Change Order or any change of Contract Sum or Contract Time is effective or binding upon the City unless and until the Mayor or its designee signs it, as authorized by City Council or by ordinance.

To detail and illustrate the Work, the City's Representative may furnish to the Contractor additional drawings and explanations consistent with the original Plans. The Contractor shall perform the Work according to these additional drawings and explanations.

The City's Representative may appoint assistants and inspectors to assist in determining that the Work and materials meet the Contract requirements. Assistants and inspectors have the authority to reject defective material and suspend Work that is being done improperly, subject to the final decisions of the City's Representative or, when appropriate, the City.

Assistants and inspectors are not authorized to accept Work, to accept materials, to issue instructions, or to give advice that is contrary to the Contract. Work done or material furnished that does not meet the Contract requirements shall be at the Contractor's risk and shall not be a basis for a Contract Claim even if the inspectors or assistants purport to change the Contract.

Assistants and inspectors may advise the Contractor of any faulty work or materials or infringements of the terms of the Contract; however, failure of the City's Representative or the assistants or inspectors to advise the Contractor does not constitute acceptance or approval.

1-05.3 *Working Drawings*

Revise the second paragraph to read as follows:

1. **Type 1** – Submitted for City information. Submittal must be received by the City a minimum of 7 working days before Work represented by the submittal begins.
2. **Type 2** – Submitted for City review and comment. Unless otherwise stated in the Contract, the Engineer will require up to 15 working days from the date the Working Drawing is received until it is returned to the Contractor. The Contractor shall not proceed with the Work represented by the Working Drawing until comments from the Engineer have been addressed.
3. **Type 2E** – Same as a Type 2 Working Drawing with Engineering as described below.
4. **Type 3** – Submitted for City review and approval. Unless otherwise stated in the Contract, the Engineer will require up to 20 working days from the date the Working Drawing is received until it is returned to the Contractor. The Contractor shall obtain the Engineer's written approval before proceeding with the Work represented by the Working Drawing.
5. **Type 3E** – Same as a Type 3 Working Drawing with Engineering as described below.

Supplement 1-05.3 as follows:

The Contract Documents include Plans that show such details as are reasonably necessary to give a comprehensive understanding of the Work. The Contractor shall submit alterations affecting the requirements and information in the Plans in writing to the Engineer for approval prior to performing such Work.

The Engineer may supplement the Plans with additional drawings and explanations, consistent with the purpose and intent of the original Plans, to detail and illustrate the Work. The Contractor shall perform the Work according to these supplemental drawings and explanations.

In addition to supplemental drawings furnished by the Engineer, the Contract Documents may also be supplemented by Type 1, Type 2 or 2E, and Type 3 or 3E Working

Drawings prepared by the Contractor, material supplier, or manufacturer, when necessary or as required by the Contract Documents to detail and illustrate portions of the Work. All types of Working Drawings shall be reviewed by the Engineer before work pursuant to those Working Drawings is performed. Type 3 and 3E Working Drawings may include, and not be limited to, shop details, erection plans, masonry lay-out diagrams, reinforcing steel and bending diagrams, post tensioning plans, shoring, cribbing, cofferdam, or falsework plans, formwork plans, or hydraulic items. Type 2 and 2E Working Drawings may include, and not be limited to, Catalog cuts or standard plans for commonly used manufactured items.

The Contractor shall be fully responsible for the accuracy of dimensions and details on Working Drawings, and for complete conformity with the Contract Documents, even if the Working Drawings have been approved by the Engineer, or if the Contractor and the Engineer agree on dimensions and details. The City does not accept Working Drawings as accurate or adequate, and does not take responsibility for, or warrant that Working Drawings will meet Contract requirements.

Engineer's review of Working Drawings shall not relieve Contractor from responsibility for variation from the requirements of the Contract Documents unless Contractor has in writing called the Engineer's attention to each such variation at the time of submission, and the Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the returned Working Drawing; nor will review by Engineer relieve Contractor from responsibility for errors or omissions in the Working Drawings or from responsibility for having complied with the provisions of this section.

The Bid prices shall include all costs for furnishing Working Drawings and Submittals.

The following listed sections of the Standard Specifications and Special Provisions require Working Drawings that may or may not be applicable to this specific project. This list is supplied as an aid to the Contractor and is by no means complete. Submittal requirements may be found in 1-05.3(1) or elsewhere in these Special Provisions.

DIVISION 2 EARTHWORK

2-09.3(3)D Shoring, Cribbing, and Cofferdams-Shop Drawings

DIVISION 6 STRUCTURES

6-01 General Requirements

6-01.9 Working Drawings

6-02 Concrete Structures

6-02.3(13) Expansion Joints-Shop Drawings

6-02.3(16) Plans for Falsework and Forms-Shop Drawings

6-02.3(26)A Shop Drawings

6-03 Steel Structures

6-03.3(7) Shop Plans

6-03.3(25) Welding and Repair Welding-Shop Drawings

6-04 Timber Structures

6-04.3(3) Shop Details

6-06 Bridge Railings

6-06.3(2) Metal Railings-Shop Drawings

DIVISION 7 DRAINAGE STRUCTURES, STORM SEWERS, SANITARY SEWERS, WATER MAINS, AND CONDUITS

7-02 Culverts

7-02.2 Materials-Catalog Cuts or Standard Plans

- 7-03 Structural Plate Pipe, Pipe Arch, Arch and Underpass
 - 7-03.2 Materials-Catalog Cuts or Standard Plans
- 7-04 Storm Sewers
 - 7-04.2 Materials-Catalog Cuts or Standard Plans
- 7-05 Manholes, Inlets, Catch Basins, and Drywells
 - 7-05.2 Materials-Catalog Cuts or Standard Plans
- 7-09 Water Mains
 - 7-09.2 Materials-Catalog Cuts or Standard Plans
- 7-12 Valves For Water Mains
 - 7-12.2 Materials-Catalog Cuts or Standard Plans
- 7-14 Hydrants
 - 7-14.2 Materials-Catalog Cuts or Standard Plans
- 7-15 Service Connections
 - 7-15.2 Materials-Catalog Cuts or Standard Plans
- 7-17 Sanitary Sewers
 - 7-17.2 Materials-Catalog Cuts or Standard Plans
- DIVISION 8 MISCELLANEOUS CONSTRUCTION
 - 8-11 Guardrail
 - 8-11.2 Materials-Catalog Cuts or Standard Plans
 - 8-12 Chain Link Fence and Wire Fence
 - 8-12.2 Materials-Catalog Cuts or Standard Plans
 - 8-13 Monument Cases
 - 8-13.2 Materials-Standard Plans
 - 8-27 Metal Hand Railings (New Section)
 - 8-27.1(1) Ornamental Handrail-Shop Drawings
 - 8-27.1(2) Pedestrian Handrail (Galvanized Steel and Aluminum)-Shop Drawings

Deviations from Standard Plans will be subject to a Working Drawing submitted by the Contractor and approved by the Engineer. Where a Working Drawing is required by the Specifications, related Work performed prior to completion of the Engineer's review of the pertinent submission will be the sole expense and responsibility of the Contractor.

Supplement 1-05.3 by adding the following:

1-05.3(1) Submittals
(***)**

Where required by the Contract Documents, the Contractor shall submit information, such as Working Drawings that will enable the City's Representative to advise the City whether the Contractor's proposed materials, Equipment or methods of work are in general conformance to the design concept and in compliance with the Plans and Specifications. Approval or acceptance of a Submittal does not relieve Contractor from complying with Contract requirements. The City's approval of a Submittal does not constitute a waiver of the Contract requirements. The City will not be obligated to accept or pay for Work performed by the Contractor that may be affected by materials, Equipment, or methods of work not submitted in a timely manner so that final review can be accomplished before the affected Work is complete. The City shall not be responsible for Delays, inefficiencies, or any additional costs or expenses caused in whole or in part by Contractor's failure to submit required information in sufficient time for review, comment, and correction. Contractor's failure to submit required information in sufficient time for review, comment and correction shall be deemed a waiver of any and all Contract Claims for adjustment of Contract Sum or Contract Time arising out of, or

related to, such a Submittal. Contractor acknowledges and agrees that it may not rely upon receiving the City's response to a Submittal in less than 14 calendar days, unless the City explicitly changes this section by a signed Change Order.

1-05.3(2) Requests for Information

(*****)

Requests for information or clarification from the Contractor to the City shall be treated as a Submittal pursuant to 1-05.3(1) SUBMITTALS.

1-05.4 Conformity With and Deviations From Plans and Stakes

Delete all of 1-05.4 and substitute the following:

The Contractor shall be responsible for setting and maintaining all alignment stakes, slope stakes, and grades necessary for the construction of the roadbed, surfacing, paving, channelization, illumination, signing, bridges, and retaining walls, if such construction is included in this Project. Except for the survey control data to be furnished by the City, calculations, surveying, and measuring required for setting and maintaining the necessary lines and grades shall be the Contractor's responsibility. The Contractor shall provide the City with copies of such calculations and staking data when requested by the Engineer. Copies of the City provided survey control data are available for the Bidder's inspection at the office of the Project Engineer.

Any staking requirements for the Project that do not fit field conditions will be reviewed and if necessary adjusted by the Engineer. Any necessary revisions to the staking information will be provided to the Contractor for use in completing the Work.

Stakes, marks, and other reference points, including existing monumentation, set by the City shall be carefully preserved by the Contractor. The Contractor will be charged for the costs of replacing stakes, markers and monumentation that were not to be disturbed but were destroyed or damaged by the Contractor's operations. This charge will be deducted from monies due or to become due to the Contractor.

To facilitate the establishment of these lines and elevations, the City will provide the Contractor with the following survey control:

ROADWAY, SURFACING AND PAVING

Establish elevation bench marks and center or base line alignment control points for the mainline, one time only. Provide right of way stakes where applicable.

Provide rights-of-way, easements or right-of-entry.

Provide the Contractor with technical advice if requested.

Computed grades where needed.

Provide horizontal and vertical curve data.

One copy of transit notes showing reference to horizontal and vertical control points.

OTHER STRUCTURES

Centerline or offset coordinates to centerline of the structure.

A sufficient number of benchmarks for levels to enable the Contractor to set grades at reasonably short distances.

Monuments and control points as shown on the Plans.

The Contractor shall give the City three weeks notification to allow adequate time to provide the above data.

The Contractor shall ensure a surveying accuracy within the following tolerances:

- | | |
|--------------------------------|-----------------------------------|
| 1. Slope stakes | ±0.1 foot |
| 2. Subgrade blue tops | ±0.01 foot |
| 3. Stationing | ±0.01 foot |
| 4. Alignment | ±0.01 foot |
| 5. Surfacing red & yellow tops | ±0.01 foot |
| 6. Superstructure elevations | ±0.01 foot (from plan elevations) |
| 7. Substructure | ±0.02 foot (from plan elevations) |

The Contractor shall slope stake the roadway before any construction may proceed. Slope stakes shall be set at 50' maximum intervals on tangents and 25' on curves.

Subgrade bluetops and surfacing red and yellow tops shall be set at 50' intervals in tangent sections, 25' intervals in curve sections, and 10' intervals in intersection radii.

The Contractor's surveyor shall be a licensed surveyor in the State of Washington. The Contractor shall keep updated survey field notes in a standard field book and in a format set by the Engineer. These field notes shall include all survey work performed by the Contractor's surveyor in establishing line, grade and slopes for the construction work. Copies of these field notes shall be provided to the Engineer upon request and upon completion of the Contract Work; the field book shall be submitted to the Engineer and become property of the City.

If the survey work provided by the Contractor does not meet the standards of the Engineer, then the Contractor shall, upon the Engineer's written request, remove the individual or individuals doing the survey work and the survey work will be completed by the Engineer at the Contractor's expense. Costs for completing the survey work required by the Engineer will be deducted from monies due or to become due the Contractor.

The City may spot-check the Contractor's surveying. These spot-checks will not change the requirements for normal checking and testing as described elsewhere, and do not relieve the Contractor of the responsibility of producing a finished product that is in accordance with the Contract.

In all disputes concerning accuracy of lines and elevations, the City shall be assumed correct and the Contractor shall correct the discrepancies before construction work may proceed. No additional compensation will be paid for this corrective Work.

Payment: The lump sum contract price for "Surveying" shall be full pay for all costs involved in furnishing all labor, tools, survey instruments, materials, and other equipment necessary for the setting and maintaining of the alignment and grade as specified.

1-05.6 *Inspection of Work and Materials*

Supplement 1-05.6 by adding the following:

1-05.6(1) Demonstration of Compliance with Contract Requirements
(***)**

The burden of proving the constructed Work complies with the Contract Documents shall be on the Contractor at all times. The Contractor shall grant the City's Representative access to the Work and work site and to places where Work is being prepared, or where materials, Equipment, or machinery are being obtained for the Work. The Contractor shall provide information requested by the City's Representative in connection with inspection work.

If the Contract Documents, laws, ordinances, or public regulatory authority requires parts of the Work to be specially inspected, tested, or approved, the Contractor shall give the City's Representative be not less than two working days prior written Notice of the availability of the subject Work for examination.

Inspection and quality control tests performed on the Contractor's work by the City's Representative shall not relieve the Contractor of its responsibility for errors or lack of quality therein and shall not be regarded as an assumption of risks or liability by the City's Representative for the Contractor's compliance with these Contract Documents. Contractor remains responsible and liable for all errors, defects or a lack of quality not discovered by inspection or observation.

1-05.6(2) Manufacturer's Directions
(***)**

Manufactured articles, material and Equipment shall be transported, stored, applied, installed, connected, erected, adjusted, tested, operated and maintained as recommended by the manufacturer, unless otherwise specified in these Special Provisions. Contractor shall provide manufacturer's installation instructions and procedures to the City prior to installation of the manufactured articles, material and Equipment.

1-05.6(3) Materials and Equipment Furnished by City
(***)**

Contractor shall install materials and Equipment furnished by the City as provided in the technical sections of the Specifications. Furnishing of material and Equipment by the City will be considered conclusive evidence of their acceptability for the purpose intended. If the Contractor discovers defects in material or Equipment furnished by the City, it shall immediately notify the City. After such discovery, the Contractor shall not proceed with Work involving City-furnished materials and Equipment unless authorized by the City. Unless otherwise noted or specifically stated, materials and Equipment furnished by the City, that are not of local occurrence or manufacture, are considered to be "FOB" railroad station or truck terminal nearest to the site of the Work. At no cost to the City, the Contractor shall unload, transport, store, and protect such material and Equipment from damage. The Contractor shall inspect such City-furnished material and Equipment on receipt and provide the City with written acceptance for the incorporation of said material and Equipment into the Work. After receipt by the Contractor, the Contractor bears all risk of loss and casualty to City furnished materials and Equipment.

1-05.7 Removal of Defective and Unauthorized Work

Supplement 1-05.7 by adding the following:

If the Contractor fails to remedy defective or unauthorized Work within the time specified in a written notice from the Engineer, or fails to perform Work required by the Contract

Documents, the Engineer may correct and remedy such Work as may be identified in the written notice, with City forces or by such other means as the City may deem necessary.

If the Contractor fails to comply with a written order to remedy what the Engineer determines to be an emergency situation, the Engineer may have the defective and unauthorized Work corrected immediately, have the rejected Work removed and replaced, or have Work the Contractor refuses to perform completed by using City or other forces. An emergency situation is a situation when, in the opinion of the Engineer, a delay in its remedy could be potentially unsafe, or might cause serious risk of loss or damage to the public.

Direct or indirect costs incurred by the City attributable to correcting and remedying defective or unauthorized Work, or Work the Contractor failed or refused to perform, shall be paid by the Contractor. Payment will be deducted by the Engineer from monies due, or to become due, the Contractor. Such direct and indirect costs shall include in particular, but without limitation, compensation for additional professional services required, and costs for repair and replacement of Work of others destroyed or damaged by correction, removal, or replacement of the Contractor's unauthorized Work.

In its sole discretion, the City may retain Work that is not in compliance with the Contract. The City will determine the just and reasonable value for such defective Work and deductions will be made in the payments due or to become due to the Contractor. Final Acceptance will not act as a waiver of the City's right to recover from the Contractor an amount representing the deduction for retention of defective Work.

No adjustment in Contract Time or Contract Sum will be allowed because of the Delay in the performance of the Work attributable to the exercise of the City's rights provided by this section.

The rights exercised under the provisions of this section shall not diminish the City's right to pursue any other avenue for additional remedy or damages with respect to the Contractor's failure to perform the Work as required.

1-05.10 Guarantees

Supplement 1-05.10 by adding the following:

The Contractor further warrants to the City, the Engineer and the City's Representative that all materials and Equipment furnished under this Contract will be of highest quality and new unless otherwise specified by the City, free from faults and defects and in conformance with the Contract Documents. All Work not so conforming to these standards shall be considered defective. If required by the City's Representative, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and Equipment.

The Work furnished shall be of first quality and the workmanship shall be the best obtainable in the various trades. The Work shall be of safe, substantial and durable construction in all respects. For a period of 365 calendar days, commencing on the date of Final Acceptance, the Contractor shall, upon the receipt of Notice in writing from the City, promptly make all repairs arising out of defective materials, workmanship, or Equipment at no cost to the City. The City is hereby authorized to make such repairs if, 14 calendar days after giving of such notice to the Contractor, the Contractor has failed to make or undertake the repairs with due diligence. In case of an emergency where, in the opinion of the City, delay could cause serious loss or damage, repairs may be made prior to or concurrent with notice being sent to the Contractor. All costs and expenses incurred by the City in connection with repair or replacement of Contractor's Work under

this Section, including but not limited to the cost of materials, Equipment, other contractor costs, additional staff costs (including overtime), inspection, design and construction management service costs shall be fully reimbursed to the City by the Contractor.

"Acceptance of the Work" shall not extinguish any covenant or agreement on the part of the Contractor to be performed or fulfilled under this Contract that has not, in fact, been performed or fulfilled at the time of such acceptance. All covenants and agreements shall continue to be binding on the Contractor until they have been fulfilled.

The City and the Contractor agree that the guarantee on the completed portions of the Work possessed and used by the City shall commence as to those portions on the date that the City takes possession of those portions and so notifies the Contractor in writing. City and Contractor further agree that such taking possession and use shall not be deemed as acceptance of the Work. Takeover of completed portions of the Work shall be at the City's option and will not be made until the Work can be put into routine service on a permanent basis.

The guarantee provided herein shall be in addition to those specific guarantee or warranty requirements for particular Equipment or Work items, or both, as indicated in the Specifications and Special Provisions.

1-05.11 Final Inspection

Delete 1-05.11 and substitute the following:

1-05.11 Final Inspections and Operational Testing
(*****)

1-05.11(1) Substantial Completion Date

When the Contractor considers the Work to be substantially complete, the Contractor shall so notify the Engineer and request the Engineer establish the Substantial Completion Date. The Contractor's request shall list the specific items of Work that remain to be completed in order to reach physical completion. The Engineer will schedule an inspection of the Work with the Contractor to determine the status of completion. The Engineer may also establish the Substantial Completion Date unilaterally.

If, after this inspection, the Engineer concurs with the Contractor that the Work is substantially complete and ready for its intended use, the Engineer, by written notice to the Contractor, will set the Substantial Completion Date. If, after this inspection the Engineer does not consider the Work substantially complete and ready for its intended use, the Engineer will, by written notice, so notify the Contractor giving the reasons therefor.

Upon receipt of written notice concurring in or denying substantial completion, whichever is applicable, the Contractor shall pursue vigorously, diligently and without unauthorized interruption, the Work necessary to reach Substantial and Physical Completion. The Contractor shall provide the Engineer with a revised schedule indicating when the Contractor expects to reach substantial and physical completion of the Work.

The above process shall be repeated until the Engineer establishes the Substantial Completion Date and the Contractor considers the Work physically complete and ready for final inspection.

1-05.11(2) Final Inspection and Physical Completion Date

When the Contractor considers the Work physically complete and ready for final inspection, the Contractor, by written Notice, shall request the Engineer to schedule a final inspection. The Engineer will set a date for final inspection. The Engineer and the Contractor will then make a final inspection and the Engineer will notify the Contractor in writing of all particulars in which the final inspection reveals the Work incomplete or unacceptable. The Contractor shall immediately take such corrective measures as are necessary to remedy the listed deficiencies. Corrective work shall be pursued vigorously, diligently, and without interruption until physical completion of the listed deficiencies. This process will continue until the Engineer is satisfied the listed deficiencies have been corrected.

If action to correct the listed deficiencies is not initiated within seven days after receipt of the written notice listing the deficiencies, the Engineer may, upon written notice to the Contractor, take whatever steps are necessary to correct those deficiencies pursuant to 1-05.7 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK.

The Contractor will not be allowed an extension of Contract Time because of a Delay in the performance of the Work attributable to the exercise of the Engineer's right under the authority of the Contract.

Upon correction of all deficiencies, the Engineer will notify the Contractor and the City, in writing, of the date upon which the Work was considered physically complete. That date shall constitute the Physical Completion Date of the Contract, but shall not imply acceptance of the Work or that all the obligations of the Contractor under the Contract have been fulfilled.

1-05.11(3) Operational Testing

It is the intent of the City to have at the Physical Completion Date a complete and operable system. Therefore when the Work involves the installation of machinery or other mechanical equipment; street lighting, electrical distribution or signal systems; irrigation systems; buildings; or other similar work it may be desirable for the Engineer to have the Contractor operate and test the Work for a period of time after final inspection but prior to the Physical Completion Date. Whenever items of Work are listed in the Contract Documents for operational testing they shall be fully tested under operating conditions for the time period specified to ensure their acceptability prior to the Physical Completion Date. During and following the test period, the Contractor shall correct any items of workmanship, materials, or Equipment that prove faulty, or that are not in first class operating condition. Equipment, electrical controls, meters, or other devices and Equipment to be tested during this period shall be tested under the observation of the Engineer, so that the Engineer may determine their suitability for the purpose for which they were installed. The Physical Completion Date cannot be established until testing and corrections have been completed to the satisfaction of the Engineer.

The costs for power, gas, labor, material, supplies, and everything else needed to successfully complete operational testing, shall be included in the unit contract prices related to the system being tested, unless specifically set forth otherwise in the Proposal.

Operational and test periods, when required by the Engineer, shall not affect a manufacturer's guaranties or warranties furnished under the terms of the Contract.

1-05.12 Final Acceptance

Delete all of 1-05.12 and substitute the following:

The Contractor shall perform all the obligations under the Contract before the completion date can be established. A certificate of completion of the Work issued by the City will establish the completion date and certify the Work as complete. The following shall occur before the completion date can be established:

The Final Contract Voucher Certification shall be signed by the Contractor verifying agreement to the final contract price.

The physical work on the Project shall be complete.

The Contractor shall furnish all documentation required by the Contract and required by law, necessary to allow the City to certify the Contract as complete.

A certificate of completion for the Work, signed by the City, will constitute acceptance of the Work. The issuance of this certificate of completion will not constitute acceptance of unauthorized or defective Work, Equipment, or materials.

The Contractor agrees that neither completion nor final acceptance shall relieve the Contractor of the responsibility to indemnify, defend, and protect the City against any claim or loss resulting from the failure of the Contractor, or the Subcontractors or lower tier subcontractors, to pay all laborers, mechanics, Subcontractors, material persons, or any other person who provides labor, supplies, or provisions for carrying out the Work or for any payments required for unemployment compensation under Title 50 RCW or for industrial insurance and medical aid required under Title 51 RCW.

Failure of the Contractor to perform all of the Contractor's obligations under the Contract shall not bar the City from unilaterally certifying the Contract complete so the Engineer may calculate a final contract price as provided in 1-09.9 PAYMENTS.

1-05.13 Superintendents, Labor and Equipment of Contractor

Delete 1-05.13.

1-05.14 Cooperation With Other Contractors

Delete all of 1-05.14 and substitute the following:

Nothing in the Contract shall be interpreted as granting to the Contractor exclusive occupancy of the Project area. The Contractor shall ascertain to its own satisfaction the scope of the Project and the nature of any other contracts that have been or may be awarded by the City in the construction of the Project, or to the end that the Contractor may perform this Contract in the light of such other contracts, if any.

The Contractor shall not cause unnecessary hindrance or Delay to others working on this or other projects. If the performance of a contract for the Project is likely to be interfered with by the simultaneous performance of some other contract or contracts, the Engineer will decide which Contractor shall cease Work temporarily and which Contractor shall continue, or whether the Work under the contracts can be coordinated so that the contractors may proceed simultaneously. On all questions concerning conflicting interest of contractors performing related Work, the decision of the Engineer shall be binding upon all contractors concerned and the City, the Engineer, the City's Representative, and their consultants shall not be responsible for any damages suffered or extra costs incurred by the Contractor resulting directly or indirectly from the Award or performance or attempted performance of any other contract or contracts on the Project or caused by a decision or omission of the Engineer respecting the order of precedence in the performance of the contracts.

If, through acts of neglect on the part of the Contractor, any others suffer loss or damage on the Work, the Contractor agrees to resolve such loss or damage fairly and expeditiously. If such other shall assert any claim against the City, the Engineer, the City's Representative, or their consultants on account of any damage alleged to have been so sustained, the City shall notify the Contractor, who shall hold harmless, indemnify, and defend the City, Engineer, the City's Representative, and their consultants, and each of their directors, officers, employees, and agents against any such claim, including all attorney's fees and any other costs incurred by the indemnified parties relative to any such claim.

The Contractor shall coordinate its work with other contractors and utility companies that may have facilities in the Project area and cooperate with them. The Contractor shall also coordinate its activities with the City; and no water mains, individual water services, street, or private driveways may be closed off without a minimum of five working days notice to the City and the private property owner. Should the property owner or the City have adequate reason, as determined by the Engineer, to avoid access or water service shutoff at the scheduled time, the Contractor shall reschedule its work to meet the new condition.

Final grading to subgrade and subgrade preparation in those areas disturbed by the utilities companies shall be the responsibility of the Contractor and included in the street construction and no additional compensation will be paid.

The Contractor shall cooperate with the utility companies and their subcontractors and so conduct its operations that the necessary construction of their facilities can be accomplished to the mutual satisfaction of the City of Everett and the utility companies.

Supplement Section 1-05 by adding the following new subsections:

1-05.16 *Water and Power*

(***)**

The Contractor shall make necessary arrangements, and shall bear the costs for power and water necessary for the performance of the Work, unless the Contract includes power and water as a pay item.

Contractor shall pay all power and water costs until Substantial Completion, whether such power or water is provided by temporary or permanent facilities. City shall not be liable for any costs or Delays arising out of or caused by the availability or lack of availability of permanent power or utilities.

1-05.17 *Oral Agreements*

(***)**

No oral agreement, representation or conversation with or by any officer, agent, or employee of the City, either before or after execution of the Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract. Such oral agreement, representation or conversation shall be considered as unofficial information and in no way binding upon the City, unless subsequently put in writing and signed by the City.

1-05.18 Contractor
(***)****1-05.18(1) Contractor's Representative**

The Contractor shall notify the City in writing of the name of the person who will act as the Contractor's representative, will have the authority to act in matter relating to this Contract, and will be delegated with authority to act as the Contractor's emergency contact. This person shall have authority to carry out the provisions of the Contract and to supply materials, Equipment, tools and labor without delay for the performance of the Work.

Contractor shall employ and keep on site on a full time basis personnel experienced in the management of construction of projects of this size and type. These shall include, but not be limited to, a project manager and superintendent. Unless the City agrees otherwise in writing, neither the Contractor's project manager nor the superintendent shall have supervisory responsibility for other projects for the Contractor while assigned to this Project. Contractor shall employ and assign such additional, full time office, support and engineering personnel to support the project manager and superintendent and allow timely completion of the Project. The project manager and superintendent shall be approved by the City, and such approval shall not be unreasonably withheld. Contractor shall submit personnel qualifications within seven (7) days of Contractor's execution of the Contract. Basis for disapproval include, but are not limited to, lack of sufficient experience managing the construction of similar type or size projects or relationships on other projects unsatisfactory to the City or, if the Project is subject to supplemental bidder responsibility criteria and such criteria contain personnel qualifications, the personnel differ from those named by Bidder in its pre-Award supplemental bidder responsibility criteria submittals. City may require removal and replacement of Contractor's supervisory staff who are disruptive or who appear to lack sufficient competence to complete the Project successfully.

1-05.18(2) Construction Procedures

The Contractor shall supervise and direct the Work and determine the means, methods, techniques, sequences and procedures of construction, except in those instances where the City, to define the quality of an item of Work, specifies in the Contract a means, method, technique, sequence or procedure for construction of that item of Work. The Contractor shall execute Work in conformity with the standard practice of the trade.

1-05.18(3) Responsibilities**1-05.18(3)A Manufacturers and Suppliers**

The Contractor shall be responsible for the adequacy, efficiency and sufficiency of manufacturers, Suppliers and their employees.

1-05.18(3)B Contractor's Employees

The Contractor shall be responsible for the adequacy, efficiency and sufficiency of its employees. Workers shall have sufficient knowledge, skill and experience to perform properly the Work assigned to them.

1-05.18(3)C Payment for Labor and Materials

The Contractor shall pay and require its Subcontractors to pay any and all accounts for labor including Worker's Compensation premiums, State Unemployment and Federal Social Security payments and other wage and salary deductions required by law. The Contractor also shall pay and cause its Subcontractors to pay any and all

accounts for services, equipment, and materials used by him and its Subcontractors during the performance of Work under this Contract. The Contractor shall pay such accounts as they become due and payable. If requested by the City, the Contractor shall promptly furnish proof of payment of such accounts to the City.

1-05.18(3)D Attention to Work

The Contractor, either in person or acting through its representative, shall give personal attention to and shall manage the Work so that it shall be prosecuted faithfully and completed under the Project schedule. When its representative is not personally present at the Project site, its designated alternate shall be available and shall have the authority to act in matters relating to this Contract.

Where detailed construction requirements are not set forth in the Standard Specifications or these Special Provisions, the Contractor shall perform the Work of a quality comparable to the workmanship specified for other parts of the Work, from firms having established good reputations for similar Work, or by following industry standard practices. The Contractor shall perform all Work in compliance with and conforming to applicable building codes in effect at the time the Work is being performed.

1-05.18(3)E Safety

The Contractor alone shall be responsible for safety on the job site, including, but not limited to, the safety of its and its Subcontractor's employees. The Contractor shall maintain the Project site and perform the Work in a manner that meets the City's responsibility under statutory and common law for the provision of a safe place to work.

1-05.18(3)F Threats, Intimidation and Harassment Forbidden

Contractor shall not allow its employees, its Subcontractors, its Subcontractors' employees, or any other agents to threaten bodily injury or property damage, to intimidate or attempt to intimidate any person, or to assault or physically harass any person. Forbidden conduct includes, but is not limited to, threatening, appearing, or actually doing any of the following: pushing, shoving, striking, physically blocking a person or a person's vehicle, vandalism, malicious mischief, or any other act that a reasonable person would understand be intended to intimidate, cause personal injury, or cause property damage. Contractor shall remove from the job site any person reasonably under its control or direction who the Contractor or City reasonably believes violated this section. The lack of a request from the City or City's Representative to the Contractor to remove someone from the job site does not relieve the Contractor from its obligation to remove someone.

1-05.18(3)G Weapons Forbidden

Contractor shall not allow its employees, its Subcontractors, its Subcontractors' employees, or any other agents or representatives to carry or possess, openly or concealed, explosives or weapons on the job site, except: (a) such explosives are as reasonably required for performance of the Work, such as those necessary for blasting or demolition work called for by the Contract Documents or (b) commissioned law enforcement officers or security personnel under authority of their commission. A weapon is any object, instrument or chemical that is (1) designed in such a manner to inflict harm or injury to another person; or (2) any item used in a manner threatening harm or injury to another person. Weapons include, but are not limited to, firearms, dangerous knives, dangerous chemicals, tear gas, martial arts

weapons, blackjacks or other weapons. Further, weapons should include those described in EMC Chapter 10.78. Possession of mace, pepper spray or the like for defensive purposes is not a violation of this policy. Contractor shall remove from the job site any person reasonably under its control or direction who the Contractor or City reasonably believes violated this section. The lack of a request from the City or City's Representative to the Contractor to remove someone from the job site does not relieve the Contractor from its obligation to remove someone.

1-05.18(3)H Safety Standards

The Contractor shall comply with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor Regulations (29 CFR, Part 5). Under this Section, the Contractor shall not require any laborer or mechanic to work in surroundings or under working conditions that are unsanitary, hazardous, or dangerous to its health and safety as determined under construction, safety, and health standards promulgated by the Secretary of Labor. These requirements do not apply to the purchase of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

1-05.18(3)I Public Safety and Convenience

The Contractor shall conduct its work so as to ensure the least possible obstruction to traffic and inconvenience to the general public, business, organizations and residents in the vicinity of the Work and to reasonably protect persons and property. No roads or street shall be closed to the public except with the permission of the City's Representative and the proper governmental authority. Fire hydrants on or adjacent to the Work shall be accessible to firefighting equipment. Temporary provisions shall be made by the Contractor for the use of sidewalks, private and public driveways and proper functioning of gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses.

1-05.19 City-Contractor Coordination

(*****)

1-05.19(1) Suggestions to Contractor

Nothing in these Contract Documents requires the City's Representative to provide the Contractor with direction or advice on how to do the Work, construction practices, or means and methods. If the City's Representative approves, suggests or recommends any construction practice, means, method or manner for doing the Work or producing materials, the approval or recommendation shall not: (A) guarantee that following the method or manner will result in compliance with the Contract Documents; (B) relieve the Contractor of any risks or obligations under the Contract Documents; or (C) create liability by the City to the Contractor.

Suggestions as to the plans or methods of accomplishing the Work or Contract requirements by the City or the City's Representative to the Contractor but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor. The City and the City's Representative assume no responsibility therefore and in no way will be held liable for any defects in the Work which may result from or be caused by use of such plan or method of Work.

1-05.19(2) Meetings with City

The Contractor shall have its duly authorized representative attend periodic informational meetings with the City's Representative and City staff, as reasonably required by the City.

Contractor, City, and City's Representative shall meet as often as determined by the City's Representative, but no less often than once each month. The purpose of the meeting is to review Project status in relation to the construction schedule; review value of Work completed during the previous month; and, if applicable, review Contractor's plans to return Project status to that required by the schedule. If requested by the City or City's Representative, the Contractor shall submit a written progress report within five days following this meeting, comprising:

The current construction schedule indicating percent complete, actual completion or start dates since the previous review, the estimated remaining duration for each activity in progress, Schedule of Values update, and narrative summary.

Reasons any activities are behind schedule and the corrective steps being taken.

1-05.19(3) Cooperation with Others

The Contractor agrees to permit entry to the work site by the City, its employees or other contractors performing Work on behalf of the City or Mall. The Contractor shall afford to the City, Mall, other contractors and their employees, reasonable facilities and cooperation and arrange its work and dispose of its materials in such a manner as to not interfere with the activities of the City or of others upon the site of Work. The Contractor shall promptly make good Contractor-caused injury or damage to persons or property that may be sustained by other contractors or employees of the City. The Contractor shall join its Work to that of others and perform its Work in proper sequence in relation to that of others.

If requested by the Contractor, the City will arrange meetings with other contractors performing Work on behalf of the City to plan coordination of construction activities. The Contractor shall inform itself of the planned activities of other contractors and will coordinate its Work with the other contractors.

Contractor shall notify the City of problems, interference or any difficulty with other contractors or workers engaged by the City. The Notice shall be sufficiently prompt and specific so as to allow the City to mitigate or avoid increased costs, time of performance, damages or injury. Contractor's failure to provide such Notice in a timely way shall be deemed a waiver and release of any and all Contract Claims relating to, arising out of, or caused by, any alleged interference, difficulty or problem with another contractor or worker engaged by the City.

1-06 CONTROL OF MATERIAL

Supplement Section 1-06 as follows:

References to materials shall also mean Contractor furnished Equipment, if any, as specified in these Special Provisions.

1-06.1 Approval of Materials Prior to Use

Revise the first paragraph of 1-06.1 to read as follows:

Prior to use, Contractor shall notify the Engineer of all proposed materials. Contractor may use the Qualified Product List (QPL) and the Aggregate Source Approval (ASA) Database. Contractor shall use the Request for Approval of Material (RAM) form.

Supplement 1-06.1 by adding the following:

Contractor shall provide product data, when specified, in accordance with 1-05.3(1) SUBMITTALS of these Special Provisions for inspecting, testing, operating, or maintaining Equipment and materials supplied as part of the Work. Unless otherwise specified, such data shall be provided at the time the referenced material or Equipment is delivered to the job site. Contractor shall provide data as specified and include, unless otherwise specified, but not be limited to shop drawings, erection drawings, reinforcing steel schedules, testing and adjusting instructions, operations manuals, maintenance procedures, parts lists, and record drawings. Contractor shall provide data as part of the Work under this Contract and its acceptability will be determined by the City in its sole discretion.

Further supplement 1-06.1 by adding the following:

1-06.1(5) Requests for Substitution
(***)**

The City will not usually consider a substitution for material or Equipment specified by brand name or manufacturer or sole-sourced.

Only the Contractor may offer materials or Equipment of equal or better quality and performance as a substitution for those specified. The Contractor shall make substitution offers in writing to the City's Representative in accordance with 1-05.3(1) SUBMITTALS of these Special Provisions. The substitution offer must include sufficient data to enable the City's Representative to assess the acceptability of the material or Equipment for the particular application and requirements. The City and City's Representative are not required or obligated to consider or review a request for substitution and may, in their sole discretion and option, consider or review such requests.

If the offered substitution requires changes to or coordination with other portions of the Work, include, if any, drawings, and details showing such changes. The Contractor agrees to perform these changes as part of the substitution of material or Equipment at no additional cost to the City. Approval of a substitution request will not relieve the Contractor from responsibility for the efficiency, quality, and performance of the substitute material or Equipment, in the same manner and degree as the material and Equipment originally specified. Reflect cost differential associated with a substitution in the offer. If the City approves the substitution, the Contract Documents will be modified by a Change Order modifying the Contract Sum in the amount of the cost differential.

1-06.2 Acceptance of Materials

1-06.2(2) Statistical Evaluation of Materials for Acceptance

1-06.2(2)B Financial Incentive

Delete 1-06.2(2)B

1-06.2(2)D Quality Level Analysis

Delete 1-06.2(2)D

1-06.3 *Manufacturer's Certificate of Compliance*

Supplement 1-06.3 by adding the following:

When authorized by the Standard Specifications or these Special Provisions and prior to use, the Engineer may accept certain Equipment on the basis of a Manufacturer's Certificate of Compliance as an alternate to Equipment inspection and testing.

A Manufacturer's Certificate of Compliance shall be reserved for cases where compliance to Contract requirements is not readily determinable through inspection and testing of materials or Equipment. The Contractor shall provide properly authenticated documents to the City's Representative that the materials and Equipment comply with the Contract requirements.

The Contractor shall pay all associated costs of providing each Manufacturer's Certificate of Compliance submitted for City acceptance.

The City reserves the right to refuse to accept Equipment on the basis of a Manufacturer's Certificate of Compliance.

1-06.3(1) *Inspection at Point of Manufacturing*
(***)**

The Contractor shall be responsible to reimburse the City for the costs of inspections at the point of manufacturing for inspections occurring outside of Whatcom, Skagit, Island, Snohomish, King, Pierce and Thurston counties. Costs to be paid or reimbursed by the Contractor include, but are not limited to, travel, subsistence, labor and lodging expenses of the City Inspector.

Point of manufacturing inspection will be required if:

Inspection and testing of materials or Equipment in the vicinity of the Work by the City is not practicable,

The Contractor requests the City to inspect and test material or Equipment at the point of manufacture, or

The Standard Specifications or these Special Provisions require that inspection, testing or witnessing of tests take place at the point of manufacture.

1-06.4 *Handling and Storing Materials*

Supplement 1-06.4 by adding the following:

Contractor shall store materials and Equipment so as to insure the preservation of their quality and fitness for the Work. Contractor shall store Equipment and materials at location that facilitates inspection. The Contractor shall be responsible for damages, loss or casualty occurring to materials and Equipment until Final Acceptance.

1-06.6 *Recycled Materials*

Delete 1-06.6 and its subsections and substitute the following:

The Contractor shall make best effort to utilize recycled materials in the construction of the project as detailed in elsewhere in the Standard Specifications and these Special Provisions.

Prior to Physical Completion Contractor shall report the quantity of recycled materials utilized in the construction of the project for each of the items listed in Section 9-03.21. Include hot mix asphalt, recycled concrete aggregate, recycled glass, steel furnace slag and other recycled materials (e.g. utilization of on-site material and aggregates from

concrete returned to the supplier). Contractor shall provide report on DOT form 350-075A Recycled Materials Reporting.

1-07 LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

1-07.1 Laws to be Observed

1-07.1(1) General

Revise 1-07.1(1) by replacing the second sentence of the first paragraph with the following:

The Contractor shall indemnify, defend, and save harmless the City (including its agents, officers, and employees) against any claims that may arise because the Contractor (or any employee of the Contractor or Subcontractor or material person) violated a legal requirement.

1-07.1(2) Health and Safety

Supplement 1-07.1(2) by adding the following:

The Contractor shall be in compliance at all times with all COVID-19 Requirements applicable to the Work. Contractor's Bid includes all costs necessary for the duration of the Work for compliance with Baseline COVID-19 Requirements..

Supplement 1-07.1 by adding the following:

1-07.1(6) Additional Requirements

The Contractor shall be in compliance with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act [42 U.S.C. 1857(h)], Section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency Regulations (40 CFR Part 15). (Contracts, subcontracts, and subgrants of amounts in excess of \$100,000).

The Contractor shall comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163).

The City advises all general contractors and subcontractors that numerous Federal, State, and Local regulations exist that could affect the procedures used in the completion of this project. The City advises each prospective Contractor that they are responsible to be aware of and comply with all applicable statutes and regulations. It is recommended that each Contractor contact the local office of the following agencies for a list of applicable regulations and requirements that might affect the implementation of this project:

- ♦ Federal Environmental Protection Agency
- ♦ Washington Department of Health
- ♦ Washington Department of Ecology
- ♦ Washington Department of Fisheries
- ♦ Washington Department of Wildlife
- ♦ Washington Department of Labor & Industries
- ♦ Puget Sound Air Pollution Control Agency
- ♦ Municipal Building Department
- ♦ Municipal Planning Department

♦ Municipal Public Works Department

If the scope of Work in this Contract includes Work at the City of Everett Water Filtration Plant or the Waste Water Pollution Control Facility, Contractor shall comply with the requirements of the Washington Department of Labor & Industries for such work including, but not limited to, Chapter 296-67 WAC. All costs associated or incurred in complying with these regulations or any other regulations listed above are included in the Contractor's Proposal.

In cases of conflict between different safety regulations, the more stringent regulation shall apply.

The Washington State Department of Labor and Industries shall be the sole and paramount administrative agency responsible for the administration of the provisions of the Washington Industrial Safety and Health Act of 1973 (WISHA).

The Contractor shall maintain at the project site office, or other well-known place at the project site, all articles necessary for providing first aid to the injured. The Contractor shall establish, publish, and make known to all employees, procedures for ensuring immediate removal to a hospital, or doctor's care, persons, including employees, who may have been injured on the project site. Employees should not be permitted to work on the project site before the Contractor has established and made known procedures for removal of injured persons to a hospital or a doctor's care.

The Contractor shall have sole responsibility for the safety, efficiency, and adequacy of the Contractor's plant, appliances, and methods, and for any damage or injury resulting from their failure, or improper maintenance, use, or operation. The Contractor shall be solely and completely responsible for the conditions of the project site, including safety for all persons and property in the performance of the Work. This requirement shall apply continuously, and not be limited to normal working hours. The required or implied duty of the Engineer to conduct construction review of the Contractor's performance does not, and shall not, be intended to include review and adequacy of the Contractor's safety measures in, on, or near the project site.

1-07.1(7) Noise

Work within 500 feet of residential properties between the hours of 10:00 p.m. and 7:00 a.m. during weekdays and between the hours of 6:00 p.m. and 8:00 a.m. on weekends or holidays are subject to noise control requirements if the work generates decibel levels of greater than 55 db(A). Contractor may apply for a Noise Variance a minimum of 30 days prior to performing work and pay \$100.00 application fee, using the following link to obtain the latest information on noise variance requirements:

<https://www.everettwa.gov/formcenter/human-resources-16/request-for-temporary-construction-noise-167>. The Contractor must not assume that a Noise Variance will be granted. In no event will the Contractor be entitled to any adjustment of the Contract Sum or Contract Time if a Noise Variance is denied.

Typical requirements include, and not limited to, broadband backup alarms on all equipment requiring a backup alarm, anti-tail gate slamming devices, dump truck bed liners, and sawcutting, vacuum excavation, pavement breaking and loading export haul noise must be done between the hours of 7:00 a.m. and 10:00 p.m. during weekdays and between 8:00 a.m. and 6:00 p.m. on weekends.

Appendix E contains the City of Everett's Noise Ordinance for Bidder's reference.

Approval to continue Work during these hours may be revoked at any time the Contractor exceeds the City's noise control regulations or complaints are received from

the public or adjoining property owners regarding the noise from the Contractor's operation. The Contractor shall have no claim for damages or delays should such permission be revoked for these reasons.

1-07.2 State Taxes

Delete 1-07.2 and substitute the following:

1-07.2 State Sales Tax

The Washington State Department of Revenue has issued special rules on the State sales tax. Sections 1-07.2(1) through 1-07.2(3) are meant to clarify those rules. The Contractor should contact the Washington State Department of Revenue for answers to questions in this area. The City will not adjust its payment if the Contractor bases a Bid on a misunderstood tax liability.

The Contractor shall include all Contractor-paid taxes in the unit bid prices or other contract amounts. In some cases, however, state retail sales tax will not be included. Section 1-07.2(3) describes this exception.

The City will pay the retained percentage only if the Contractor has obtained from the Washington State Department of Revenue a certificate showing that all Contract-related taxes have been paid (RCW 60.28.050). The City may deduct from its payments to the Contractor any amount the Contractor may owe the Washington State Department of Revenue, whether the amount owed relates to this Contract or not. Any amount so deducted will be paid into the proper State fund.

1-07.2(1) State Sales Tax — Rule 171 – Use Tax

WAC 458-20-171, and its related rules, apply to building, repairing, or improving streets, roads, etc., that are owned by a municipal corporation, or political subdivision of the state, or by the United States, and that are used primarily for foot or vehicular traffic. This includes storm or combined sewer systems within and included as a part of the street or road drainage system and power lines when such are part of the roadway lighting system. For Work performed in such cases, the Contractor shall include Washington State Retail Sales Taxes in the various unit bid item prices, or other contract amounts, including those that the Contractor pays on the purchase of the materials, Equipment, or supplies used or consumed in doing the Work.

1-07.2(2) State Sales Tax — Rule 170 –Retail Sales Tax

WAC 458-20-170, Retail Sales Tax, and its related rules, apply to the constructing and repairing of new or existing buildings, or other structures, upon real property. This includes, but is not limited to, the construction of streets, roads, highways, etc., owned by the State of Washington; water mains and their appurtenances; sanitary sewers and sewage disposal systems unless such sewers and disposal systems are within, and a part of, a street or road drainage system; telephone, telegraph, electrical power distribution lines, or other conduits or lines in or above streets or roads, unless such power lines become a part of a street or road lighting system; and installing or attaching of any article of tangible personal property in or to real property, whether or not such personal property becomes a part of the realty by virtue of installation.

For Work performed in such cases, the Contractor shall collect from the City, retail sales tax on the full Contract price. The City will automatically add this sales tax to each payment to the Contractor. For this reason, the Contractor shall not include the retail sales tax in the unit bid item prices, or in any other Contract amount subject to Rule 170, with the following exception.

Exception: The City will not add in sales tax for a payment the Contractor or a Subcontractor makes on the purchase or rental of tools, machinery, equipment, or consumable supplies not integrated into the project. Such sales taxes shall be included in the unit bid item prices or in any other Contract amount.

1-07.2(3) Services

The Contractor shall not collect retail sales tax from the City on any contract wholly for professional or other services (as defined in Washington State Department of Revenue Rules 138 and 244).

1-07.3 Fire Prevention and Merchantable Timber Requirements

Delete 1-07.3 in its entirety.

1-07.5 Environmental Regulations

1-07.5(4) Air Quality

Delete all of 1-07.5(4) and substitute the following:

The Contractor shall comply with all rules of the Puget Sound Clean Air Agency (PSCAA) (800-552-3565). These rules include PSCAA Regulation I. Excerpts of Regulation I are included in the Appendix D as it relates to fugitive dust control. The Contractor shall submit a dust control plan including dust control measures for its activities related to this Contract that may cause dust. This plan shall be submitted to the Engineer prior to commencing activity at the job site.

1-07.6 Permits and Licenses

Supplement 1-07.6 by adding the following:

A City of Everett business license is required for the Contractor and the Contractor's Subcontractors prior to commencing construction on this Contract.

Contractor shall obtain all necessary permits required by law and the City of Everett. All general building, electrical, plumbing permits will be issued at no cost to the Contractor. In addition, obtain all required permits for waste disposal sites. Waste disposal sites shall be in the United States, unless otherwise expressly stated in the Contract Documents or the City gives prior written approval.

This Project has more than one acre of total disturbed area within the project limits and requires coverage under the Construction Stormwater General Permit (CSWGP). The City will obtain coverage for the project in order to facilitate the project schedule. A copy of the permit and coverage letter will be provided. The Contractor shall assume responsibility for the requirements of the CSWGP by filing a Transfer of Coverage form with Ecology, developing a Construction Stormwater Pollution Prevention Plan (SWPPP) prior to beginning construction, and complying with the requirements of the permit. Criteria and requirements for developing a SWPPP can be found in the Washington State Department of Ecology 2019 Stormwater Management Manual for Western Washington. A link to the Manual can be found on the City's web site using the following URL:

[Stormwater Technical Resources | Everett, WA - Official Website](#)

Contact Ecology to determine if other requirements apply to the Project.

NW Region DOE phone: 425-649-7000

Include all cost incurred for obtaining the CONSTRUCTION STORMWATER GENERAL PERMIT in appropriate bid item or items as no direct compensation will be made.

This Project contains less than one acre of total disturbed area within the project limits and does not require Contractor to apply for Ecology's Construction Stormwater General Permit.

1-07.9 Wages

1-07.9(1) General

Delete the first paragraph of 1-07.9(1) and substitute the following:

This Contract is subject to the minimum wage requirements of RCW 39.12 and to RCW 48.28, as amended or supplemented. Workers shall receive no less than the prevailing rate of wage. Bidder shall use the Washington State Prevailing Wage Rates for Snohomish County, effective at the time of bid opening. Bidder is solely responsible to use the schedule in effect at the Bid Opening Date, determine the appropriate labor classification(s), and use the appropriate and correct prevailing wage and benefit rate(s). The hourly minimum rates for wages and fringe benefits can be obtained at the following URL:

<https://www.lni.wa.gov/licensing-permits/public-works-projects/prevailing-wage-rates>

Printed copies of the current prevailing wage rates are available for viewing at City of Everett Public Works, 3200 Cedar St, Everett, WA and the City will mail a hard copy of the prevailing wage rates upon written request received within 7 days of the Bid Opening Date.

Delete the fifth paragraph of 1-07.9(1) and substitute the following:

If employing labor in a class not listed in the L & I prevailing wage rate schedule, the Contractor shall request a determination of the correct wage and benefits rate for that class and locality from the Industrial Statistician, Washington State Department of Labor and Industries (State L&I), and provide a copy of those determinations to the Project Engineer.

Delete the final paragraph of 1-07.9(1) that begins with "There are many work-ready . . ."

1-07.9(5) Required Documents

Supplement 1-07.9(5) by adding the following:

The City may require payroll reports for the Contractor and every Subcontractor be submitted weekly to the Construction Division, Public Works Service Center, 3200 Cedar Street, Everett, Washington 98201. The payroll reports shall contain the following information:

1. Name and residence address of each worker.
2. Social Security number of each worker.
3. Classification of work performed by each worker. The classification shall be specific and match the classification categories listed in the Contract Documents.
4. Total number of hours employed each day.
5. Total number of hours employed during the payroll period.
6. Straight time and overtime hourly rate of wages paid to each worker.

7. Total or gross amount earned by each worker.
8. Deductions for Medical Aid, FICA, Federal withholding tax, and any other deductions taken.
9. Net amount paid each worker.
10. Contractor's, or Subcontractor's, name and address.
11. Days and dates worked.
12. Date of final day of pay period.
13. Whether fringe benefits were paid to each worker as part of the hourly wage rate or whether fringe benefits were paid into an approved plan, fund, or program.

Payrolls may be submitted on Federal payroll form WH-347, or equivalent. The reverse side of the form contains an affidavit that shall be filled out and signed. If the Contractor's payroll reports are computerized, the computerized reports may be submitted along with a Statement of Compliance affidavit photocopied from the back of form WH-347, or equivalent.

The first payroll submitted for the Work for both the Contractor and each Subcontractor shall be labeled "Initial." The last payroll submitted for the Work for both the Contractor and each Subcontractor shall be labeled "Final." Payrolls shall be sequentially numbered for all periods in which Work has been done. A certificate of completion for the Work, signed by the City, will constitute acceptance of the Work. The issuance of this certificate of completion will not constitute acceptance of unauthorized or defective Work or material.

1-07.11 Requirements for Nondiscrimination

Supplement 1-07.11 as follows:

The Contractor will be required to assure that equal employment opportunities will be in effect to all individuals throughout the length of this Contract, pursuant to 1-07.11 REQUIREMENTS FOR NONDISCRIMINATION. The Contractor must comply with all local, state and federal laws pertaining to non-discrimination and equal employment opportunity.

The City of Everett hereby gives public notice that it is the City's policy to assure full compliance with Title VI of the Civil Rights Act of 1964, the Civil rights Restoration Act of 1987, and related statutes and regulations in all programs and activities. Title VI requires that no person shall, on the grounds of race, color, sex, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any Federal Aid Highway program or other activity for which the City receives Federal financial assistance.

Any person who believes they have been aggrieved by an unlawful discriminatory practice under Title VI has a right to file a formal complaint with the City of Everett. Any such complaint shall be in writing and filed with the City's Title VI Coordinator within 180 calendar days following the date of the alleged discriminatory occurrence. Title VI Discrimination Complaint Forms may be obtained from the Human Resources office at no cost to the complainant by calling (425) 257-8767.

Notification specific to bidders:

All bidders are hereby notified that the City of Everett will affirmatively ensure that in any contract entered into pursuant to this Invitation to Bid, minority business enterprises will be afforded full opportunity to submit bids in response to this

invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an Award.

Title VI Assurance

- a. The Contractor, with regard to the Work performed during the Contract, shall not discriminate on the grounds of race, color, sex or national origin in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in such discrimination, including discrimination in employment practices.
- b. In all solicitations either by competitive bidding or negotiations made by the Contractor for Work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential Subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this Contract.
- c. The Contractor shall provide all information and reports required by federal regulations applicable to this Contract. The Contractor shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the City to be pertinent to ascertain compliance with applicable federal regulations. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the City, and shall set forth what efforts it has made to obtain the information.
- d. In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the City shall impose such Contract sanctions as it, or the City's funding agencies, may determine to be appropriate, including, but not limited to: (a) withholding of payments to the Contractor until the Contractor complies, and/or (b) termination or suspension of the Contract, in whole or in part.
- e. The Contractor shall include the provisions of paragraphs (a) through (e) in every subcontract, including contracts for procurement and leases of equipment, unless exempt by applicable federal regulations or directives issued pursuant thereto. The Contractor shall take such action, including sanctions for noncompliance, with respect to Subcontractors as the City or relevant federal agency may direct so as to enforce such provisions. Provided, however, in the event a Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or supplier as a result of the foregoing direction, the Contractor may request that the City or the United States to enter into such litigation to protect their respective interests.

In the event of any inconsistency between the above supplemental requirements to 1-07.11 and the requirements of the 1-07.11 of the Standard Specifications, the more stringent requirements control, unless otherwise determined by the City in writing. In addition, the City may determine in writing that one or more provisions of 1-07.11 of the Standard Specifications are not applicable.

1-07.14 Responsibility for Damage

Delete 1-07.14 and replace with the following:

The City, and all officers and employees of the City, including but not limited to those of the Public Works Department, will not be responsible in any manner: for any loss or damage that may happen to the Work or any part; for any loss of material or damage to any of the materials or other things used or employed in the performance of Work; for

injury to or death of any persons, either workers or the public; or for damage to the public for any cause which might have been prevented by the Contractor, or the workers, or anyone employed by the Contractor.

The Contractor shall be responsible for all liability imposed by law for injuries to, or the death of, any persons or damages to property resulting from any cause whatsoever during the performance of the Work, or before Final Acceptance.

Subject to the limitations in this Section, and RCW 4.24.115, the Contractor shall indemnify, defend, and save harmless the City and all its officers and employees from all claims, suits, or actions brought for injuries to, or death of, any persons or damages resulting from construction of the Work or in consequence of any negligence or breach of Contract regarding the Work, the use of any improper materials in the Work, caused in whole or in part by any act or omission by the Contractor or the agents or employees of the Contractor during performance or at any time before final acceptance. In addition to any remedy authorized by law, the City may retain so much of the money due the Contractor as deemed necessary by the Engineer to ensure the defense and indemnification obligations of this Section until disposition has been made of such suits or claims.

Pursuant to RCW 4.24.115, such claims, suits, or actions result from the concurrent negligence of (a) the indemnitee or the indemnitee's agents or employees and (b) the Contractor or the Contractor's agent or employees, the indemnity provisions provided in the preceding paragraphs of this Section shall be valid and enforceable only to the extent of the Contractor's negligence or the negligence of its agents and employees.

The Contractor shall bear sole responsibility for damage to completed portions of the project and to property located off the project caused by erosion, siltation, runoff, or other related items during the construction of the project. The Contractor shall also bear sole responsibility for any pollution of rivers, streams, ground water, or other waters that may occur as a result of construction operations.

The Contractor shall exercise all necessary precautions throughout the life of the Project to prevent pollution, erosion, siltation, and damage to property.

The City will forward to the Contractor all claims filed against the City that are deemed to have arisen in relation to the Contractor's Work or activities under this Contract, and, in the opinion of the City, are subject to the defense, indemnity, and insurance provisions of the Contract Documents. Claims will be deemed tendered to the Contractor and insurer, who has named the City as a named insured or an additional insured under the Contract's insurance provisions, once the claim has been forwarded via certified mail to the Contractor. The Contractor shall be responsible to provide a copy of the claim to the Contractor's designated insurance agent who has obtained/met the Contract's insurance provision requirements.

Within 60 calendar days following the date a claim is sent by the City to the Contractor, the Contractor shall notify the City Attorney's Office of the following:

- a. Whether the claim is allowed or is denied in whole or in part, and, if so, the specific reasons for the denial of the individual claim, and if not denied in full, when payment has been or will be made to the claimant(s) for the portion of the claim that is allowed, or
- b. If resolution negotiations are continuing. In this event, status updates will be reported no longer than every 60 calendar days until the claim is resolved or a lawsuit is filed.

If the Contractor fails to provide the above notification within 60 calendar days, then the Contractor shall yield to the City sole and exclusive discretion to allow all or part of the claim on behalf of the Contractor, and the Contractor shall be deemed to have WAIVED any and all defenses, objections, or other avoidances to the City's allowance of the claim, or the amount allowed by the City, under common law, constitution, statute, or the Contract and these Standard Specifications. If all or part of a claim is allowed, the City will notify the Contractor via certified mail that it has allowed all or part of the claim and make appropriate payments to the claimant(s) with City funds.

Payments of funds by the City to claimant(s) under this Section will be made on behalf of the Contractor and at the expense of the Contractor, and the Contractor shall be unconditionally obligated to reimburse the City for the "total reimbursement amount", which is the sum of the amount paid to the claimant(s), plus all costs incurred by the City in evaluating the circumstances surrounding the claim, the allowance of the claim, the amount due to the claimant, and all other direct costs for the City's administration and payment of the claim on the Contractor's behalf. The City will be authorized to withhold the total reimbursement amount from amounts due the Contractor, or, if no further payments are to be made to the Contractor under the Contract, the Contractor shall directly reimburse the City for the amounts paid within 30 days of the date notice that the claim was allowed was sent to the Contractor. In the event reimbursement from the Contractor is not received by the City within 30 days, interest shall accrue on the total reimbursement amount owing at the rate of 12 percent per annum calculated at a daily rate from the date the Contractor was notified that the claim was allowed. The City's costs to enforce recovery of these amounts are additive to the amounts owing.

The Contractor specifically assumes all potential liability for actions brought by employees of the Contractor and, solely for the purpose of enforcing the defense and indemnification obligations set forth in 1-07.14, the Contractor specifically waives any immunity granted under the State industrial insurance law, Title 51 RCW. This waiver has been mutually negotiated by the parties. The Contractor shall similarly require that each Subcontractor it retains in connection with the project comply with the terms of this paragraph, waive any immunity granted under Title 51 RCW, and assume all liability for actions brought by employees of the Subcontractor.

The indemnity, defense and other obligations in this 1-07.14 are in addition to any indemnity, defense or other obligation that may be contained elsewhere in the Contract Documents.

1-07.17 *Utilities and Similar Facilities*

Supplement 1-07.17 by adding the following:

The Contractor shall review its responsibilities under Chapter 19.122 RCW, a law relating to underground utilities. Cost to the Contractor incurred as a result of complying with this law shall be at the Contractor's expense. In accordance with RCW 19.122, the Contractor shall call the Utility Coordinating Council One Call Center, 1-800-424-5555, for field location, not less than 2 nor more than 10 business days before the scheduled date for commencement of excavation that may affect underground utility facilities, unless otherwise agreed upon by the parties involved. A business day is defined as any day other than Saturday, Sunday, or a legal local, State, or Federal holiday.

The Contractor shall be responsible for determining the exact location, including service connections, of all public and private underground utilities marked at the site of the Work. The Contractor shall perform field verification prior to beginning Work that could result in damage to buried utilities, including but not limited to exploratory excavations, in

sufficient time so as not to impede the progress of the Work or fabrication of materials to be incorporated into the Work. The Contractor shall immediately notify the City's Representative as to any utility discovered by him in a different position than shown on the Plans or that is not shown on the Plans.

No excavation shall begin until all known underground public and private utilities in the vicinity of the excavation area have been located and marked.

Utilities of record are shown on the Plans insofar as it is possible to do so. Failure of the City to show the existence of subsurface objects or installation on the Plans shall not relieve the Contractor from its responsibility to make an independent check on the ground, nor relieve Contractor from all liability for damages resulting from its operations.

It shall be entirely the responsibility of the Contractor to give proper notification to the agencies that have utilities in place and to coordinate with these agencies in the protection and relocation of the various underground installations. These agencies will give assistance in the location of the various utilities, but this shall not relieve the Contractor from responsibility for any damage incurred. The City shall require a notification of at least five working days. The Contractor shall hold the City harmless against any claim of any nature resulting from Delays in attending to same.

Following are addresses and telephone numbers of utilities in the Everett area for the Contractor's convenience as of October 1, 2024:

Snohomish County PUD #1	Puget Sound Energy
2320 California Street	3630 Railway Ave
Everett, Washington 98206	Everett, WA 98201
Email: relocations@snopud.com	Attn: Mardy Punteney
	Tel. (425) 754-8053
Zipty Fiber Headquarters	Email: Mardy.Punteney@pse.com
PO Box 1127	
Everett, Washington 98206	Lumen Network
Attn: Samantha Johnston	1208 NE 64th Street
Tel. (208) 810-5640	Seattle, WA 98115-6722
Email: Samantha.Johnston1@zipty.com	relocations@lumen.com
	Construction Contact:
Silver Lake Water District	Tel. (253) 337-1604
15205 41st Ave SE	Email: Alec.Haggerty@lumen.com
Bothell, Washington 98012-6114	
Attn: Scott Smith	City of Everett, Storm Water
Tel. (425) 337-3647 Ext 216	3200 Cedar Street
Email: SSmith@slwsd.com	Everett, Washington 98201
	Attn: Heather Griffin
Mukilteo Water & Wastewater District	Tel. (425) 257-7206
7824 Mukilteo Speedway	Email: Stormwater@everettwa.gov
Mukilteo, Washington 98275	
Attn: Rick Matthews	City of Everett, Water
Tel. (425) 355-3355	Public Works Department
Email: RickM@mukilteowwd.org	3200 Cedar Street
	Everett, Washington 98201
Alderwood Water & Wastewater District	Attn: Ryan Bigley
15204 35 th Ave W	Tel. (425) 257-7213

Lynnwood, Washington 98087	Email: rbigley@everettwa.gov
Attn: Tyler Gardner	
Tel. (425) 787-0250	City of Everett, Sanitary Sewer
Email: TylerG@awwd.com	Public Works Department
	3200 Cedar Street
Xfinity/Comcast	Everett, Washington 98201
2631 Walnut Street	Attn: Grant Moen
Everett, Washington 98203	Tel. (425) 257-8947
Attn: Casey Brown	Email: Gmoen@everettwa.gov
Tel. (425) 754-0064	
Email: Casey.Brown2@comcast.com	
Cogent Communications	City of Everett, Traffic
32275 32nd Ave St	Public Works Department
Federal Way, WA 98001	3200 Cedar Street
Ross Buell	Everett, Washington 98201
Email: Rbuell@cogentco.com	Attn: Corey Hert
	Tel. (425) 257-8887

Wave Broadband/Astound	Email: CHert@everettwa.gov
4766 1st Ave S	
Seattle, WA 98134	Verizon
Jeremy Anderson	Brad Landis
(425) 319-0216	(425) 229-3123
jeremy.anderson@wavebroadband.com	1-800-483-1000 (emergency)
Jim Biggs	Email: Brad.landis@verizon.com
(206) 786-8720	
Jim.Biggs@astound.com	

1-07.17(1) Utility Construction, Removal or Relocation by Contractor

Delete all three paragraphs of 1-07.17(1) and substitute the following:

If the Work requires removing or relocating a utility, utility owners or their contractors will furnish all work necessary to adjust, relocate, replace, or construct their facilities.

1-07.17(2) Utility Construction, Removal or Relocation by Others

Revise the first paragraph of 1-07.17(2) as follows:

Any authorized agent of the City or utility owners may enter the City right-of-way or easement to repair, rearrange, alter, or connect their equipment. The Contractor shall cooperate with such effort and shall avoid creating delays or hindrances to those doing the Work. The Contractor shall arrange to coordinate work schedules as needed.

Potholing

Potholing is included as a bid item for use in determining the location of existing utilities and other below grade features in advance of the Contractor's operations. The Contractor shall submit all potholing requests to the Engineer for approval, at least 2 working days before potholing is scheduled. Additionally, the Contractor shall provide potholing at Engineer's request.

The Contractor shall pothole ahead of excavation operations noting the depth, location, size and material of the underground utilities and other below grade features exposed.

The locations of potholing shall be marked with surface paint and a PK nail noting pothole number.

Any necessary design modifications resulting from potholing shall be returned to the Contractor within 5 working days and shall constitute no basis for a claim of delay.

In no way shall the work described under Utility Potholing relieve Contractor of any of the responsibilities described in Section 1-07.17 of the Standard Specifications and Special Provisions, and elsewhere in the Contract Documents.

1-07.18 Public Liability and Property Damage Insurance

Delete 1-07.18 and substitute the following:

1-07.18 Insurance

(*****)

1-07.18(1) General Requirements

- A. The Contractor shall obtain the insurance described in this section from insurers approved by the State Insurance Commissioner pursuant to RCW Title 48. The insurance shall be provided by an insurer with a rating of A-: VII or higher in the A.M. Best's Key Rating Guide, that is licensed to do business in the state of Washington, or issued as a surplus line by a Washington Surplus lines broker. The City reserves the right to approve or reject the insurance provided, based on the insurer (including financial condition), terms and coverage, the Certificate of Insurance, and endorsements.
- B. The Contractor shall keep this insurance in force during the term of the Contract and for 30 calendar days after the Physical Completion date, unless otherwise indicated in 1-07.18(1)C of this section.
- C. If any insurance policy is written on a claims made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract. The policy shall state that coverage is claims made, and state the retroactive date. Claims-made form coverage shall be maintained by the Contractor for a minimum of 36 months following the Final Completion or earlier termination of this Contract, and the Contractor shall annually provide the City with proof of renewal. If renewal of the claims made form of coverage becomes unavailable, or economically prohibitive, the Contractor shall purchase an extended reporting period, "tail", or execute another form of guarantee acceptable to the City to assure financial responsibility for liability for services performed.
- D. The insurance policies shall contain a "cross liability" provision.
- E. The Contractor's and all subcontractors' insurance coverage shall be primary and non-contributory insurance as respects the City's insurance, self-insurance, or insurance pool coverage.
- F. All insurance policies and Certificates of Insurance shall include a requirement providing for a minimum of 30 days prior written notice to the City of any cancellation in any insurance policy.
- G. Upon request, the Contractor shall forward to the City a full and certified copy of the insurance policy(s). The Contractor shall not begin Work under the Contract until the required insurance has been obtained and approved by the City.

- H. Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of Contract, upon which the City may, after giving five business days notice to the Contractor to correct the breach, immediately terminate the Contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the City on demand, or at the sole discretion of the City, offset against funds due the Contractor from the City.
- I. All costs for insurance shall be included in the unit or lump sum prices of the Contract and no additional payment will be made.
- J. The Contractor waives all rights against the City and its separate contractors, and their agents and employees, for damages caused by fire or other perils to the extent such damage cost is actually paid by property insurance applicable to the Work. The Contractor shall require similar waivers from all Subcontractors.
- K. The City may utilize third-party contractor(s), software and/or websites for uploading and verification of the Contractor's insurance. The Contractor will provide (by upload or otherwise as directed by the City) insurance information and documentation as may be required by such third-party. No statement on a third-party website (such as a Trustlayer) that a requirement is "waived" or "overridden" is a waiver of Contractor's obligations to fulfill the requirements of this Section.

1-07.18(2) Additional Insured

All insurance policies, with the exception of Professional Liability and Workers Compensation, shall name the following listed entities as additional insured(s):

- ♦ The City and its elected officials, officers, employees, agents, and volunteers

The above-listed persons shall be additional insured(s) for the full available limits of liability maintained by the Contractor, whether primary, excess, contingent or otherwise, irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract, and irrespective of whether the Certificate of Insurance provided by the Contractor pursuant to 1-07.18(4) of this section describes limits lower than those maintained by the Contractor.

1-07.18(3) Subcontractors

Contractor shall ensure that each Subcontractor of every tier obtains and maintains at a minimum the insurance coverages listed in 1-07.18(5)A and 1-07.18(5)B of this section. Upon request of the City, the Contractor shall provide evidence of such insurance as required in 1-07.18(4).

1-07.18(4) Evidence of Insurance

The Contractor shall deliver to the City a Certificate(s) of Insurance and endorsements for each policy of insurance meeting the requirements set forth herein when the Contractor delivers the signed Contract for the Work. The certificate and endorsements shall conform to the following requirements:

An ACORD certificate or a form determined by the City to be equivalent.

The Description of Operations in the certificate must read as: "All policies of insurance, except workers compensation, are endorsed to name the City of Everett, its elected officials, officers, employees, agents, and volunteers as additional insured(s). All such insurance is primary as respects the City of Everett, and any other insurance maintained

by the City of Everett is excess and not contributing. The City of Everett will be given at least thirty (30) days prior written notice of any cancellation, non-renewal, or other material change in any insurance policy.”

Copies of all endorsements naming City and all other entities listed in 1-07.18(2) of this section as Additional Insured(s), showing the policy number. The Contractor may submit a copy of a blanket additional insured clause from its policies instead of a separate endorsement. A statement of additional insured status on an ACORD Certificate of Insurance shall not satisfy this requirement.

Other amendatory endorsements to show the coverage required herein.

1-07.18(5) Coverages and Limits

The insurance shall provide the minimum coverages and limits set forth below. Providing coverage in these stated minimum limits shall not be construed to relieve the Contractor from liability in excess of such limits. All deductibles and self-insured retentions shall be disclosed and are subject to approval by the City. The cost of any claim payments falling within the deductible shall be the responsibility of the Contractor.

1-07.18(5)A Commercial General Liability

A policy of Commercial General Liability Insurance, including:

- Per project aggregate
- Premises/Operations Liability
- Products/Completed Operations – for a period of one year following final acceptance of the Work.
- Personal/Advertising Injury
- Contractual Liability
- Independent Contractors Liability
- Stop Gap / Employers' Liability
- Explosion, Collapse, or Underground Property Damage (XCU)
- Blasting (only required when the Contractor's work under this Contract includes exposures to which this specified coverage responds)

Such policy must provide the following minimum limits:

\$2,000,000	Each Occurrence
\$5,000,000	General Aggregate
\$2,000,000	Products & Completed Operations Aggregate
\$2,000,000	Personal & Advertising Injury, each offence

Stop Gap / Employers' Liability

\$1,000,000	Each Accident
\$1,000,000	Disease - Policy Limit
\$1,000,000	Disease - Each Employee

1-07.18(5)B Automobile Liability

Automobile Liability for owned, non-owned, hired, and leased vehicles, with an MCS 90 endorsement and a CA 9948 endorsement attached if “pollutants” are to be transported. Such policy(ies) shall provide the following minimum limit:

\$1,000,000	combined single limit
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1-07.18(5)C Workers' Compensation

The Contractor shall comply with Workers' Compensation coverage as required by the Industrial Insurance laws of the state of Washington.

1-07.18(5)D Coverage for Working On, Over, or Near Navigable Waters

If this Contract involves Work on or adjacent to navigable water, as defined by the U.S. Department of Labor, then the Contractor shall provide proof of insurance coverage in compliance with the statutory requirements of the U.S. Longshore and Harbor Workers' Compensation Act as administered by the U.S. Department of Labor.

If the Contractor is working from barges or any other watercraft, owned or non-owned, the Contractor shall maintain Protection and Indemnity (P&I) insurance providing coverage for actions of the crew to third parties to the same limits stated under 1-07.18(5)A of this section for Commercial General Liability Insurance. The Contractor shall also provide proof of insurance coverage in compliance with the statutory requirements of the Merchant Marine Act of 1920 (the "Jones Act").

1-07.18(5)E Excess or Umbrella Liability

The limits stated in this section 1-07.18 may be satisfied by a combination of liability and, if necessary, commercial umbrella/excess policies.

1-07.18(5)F Pollution Liability

The Contractor shall provide a Pollution Liability policy, providing coverage for claims involving bodily injury, property damage (including loss of use of tangible property that has not been physically injured), cleanup costs, remediation, disposal or other handling of pollutants, including costs and expenses incurred in the investigation, defense, or settlement of claims arising out of:

Contractor's operations related to this project;

Remediation, abatement, repair, maintenance or other work with lead-based paint or materials containing asbestos; and

Transportation of hazardous materials away from any site related to this project.

Such Pollution Liability policy shall provide the following minimum coverage:

\$2,000,000	each loss and annual aggregate
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1-07.18(5)G Professional Liability

The Contractor, its Subcontractor and its design consultant providing construction management, value engineering, or other design-related non-construction professional services shall provide evidence of Professional Liability insurance covering professional errors and omissions. Such policy shall provide the following minimum limits:

\$2,000,000	per Claim
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If the scope of such design-related professional services includes work related to pollution conditions, the Professional Liability insurance shall include Pollution Liability coverage.

If insurance is on a claims made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract.

1-07.18(5)H Builder's Risk

If the Project includes construction of a structure, the Contractor shall procure and maintain during the life of the Contract, or until acceptance of the project by the City, whichever is longer, "All Risk" Builders Risk or Installation Floater Insurance at least as broad as ISO form number CP0020 (Builders Risk Coverage Form) with ISO form number CP0030 (Causes of Loss – Special Form) including coverage for collapse, theft, off-site storage and property in transit. The coverage shall insure for direct physical loss to property of the entire construction project, for 100% of the replacement value thereof and include earthquake. The policy shall be endorsed to cover the interests, as they may appear, of the City, Contractor and subcontractors of all tiers with the City and sub-contractors listed as a Named Insured. In the event of a loss to any or all of the work and/or materials therein and/or to be provided at any time prior to the final close-out of the Contract and acceptance of the project by the City, the Contractor shall promptly reconstruct, repair, replace or restore all work and/or materials so destroyed. Nothing herein provided for shall in any way excuse the Contractor or its surety from the obligation of furnishing all the required materials and completing the work in full compliance with the terms of the Contract.

1-07.20 Patented Devices, Materials, and Processes

Delete the first paragraph of 1-07.20 and substitute the following:

The Contractor shall assume all costs arising from the use of patented devices, materials, or processes used on or incorporated in the Work, and agrees to indemnify, defend, and save harmless the City, and its officers, employees and agents from all actions of any nature for, or on account of the use of any patented devices, materials, or processes.

1-07.23 Public Convenience and Safety

Delete the last sentence of the first paragraph of 1-07.23 and substitute the following:

Nothing contained in this Contract is intended to create any third-party beneficiary rights in favor of the public or any individual utilizing the facilities being constructed or improved under this Contract.

1-07.23(1) Construction Under Traffic

Revise the third sentence of the second paragraph to read as follows:

Do NOT impair accessibility to existing or temporary pedestrian push buttons. City may allow activating pedestrian recall timing or other accommodations during construction.

Supplement 1-07.23(1) by adding the following:

If Engineer determines the permitted closure hours adversely affect traffic, the Engineer may adjust the hours accordingly. The Engineer will notify the Contractor in writing of any change in the closure hours.

No lane closures will be allowed on a holiday or holiday weekend, or after 12:00 p.m. on a day prior to a holiday or holiday weekend. A holiday weekend is defined as having a holiday fall on Friday, Saturday, Sunday or Monday.

Contractor shall provide a uniformed off-duty Police Officer to control traffic in critical situations as determined by the Engineer. The uniformed officer shall be paid under contract item "Traffic Control – Off-Duty Police Officer."

Contractor shall notify the local Fire, Police and Engineering Departments before the beginning of each phase of construction so that these agencies may re-route their emergency vehicles around the construction zone. The non-emergency phone number for Everett Police is 258-2484, for Fire Dispatch is 257-8757, and for Public Works Engineering is 257-8800.

Contractor shall notify City of Everett Transit at 425-257-8984 and Community Transit at 425-348-7100 of all street closures or delays at least 24 hours in advance to enable rerouting of buses.

Contractor shall notify the property owners at least 72 hours in advance to enable them to remove vehicles parked in the vicinity of Work. Towing vehicles shall be the responsibility of the Contractor and no additional payment will be made.

Further supplement 1-07.23(1) by adding the following:

1-07.23(1)A General Requirements Traffic

(*****)

The following general requirements apply to all Work on the Project:

Prepare and submit to Engineer a Traffic Control Plan in accordance with 1-10.2(2) TRAFFIC CONTROL PLANS.

Refer to 1-08.4(2) SPECIAL CONSTRUCTION CONSTRAINTS regarding construction constraints resulting from traffic control.

Notify all affected property owners prior to commencing the barricading of streets, sidewalks and driveways.

All business driveways shall remain open except as necessary to permit curing of construction materials or for short periods of time as required for excavations. However, at least one driveway per business shall remain open to vehicular traffic at all times unless otherwise approved by the Engineer and affected property owner in writing.

Signs and barricades shall be supplemented by lanterns or flasher units during the hours of darkness.

Drivers of motor vehicles used in connection with the construction shall obey traffic rules posted for such location in the same manner and under the same restrictions as provided for the drivers of private vehicles.

Conduct the Work, at all time throughout the project, in such a manner as will obstruct and inconvenience vehicular and pedestrian traffic as little as possible. Keep the streets, sidewalks and private driveways open except for the brief periods when actual Work is being done.

No lane closures will be permitted between 3:30 p.m. and 6:00 p.m., unless specifically approved by the Engineer.

1-07.23(3) Work Zone Clear Zone

Delete 1-07.23(3) in its entirety.

1-07.24 Rights of Way

Delete 1-07.24 and substitute the following:

Street right of way lines, limits of easements, and limits of construction permits are indicated on the Plans. The Contractor's construction activities shall be confined within these limits, unless arrangements for use of private property are made.

Generally, the City will have obtained, prior to bid opening, all rights of way and easements, both permanent and temporary, necessary for carrying out the Work. Exceptions to this are noted on the Plans.

Whenever any of the Work is accomplished on or through property other than public right of way, the Contractor shall meet and fulfill all covenants and stipulations of any easement agreement obtained by the City from the owner of the private property. Copies of the easement agreements may be included in the Contract Documents or made available to the Contractor as soon as practical after they have been obtained by the Engineer.

The Contractor shall not proceed with any portion of the Work in areas where right of way, easements or rights of entry have not been acquired until the Engineer certifies to the Contractor that the right of way or easement is available or that the right of entry has been received. If the Contractor is delayed due to acts of omission on the part of the City in obtaining easements, rights of entry or right of way, the Contractor will be entitled to an extension of time. The Contractor agrees that Delay resulting from City obtaining easement or right of entry or right of way shall not be a breach of Contract.

Each property owner shall be given 48 hours notice prior to entry by the Contractor. This includes entry onto easements and private property where private improvements must be adjusted.

The Contractor shall be responsible for providing, without expense or liability to the City, any additional land and access thereto that the Contractor may desire for temporary construction facilities, storage of materials, or other Contractor needs. However, before using any private property, whether adjoining the Work or not, the Contractor shall file with the Engineer a written permission of the private property owner, and, upon vacating the premises, a written release from the property owner of each property disturbed or otherwise interfered with by reasons of construction pursued under this Contract. The statement shall be signed by the private property owner, or proper authority acting for the owner of the private property affected, stating that permission has been granted to use the property and all necessary permits have been obtained or, in the case of a release, that the restoration of the property has been satisfactorily accomplished. The statement shall include the parcel number, address, and date of signature. Written releases shall be filed with the Engineer before the Completion Date will be established.

1-07.27 No Waiver of State's Legal Rights

Delete 1-07.27 and substitute the following:

1-07.27 No Waiver of City's Legal Rights

(***)**

The City shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the Work and payment therefor from showing the true amount and character of the Work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate, or certificate is untrue or incorrectly made, or that the Work or materials do not conform in fact to the Contract. The City shall not be precluded or estopped, notwithstanding any such measurement, estimate, or certificate, and payment in accordance therewith, from recovering from the Contractor and the Sureties such damages as it may sustain by reason

of the Contractor's failure to comply with the terms of the Contract. Neither the acceptance by the Engineer nor any payment for the whole or any part of the Work, nor any extension of time, nor any possession taken by the City shall operate as a waiver of any portion of the Contract or of any power herein reserved or any right to damages herein provided, or bar recovery of any money wrongfully or erroneously paid to the Contractor. A waiver of any breach of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor and the City recognize that the impact of overcharges to the City by the Contractor resulting from antitrust law violations by the Contractor's suppliers or Subcontractors adversely affects the City rather than the Contractor. Therefore, the Contractor agrees to assign to the City all claims for such overcharges.

1-08 PROSECUTION AND PROGRESS

Supplement Section 1-08 by adding the following:

1-08.0 Preliminary Matters

1-08.0(1) Preconstruction Conference

Prior to the Contractor beginning the Work, a preconstruction conference will be held between the Contractor, the Engineer and such other interested parties as may be invited. The purpose of the preconstruction conference will be:

1. To review the initial progress schedule;
2. To establish a working understanding among the various parties associated or affected by the Work;
3. To establish and review, at a minimum, procedures for progress payment, notifications, approvals, and submittals;
4. To establish normal working hours for the Work;
5. To review safety standards and traffic control; and
6. To discuss such other related items as may be pertinent to the Work.

The Contractor shall prepare and submit at the preconstruction meeting the following:

1. A Schedule of Values of all lump sum items;
2. A preliminary schedule of working drawing submittals; and
3. A list of material sources for approval if applicable.

1-08.0(2) Hours of Work

Except in the case of emergency or unless otherwise required by 1-07.23(1) or otherwise noted and approved by the City within these Special Provisions, the normal straight time working hours for the Contract shall be any consecutive 8-hour period between 7:00 a.m. and 6:00 p.m. of a working day with a maximum 1-hour lunch break and a 5-day work week. Should Contractor elect to work on a holiday or weekend, those normal working hours shall be from 9:00 a.m. to 6:00 p.m. The normal straight time 8-hour working period for the Contract shall be established at the preconstruction conference or prior to the Contractor commencing the Work.

When connecting to existing water mains and services are required, the City will obtain all necessary permissions and the normal hours of work shall be any consecutive 8-hour period between 6:00 p.m. and 7:00 a.m. Refer to 7-09.3(19)A regarding night or weekend connection work time requirements.

If a Contractor is required to or desires to perform Work on holidays, weekends, or before 7:00 a.m. or after 10:00 p.m. on any weekday, the Contractor shall apply in

writing to the Engineer for permission to work such times. Permission to work longer than an 8-hour period between 7:00 a.m. and 6:00 p.m. is not required. Such requests shall be submitted to the Engineer no later than noon on the working day prior to the day for which the Contractor is requesting permission to work, unless a noise variance will be required. In such case provide request a minimum of 30 days prior to performing the work in accordance with 1-07.1(7) NOISE.

Permission to work Saturdays, Sundays, holidays or other than the agreed upon normal straight time working hours Monday through Friday may be given subject to certain other conditions set forth by the City or Engineer. These conditions may include, and not be limited to; requiring the Contractor to reimburse the City for the costs in excess of straight-time costs for City employees and necessary assistants who worked during such times, on non-Federal aid projects. Assistants may include, and are not limited to, survey crews; personnel from the City's material testing lab; inspectors; and other City employees when in the opinion of the Engineer, such work necessitates their presence. The work performed on Saturdays, Sundays, and holidays will be considered as working days with regards to the Contract Time; and considering multiple work shifts as multiple working days with respect to Contract Time even though the multiple shifts occur in a single 24-hour period.

1-08.0(3) Reimbursement for Overtime Work of City Employees and Assistants

Where the Contractor elects to work on a Saturday, Sunday, or holiday, or longer than an 8-hour work shift on a regular working day, as defined in the Standard Specifications, such work shall be considered as overtime work. On all such overtime work an inspector will be present, and a survey crew may be required at the discretion of the Engineer. If such work is the result of Contractor's inability to complete work or coordinate materials, equipment and labor in accordance with agreed schedule, then the City may deduct from amounts due or to become due to the Contractor for the costs in excess of the straight-time costs for employees and assistants of the City required to work overtime hours.

The Contractor by these specifications does hereby authorize the Engineer to deduct such costs from the amount due or to become due to the Contractor.

1-08.1 Subcontracting

Delete 1-08.1(7)A Payment Certification and substitute the following:

On all projects funded only with City funds, the Contractor shall certify to the actual amounts paid Disadvantaged, Minority, or Women's Business Enterprise firms that were used as subcontractors, lower tier subcontractors, manufacturers, regular dealers, or service providers on the Contract. This certification shall be submitted to the Engineer on WSDOT form 140-542 within 20 calendar days after physical completion of the Contract.

Supplement 1-08.1 by adding the following:

The Contract Documents shall apply to Subcontractors and suppliers as if each had signed the Contract with the City. Contractor shall include the provisions of these Contract Documents or a "flow down" clause in each contract with Subcontractors and suppliers.

The City will not approve a Subcontractor that is also providing services to the City on the same project.

In addition to any other requirement in this Section, no Subcontractor or lower tier subcontractor will be permitted to perform Work under the Contract until the following documents have been completed and submitted to the Engineer:

1. Request to Sublet Work (Form 421-012), and
2. Contractor and Subcontractor or Lower Tier Subcontractor Certification for Federal-aid Projects (Form 420-004).

The Contractor's records pertaining to the requirements of this Special Provision shall be open to inspection or audit by representatives of the City during the life of the Contract and for a period of not less than three years after the date of acceptance of the Contract. The Contractor shall retain these records for that period. The Contractor shall also guarantee that these records of all Subcontractors and lower tier subcontractors shall be available and open to similar inspection or audit for the same time period.

In addition to any other requirement in this Section, Contractor shall not sublet to a single Subcontractor more than one-half of the Project. The City may refuse to approve any subcontract for any reason. Subcontractors will be considered agents of the Contractor and their work shall be subject to the provisions of the Contract. References in the Contract Documents to actions required of Subcontractors, manufacturers, suppliers, or any person other than the Contractor, the City or the City's Representative shall be interpreted as requiring that the Contractor shall require such Subcontractor, manufacturer, supplier or person to perform the specified action.

1-08.3 Progress Schedule

1-08.3(1) General Requirements

Delete 1-08.3(1) and substitute the following:

1-08.3(1) General

(*****)

Because time is of the essence, diligent and expeditious progress and completion of the Work by the Contract Completion Date is required of the Contractor. Careful, adequate, accurate and complete planning and scheduling of the Work by the Contractor, both prior to the start of, and throughout, construction, is vital to the success of this Project for both the Contractor and the City. The purposes of the schedules and reports include:

1. Ensuring adequate planning and execution of the Work by the Contractor.
2. Assisting the City or its representative in monitoring construction.
3. Assessing the impact of any actual, potential or proposed change, including, but not limited to, the financial impact resulting from schedule changes and changes to the scope of Work.
4. Supporting the basis for construction payments.
5. Planning by City and tenants.
6. Avoiding additional or extra costs or expenses to the City.

All schedules will be reviewed by the City and the City's Representative. The City or City's Representative's review of any schedule shall not transfer the Contractor's responsibilities to the City. Review shall not constitute approval or acceptance of the Contractor's construction means, methods, sequencing, logic, order, precedence and succession of activities or Contractor's ability to complete the Work in a timely manner. Any mistakes or errors in any schedule, including, but not limited to, mistakes or errors of logic, order, precedence, and duration, are and remain the Contractor's. The City or City's Representative may, however, comment upon the schedule. The Contractor remains wholly responsible for completing the Work within the Contract duration. Any

comments by City or City's Representative personnel regarding the schedule shall not be construed as approval or ratification, nor shall the Contractor incorporate or change its schedule as a result of City or City's Representative comments in the absence of an express written directive to that effect.

Contractor shall submit, update and maintain schedules as required by the Contract Documents.

The Contractor shall provide sufficient material, equipment, and labor to meet the interim milestones, Substantial Completion, Physical Completion and Completion Dates provided by the Contract Documents. The City allocates its resources to a Contract based on the total time allowed in the Contract. The Contractor may submit a schedule indicating Completion Date earlier than the end of Contract Time, but City cannot guarantee its resources will be available to meet such schedule. City shall not pay or be liable for any additional compensation if the Contractor is not able to meet a schedule that indicates a Completion Date earlier than the end of Contract Time.

Failure to schedule City furnished or installed materials and Equipment for installation on or after its planned arrival pursuant to the City's Contract with the supplier or failure to notify the City in writing of tasks dependent upon the fact or date of arrival of such City furnished materials and Equipment, constitute a waiver by Contractor of any Contract Claim arising out of or related to the timeliness of the furnishing or installation of such material and Equipment. All schedules shall allow for timely incorporation of any other's work under separate contract with City and for timely incorporation of any work provided and installed by City. Unless otherwise expressly authorized in writing by the City's Representative, the Contractor shall integrate the schedules with the Schedule of Values and unit price items so that each construction activity is represented by a dollar value.

Float in a progress schedule belongs to the City.

Subcontractors shall review all schedules prior to submission to the City and City's Representative. At the City's option and sole discretion, City may require Contractor to obtain written acceptance of each schedule by Subcontractors as practical and feasible, as the schedule relates to Subcontractors' work.

Contractor shall not schedule any activity with an unrealistic, unduly long, or unduly short duration. Contractor shall use its best efforts in good faith to set reasonable durations for all activities. Contractor shall not attempt to "grab the Float" or make an effort to use Float in the Progress Schedule for the benefit of the Contractor, rather than the benefit of the Project. Contractor shall use its best efforts in good faith to minimize dependencies, minimize the number of critical paths, and schedule the Project to be complete as expeditiously as reasonably possible.

Contractor shall submit with each application for payment or progress pay estimate an updated progress schedule, but no less often than monthly. If requested by the City's Representative or the City, Contractor shall prepare and submit updated progress schedules from time to time that may be more frequent than monthly.

The Contractor hereby expressly agrees and acknowledges that any failure by Contractor to provide accurate, complete, current and updated schedules at least monthly constitutes a waiver of any and all claims or requests for adjustment of Contract Sum or Time that arise out of, result from, or are caused by, any Delay on the Project or scheduling of the Work. Timely submission of updated schedules at least monthly is a condition precedent to any later or subsequent Contract Claim or request for an adjustment of either Contract Sum or Time related to or arising out of time, an alleged Delay, or the schedule or sequence of Work. Similarly, the parties agree the City may

withhold progress pay estimates if updated schedules are not timely submitted monthly. These remedies are cumulative and not exclusive of other remedy. The City's use of one or more of these remedies does not constitute an election or prevent the City from pursuing other remedies for this or other defaults.

No later than the pre-construction conference, Contractor shall submit a preliminary schedule ("Preliminary Schedule") for the entire Work to City's Representative and City. Contractor shall prepare such schedule in consultation with its Subcontractors.

1-08.3(2) Project Schedule Types

Delete 1-08.3(2), including its subsections, and substitute the following:

1-08.3(2) Project Schedule Requirements For Contracts Exceeding \$500,000

(*****)

1-08.3(2)A Scheduler

Contractor represents and warrants that it employs, or will engage prior to preparation of the Preliminary Schedule, a qualified scheduler. A "qualified scheduler" is a person who has at least five years of full time, construction project scheduling experience, who is familiar, competent and professional in creating, maintaining and updating time scaled and resource loaded critical path schedules. Contractor shall submit to the City the name, address, and qualifications of the qualified scheduler to the City for approval no later than the pre-construction conference.

1-08.3(2)B Baseline Schedule

The progress schedule submitted to the City's Representative and City after their review of the Preliminary Schedule shall be the Baseline Schedule. The Baseline Schedule shall be the baseline schedule against which all future schedules are compared and updated, and job progress is measured. The Baseline Schedule shall not be reset or changed without the written agreement of City's Representative and City.

1-08.3(2)C Updates

Contractor shall submit with each application for payment or progress pay estimate an updated progress schedule, but no less often than monthly. If requested by City's Representative or the City, Contractor shall prepare and submit updated progress schedules from time to time, which may be more frequent than monthly.

An updated progress schedule shall identify progress of the Project or Work to the date of submission. It shall include, but not be limited to: (1) identification of all actual start and completion dates occurring prior to the submission of the schedule; (2) comparison of actual start and completion dates to the planned start and completion dates shown on the Baseline Schedule; and (3) comparison of expected start and completion dates for work to occur after submission updated progress schedule to the planned start and completion dates shown on the Baseline Schedule. Work remaining to be completed at the end of a period for an activity should show the remaining duration required to complete that activity. The percent complete for that activity should also be shown. If during the course of construction the Contractor desires or feels it necessary to make changes in the schedule logic, these changes should be identified, highlighted, and specifically and expressly brought to the attention of the City's Representative and City along with the schedule update.

An updated progress schedule shall show changes occurring since submission of the previous updated progress schedule such as:

1. Major changes in scope;
2. Activities modified since previous submission;
3. Revised projection for construction completion, as applicable; and
4. Any other changes.

Contractor shall submit an updated progress schedule for review by the City and City's Representative, at the weekly construction meeting or as otherwise as requested by City's Representative or City. Any deviation from the Baseline Schedule shall be explained by the Contractor, including the cause and effect of the deviation. Contractor shall state in writing the corrective measures it will take to bring the progress of the Work back in line with the Baseline Schedule.

Once an actual start or completion date is stated in a submitted progress schedule, Contractor shall not change schedule without prior written agreement of the City and City's Representative.

With each submitted updated progress schedule, Contractor shall provide a written narrative report that identifies anticipated or actual deviations from the Baseline Schedule, causes of the deviations, and the impact of the deviations on the schedule and describes the corrective action taken or proposed, and its effect.

1-08.3(3) Schedule Updates

Delete 1-08.3(3) and substitute the following:

1-08.3(3) Schedule Format And Content (***)**

1-08.3(3)A Schedule Format

All schedules shall be in the following form:

1. Network analysis system using the current version of Microsoft Project software (or other software acceptable to the City Representative) and the critical path method, as outlined in The Associated General Contractors of America (AGC) publication "The Use of CPM in Construction A Manual for General Contractors."
2. Sequence of Listings: The chronological order of the start of each activity of Work. Listings on Progress Schedule and Schedule of Values shall be the same.
3. Scale and Spacing: To provide space for notations and revisions.
4. Each schedule and update shall be provided in three (3) paper copies and one electronic copy in current Microsoft Project format (or other format acceptable to the City Representative). Paper copies shall be on a single sheet of paper and of sufficient size to allow legibility of schedule. Pieces of the schedule on separate sheets of paper that must be taped together to form schedule are not permitted. Electronic copies shall be submitted on either separate CD-ROMs or as email attachment to City's Representative or as otherwise acceptable to the City Representative.
5. Updated Progress Schedules shall indicate progress of the Work to the date of submission by drawing a vertical line down the schedule to represent Work completed to date.

1-08.3(3)B Schedule Contents

All Progress Schedules shall:

1. Include essential sub schedules of related activities.
2. Allow for timely incorporation of any other's work under separate contract with City.
3. Allow for timely incorporation of work provided and installed by City.
4. Include submittals to agencies required for performance of Work with sufficient, adequate and reasonable time for review, comment and return submittals.
5. Allow for appropriate durations to complete activities that may be affected by weather during the time of year the activities are performed.
6. Identify logical connections, dependency upon preceding or succeeding activities, restraints or constraints, planned start and completion dates, duration, actual start and completion dates, and variances.
7. Activity durations shall not exceed twenty (20) days. The activities shall be related to early and late start, early and late finish, and Float dates.

Activities listed in the Preliminary Schedule shall be included in all subsequent schedules. No activity in the Preliminary Schedule shall be deleted without prior written consent of the Representative and City.

Contractor shall notify City's Representative and City in writing and highlight the addition of all activities to the schedule after the Preliminary Schedule.

The Baseline Schedule shall be part of the Contract.

Each activity shall be identified with a number that incorporates the Specification section number.

Activities shall be consistent and identified with the Schedule of Values (if applicable) or unit prices of the bid schedule. All elements and items in the Schedule of Values or unit prices in the bid schedule shall appear in the Progress Schedules.

Contractor shall provide sub schedules for each stage/phase of Work as required by City, City's Representative, or Subcontractor.

Contractor shall provide sub schedules to define major portions of the entire schedule. Include long lead time items for Equipment and material that requires long fabrication time. Order these well in advance of required delivery time to sequence with overall construction schedule.

Each schedule shall show accumulated percentage of completion of each activity, and total percentage of Work completed, as of the date of payment application.

Contractor shall include in each schedule as activities the submission, review, and correction of Submittals, Shop Drawings, Product Data and Samples. The schedule should show:

1. The dates for Contractor's Submittals.
2. A minimum of 14 calendar days duration for City or City's Representative's review.
3. Indicate decision data for selection of finishes.
4. Show Submittal preparation, submission, review, and breakdown at a minimum. Show individual parts of major Submittals.

Contractor shall identify any and all Work furnished by City and installed by City on the construction schedule.

1-08.3(4) Measurement

Delete 1-08.3(4)

1-08.3(5) Payment

Delete 1-08.3(5) and substitute the following:

Costs incurred in performance of this Work shall be included in the contract bid items and no direct compensation shall be paid.

1-08.4 Prosecution of Work

Delete 1-08.4 and substitute the following:

1-08.4 Notice to Proceed and Prosecution of Work

(*****)

The City will issue a Notice to Proceed after the Contract has been executed and the Contract Bonds and evidence of insurance have been approved and filed by the City. The Contractor shall not commence with the Work until the Notice to Proceed has been given by the City. The Contractor shall commence construction activities on the Project site within 14 calendar days of the Notice to Proceed Date, unless otherwise approved in writing. The Contractor shall 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 shall not relieve the Contractor of the responsibility to complete the Work within the time(s) specified in the Contract.

The City is not obligated to accept or pay for Work performed by the Contractor or be liable for any Delays, prior to delivery of the Notice to Proceed. The City's knowledge of Work being performed prior to delivery of the Notice to Proceed will not obligate the City to accept or pay for such Work. Contractor waives any and all Contract Claims for an adjustment of Contract Sum or Contract Time arising out of, or related to, Work it performs prior to receipt of the Notice to Proceed.

The City may issue partial Notices to Proceed. Contractor may seek permission in writing to perform some Work prior to issuance to the Notice to Proceed, such as shop drawings, equipment and material Submittals, or surveying and the City or City's Representative may, in its sole discretion, approve in writing such Work prior to the issuance of the Notice to Proceed.

Supplement 1-08.4 by adding the following:

1-08.4(1) Construction Progress

(*****)

The Contractor shall furnish all labor, materials, facilities and Equipment necessary to ensure the prosecution and completion of the Project within the interim milestones, Substantial Completion, Physical Completion and Completion Dates of the Contract. If Work falls seven calendar days or more behind the reviewed Preliminary Schedule, the Contractor agrees that, at its sole cost and expense, it will take all actions necessary to return the Project to the accepted schedule. These actions may include the following:

- a. Increase labor in quantities and crafts.

- b. Increase the number of working hours per shift, shifts per working day, working days per week, or the amount of Equipment, or any combination of the foregoing.
- c. Reschedule activities.

If requested by the City's Representative, the Contractor shall prepare a proposed schedule revision demonstrating a plan to make up the lag in progress and insure completion of the Work within the Contract Time. All actions taken to return the Project to the accepted schedule are at the Contractor's expense.

The Contractor shall pay all costs incurred by the City that result from the Contractor's action to return the Project to its accepted schedule, including, but not limited to, additional, overtime, or third party inspection, design and construction management service costs. Contractor agrees that City shall deduct such charges from payments due the Contractor. It is further understood and agreed that none of the services performed by the City's Representative in monitoring, reviewing and reporting Project status and progress shall relieve the Contractor of responsibility for planning and managing construction Work in conformance with the construction schedule.

1-08.5 *Time for Completion*

Delete all of 1-08.5 and substitute the following:

1-08.5(1) General

The Contractor shall complete all physical Contract Work within the number of "working days" stated in the Contract Provisions or as extended by the Engineer in accordance with Section 1-08.8. Every day will be counted as a "working day" unless it is a nonworking day or an Engineer determined unworkable day. A nonworking day is defined as a Saturday, a Sunday, a whole or half day on which the Contract specifically prohibits Work on the critical path of the Contractor's approved progress schedule, or one of these holidays: January 1, the third Monday of January, the third Monday of February, Memorial Day, June 19, July 4, Labor Day, November 11, Thanksgiving Day, the day after Thanksgiving, and Christmas Day. When any of these holidays fall on a Sunday, the following Monday shall be counted a nonworking day. When the holiday falls on a Saturday, the preceding Friday shall be counted a nonworking day. The days between December 25 and January 1 will be classified as nonworking days.

An unworkable day is defined as a half or whole day the Engineer declares to be unworkable because of weather or conditions caused by the weather that prevents satisfactory and timely performance of the Work shown on the critical path of the Contractor's approved progress schedule. Other conditions beyond the control of the Contractor may qualify for an extension of time in accordance with Section 1-08.8.

Contract Time shall begin on the effective date of the Notice to Proceed. The Contract Documents may specify another starting date for Contract Time, in which case, Contract Time will begin on the starting date the Contract Documents specify.

Each working day shall be charged to the Contract as it occurs, beginning on the effective date of the Notice to Proceed, unless otherwise provided in the Contract Documents, until the Contract Work is physically complete. Each week the Engineer will provide the Contractor a statement that shows the number of working days: (1) charged to the Contract the week before; (2) specified for the physical completion of the Contract; and (3) remaining for the physical completion of the Contract. The statement will also show the nonworking days and partial or whole day the Engineer declares as unworkable. Within 14 calendar days after the date of each statement, the Contractor

shall file a written protest of any alleged discrepancies in it. To be considered by the Engineer, the protest shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of time disputed. By not filing such detailed protest in that period, the Contractor shall be deemed as having accepted the statement as correct. If the Contractor elects to work ten hours a day and four days a week (a 4-10 schedule) and the fifth day of the week in which a 4-10 shift is worked would ordinarily be charged as a working day then the fifth day of that week will be charged as a working day whether or not the Contractor works on that day.

The Engineer will give the Contractor written notice of the Physical Completion Date for all Work the Contract requires. That date shall constitute the Physical Completion Date of the Contract, but shall not imply the City's acceptance of the Work or the Contract.

The Engineer will give the Contractor written notice of the Completion Date of the Contract after all the Contractor's obligations under the Contract have been performed by the Contractor. The following events must occur before the Completion Date can be established:

1. The physical Work on the project must be complete; and
2. The Contractor shall furnish all documentation required by the Contract and required by law, to allow the City to process final acceptance of the Contract. The following documents must be received by the Engineer prior to establishing a Completion Date:
 - a. Certified payrolls.
 - b. Material Acceptance Certification Documents.
 - c. Annual Report of Amounts Paid as MBE/WBE Participants.
 - d. Final Contractor Voucher Certification.
 - e. Copies of the approved "Affidavit of Prevailing Wages Paid" for the Contractor and all Subcontractors.
 - f. A copy of the Notice of Termination sent to the Washington State Department of Ecology (Ecology); the elapse of 30 calendar days from the date of receipt of the Notice of Termination by Ecology; and no rejection of the Notice of Termination by Ecology. This requirement will not apply if the Construction Stormwater General Permit is transferred back to the City in accordance with Section 8-01.3(16)

1-08.5(2) Substantial Completion

(*****)

When the Contractor considers the Work to be Substantially Complete and ready for its intended use, it shall give Notice to the City's Representative. The Notice shall include an itemized list of remaining incomplete Work. If the City's Representative determines the Work is not substantially complete, it will so notify the Contractor in writing, identifying the reasons for such a determination. If the City's Representative finds the Work substantially complete, it will meet with the Contractor to (1) prepare a Punch List of incomplete items of Work; (2) define the division of responsibility between City and Contractor with respect to security, operation, maintenance, heat, utilities, insurance, and warranties; and (3) describe other issues related to acceptance of the substantially completed Work.

If the City's Representative is not an employee of the City, the City's Representative will write to the City upon reaching agreement with the Contractor, certifying that the Work is substantially complete, listing the items of incomplete Work, stating the date for completion of incomplete work, defining the division of responsibilities, and setting forth any other terms related to acceptance. In such event, the City will review the City's Representative's certification that the Work is substantially complete. If the City concurs, the City will notify the Contractor in writing that the Work is accepted as substantially complete. Except for any portion(s) of Work specified for early completion or required by the City for early possession, Substantial Completion will not occur for Work until the entire Project is ready for possession and use. The acceptance Notice will include a Punch List of incomplete Work items and corrective Works, set the date for their completion and repair, describes the division of responsibility between the City and Contractor, and describe other terms of acceptance. The Contractor will acknowledge receipt of the acceptance Notice in writing, indicating acceptance of all of its terms and provisions.

Subsequent to the Substantial Completion date, the City may exclude the Contractor from the Work during such periods when construction activities might interfere with the intended operation of the Project. The City, however, shall allow the Contractor reasonable access for completion or correction of incomplete Punch List items.

1-08.5(3) Acceptance of Work
(*****)

Upon completion of the Project, including, but not limited to, record drawings, as-builts, required reports and operations and maintenance manuals, the Contractor shall so notify the City's Representative in writing. Upon receipt of the notification, the City's Representative will promptly, by personal inspection, determine the actual status of the Work in accordance with the terms of the Contract. If the City's Representative finds materials, Equipment, or workmanship that do not meet the terms of the Contract, it will prepare a Punch List of such items and submit it to the Contractor. Following completion of the corrective work by the Contractor, the City's Representative will notify the City that the Work has been completed in accordance with the Contract. The City shall make the final determination of acceptability and completion. For portions of the Project not previously accepted as substantially complete, the conditions of guarantee shall commence on the date that the City determines the Project is complete.

1-08.6 Suspension of Work

Delete 1-08.6 and substitute the following:

The Engineer may order suspension of all or any part of the Work if:

1. Unsuitable weather prevents satisfactory and timely performance of the Work; or
2. The Contractor does not comply with the Contract; or
3. It is in the public interest.

When ordered by the Engineer to suspend or resume Work, the Contractor shall do so immediately.

If the Work is suspended for reason (1) above, the period of Work stoppage will be counted as unworkable days. But if the Engineer believes the Contractor should have completed the suspended Work before the suspension, all or part of the suspension period may be counted as working days. The Engineer will set the number of

unworkable days (or parts of days) by deciding how long the suspension delayed the entire project.

If the Work is suspended for reason (2) above, the period of Work stoppage will be counted as working days. The lost Work time, however, shall not relieve the Contractor from the Contract responsibility.

If the performance of all or any part of the Work is suspended, delayed, or interrupted for an unreasonable period of time by an act of the City in the administration of the Contract, or by failure to act within the time specified in the Contract (or if no time is specified, within a reasonable time), the Engineer will make an adjustment for increases in the cost or time for the performance of the Contract (excluding profit) necessarily caused by the suspension, delay, or interruption. However, no adjustment will be made for suspensions, delays, or interruptions if (1) the performance would have been suspended, delayed, or interrupted by other causes, including the fault or negligence of the Contractor, or (2) an equitable adjustment is provided for or excluded under another provision of the Contract.

If the Contractor believes that the performance of the Work is suspended, delayed, or interrupted for an unreasonable period of time and such suspension, delay, or interruption is the responsibility of the City, the Contractor shall immediately submit a written Notice to the Engineer within 14 calendar days of the start of the suspension delay or interruption requesting an equitable adjustment. No adjustment shall be allowed for costs incurred more than 14 calendar days before the date the Engineer receives the Contractor's written Notice. The Engineer will issue a Written Determination to the Contractor and adjust payment and time in accordance with this section, if warranted. If the Contractor does not agree with the Written Determination, then the Contractor may pursue remedies in accordance with Section 1-04.5 and Section 1-09.11. The Contractor shall keep full and complete records of the costs and additional time of such suspension, delay, or interruption and shall permit the Engineer to have access to those records and any other records as may be deemed necessary by the Engineer to assist in evaluating the Notice.

The Engineer will determine if an equitable adjustment in cost or time is due as provided in this section. The equitable adjustment for increase in costs, if due, shall be subject to the limitations provided in Section 1-09.4, provided that no profit of any kind will be allowed on increases in costs caused by the suspension, delay, or interruption.

Request for extensions of time will be evaluated in accordance with Section 1-08.8.

The Engineer's determination as to whether an adjustment should be made will be final.

By failing to follow procedures of Section 1-04.5 and Section 1-9.11, the Contractor completely waives claims for protested Work.

1-08.6(1) Suspension Procedures

(*****)

The City may, at its convenience and at any time and without cause, suspend all or any part of the Work by notice in writing to the Contractor. The Contractor will be allowed an increase in the Contract Sum or an extension of Contract Time, or both, directly attributable to any suspension in accordance with the Change Order procedures in these Special Provisions; provided, (1) the Contractor shall not be entitled to any increase to the extent caused by the Contractor and (2) Contract Sum increases and Contract Time extensions for suspension caused by Third Parties or Force Majeure Events are limited as set forth in 1-09.11A(3)D THIRD PARTY CAUSED DELAYS AND FORCE

MAJEURE. The Contractor shall resume the Work within five (5) calendar days after receiving written notice from the City to do so.

1-08.7 *Maintenance During Suspension*

Delete all of 1-08.7 and substitute the following:

Before and during any suspension (as described in Section 1-08.6) the Contractor shall protect the Work from damage or deterioration. Suspension shall not relieve the Contractor from anything the Contract requires unless this Section states otherwise.

At no expense to the City, the Contractor shall provide through the construction area a safe, smooth, and unobstructed roadway, sidewalk, and path for public use during suspension, as required in 1-07.23 PUBLIC CONVENIENCE AND SAFETY. This may require a temporary road or detour.

If the Engineer determines that the Contractor failed to pursue the Work diligently before the suspension, or failed to comply with the Contract or orders, then the Contractor shall maintain the temporary roadway, sidewalk, and path in use during suspension. In this case, the Contractor shall bear the maintenance costs. If the Contractor fails to maintain the temporary roadway, sidewalk, and path the City will do the Work and deduct all resulting costs from payments due to the Contractor.

If the Engineer determines that the Contractor has pursued the Work diligently before the suspension, then the City will maintain the temporary roadway, sidewalk, and path (and bear its cost). This City-provided maintenance work will include only routine maintenance of:

1. The Traveled Way, Auxiliary Lanes, Shoulders, detour surface, sidewalks, and paths,
2. Roadway drainage along and under the traveled Roadway, sidewalk, path or detour, and
3. All barricades, signs, and lights needed for directing traffic through the temporary Roadway, sidewalk, path or detour in the construction area.

The Contractor shall protect and maintain all other Work in areas not used by traffic. All costs associated with protecting and maintaining such Work shall be the responsibility of the Contractor except those costs associated with implementing the TESC Plan according to Section 8-01.

After suspension during which the City has done the routine maintenance, the Contractor shall accept the traveled Roadway, sidewalk, path or detour as is when Work resumes. The Contractor shall make no claim against the City for the condition of the Roadway or detour.

After any suspension, the Contractor shall resume all responsibilities the Contract assigns for the Work.

1-08.8 *Extensions of Time*

Delete the second paragraph of 1-08.8 and replace with:

In evaluating requests for time extension, the Engineer will consider how well the Contractor used the time from Contract execution up to the point of the delay and the effect the delay had on any completion times included in the Special Provisions. The Engineer will evaluate and issue a Written Determination.

Delete the final two sentences of 1-08.8 and replace with:

If the Contractor does not agree with the Engineer's Written Determination, the Contractor shall provide Notice in accordance with Section 1-04.5. By failing to follow the procedures of Section 1-04.5 and Section 1-9.11, the Contractor completely waives claims for protested Work.

Supplement 1-08.8 by adding the following:

Any requests for extensions in Contract Time, whether resulting from Extra Work directed by the City or not, shall be accompanied by an analysis of schedules using the critical path method. This analysis shall include an updated schedule, an as-planned schedule, an as-built schedule, a but-for schedule, and narrative explaining the alleged causes, schedule impacts and all costs related to or arising out of the proposed extension. Any requests for extensions of Contract Time by the Contractor shall be submitted in accordance with these Contract Documents. If a request combined with previous extension requests, equals 20 percent or more of the original Contract Time then the Contractor's letter of request must bear consent of Surety if so required by the City. Extensions of Contract Time will be granted only as provided in the Contract Documents and to the extent that affected critical activities exceed the Total Float time along the affected paths of the reviewed Preliminary Schedule at the time the change was authorized in writing by the City. Contractor has the burden of clearly and convincingly demonstrating entitlement to any adjustment of Contract Time.

If the City is solely responsible for any Delay to Substantial Completion, Physical Completion, Completion Date, or Final Acceptance, the Contractor shall only be entitled to compensation or other damages as described in 1-09.11A REMEDIES, provided that Contractor timely gave Notice pursuant to 1-04.5 NOTICE BY CONTRACTOR, timely submitted a Contract Claim pursuant to 1-09.11(2) CONTRACT CLAIMS and fulfilled the requirements of 1-08.3 PROGRESS SCHEDULE.

1-08.9 *Liquidated Damages*

Revise the second and third paragraphs of 1-08.9 to read as follows:

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 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

$$LD=0.15C/T$$

Where:

LD = liquidated damages per working day (rounded to the nearest dollar)

C = original Contract amount

T = original time for Physical Completion

When the Contract Work has progressed to Substantial Completion as defined in the Contract, the Engineer may determine that the work 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 shall 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 shall complete the remaining Work as promptly as possible. Upon request by the Project Engineer, the Contractor shall furnish a written schedule for completing the physical Work on the Contract.

1-08.10 Termination of Contract

1-08.10(1) Termination for Default

Delete all of 1-08.10(1) and substitute the following:

The City may terminate the Contract upon written notice to Contractor and its Surety whenever the Contractor is deemed to be in default or fails to fulfill, in a timely and proper manner, one or more Contract obligations, or is in violation of any provisions or covenants of the Contract. Termination shall be effective upon Contractor's and Surety's receipt of such notice

For purposes of this section, the Contractor shall be deemed to be in default upon the occurrence of one or more of the following events:

1. If Contractor is bankrupt or insolvent.
2. If Contractor makes a general assignment for the benefit of creditors.
3. If a trustee or receiver is appointed for Contractor, or for any of Contractor's property.
4. If Contractor files a petition to take advantage of any debtor's law, or to reorganize under any bankruptcy chapter or law.
5. If Contractor repeatedly fails to make prompt payments to subcontractors or others for labor, materials, or Equipment.
6. If Contractor disregards laws, ordinances, rules, regulations, or orders of public bodies having jurisdiction.
7. If Contractor disregards the authority of the City or City's Representative.
8. If Contractor substantially violates the provisions of the Contract Documents or fails, neglects, or refuses to proceed in compliance with the provisions of the Contract Documents.
9. If the Contractor made material misrepresentations to the City with respect to: (a) its qualifications or those of its subcontractors; (b) its or its subcontractors' ability to perform the Work in a timely, workmanlike manner; (c) the materials installed or to be installed; or (d) progress pay estimates.
10. If Contractor fails to supply sufficient skilled workers or suitable materials or equipment.
11. If Contractor refuses or fails to prosecute the Work with such diligence as will ensure its Physical Completion within the original Physical Completion time and any extensions of time which may have been granted to the Contractor by change order or otherwise.
12. If Contractor disregards laws, ordinances, rules, codes, regulations, orders or similar requirements of any public entity having jurisdiction.
13. If Contractor performs Work which deviates from the Contract.
14. If Contractor otherwise violates in any material way any provisions or requirements of the Contract.

After termination of the Contractor for default, the City may transfer performance of the Work to the Contractor's Surety or elect to prosecute to completion by contract or otherwise.

If the City chooses to provide such sufficiency of labor or materials as required to complete the Work, the City may exclude the Contractor from the site and take possession of the Work and all of the Contractor's tools, appliances, owned or rented construction equipment, and machinery at the site and use the same to the full extent they could be used by the Contractor. The City may incorporate in the Work all materials and Equipment stored at the site or for which the City has paid the Contractor, but which are not yet on site. In such case, the Contractor will not be entitled to receive any further payment until the Work is finished. At the City's sole option, Contractor shall assign and transfer any contractual rights to material and Equipment to be installed, incorporated, or used in the performance of the Work. City shall credit Contractor for the reasonable fair market rental value of any and all Contractor owned equipment for so long as retained and used by the City. City shall credit Contractor for all materials and supplies on site or on order, but not yet paid for by City, provided that ownership is transferred and assigned to the City and the materials and supplies conform to the requirements of the Contract Documents.

If the unpaid balance of the Contract Sum exceeds the direct and indirect cost of the completed Work, including construction management services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor shall pay the difference to the City. Such costs incurred by the City will be verified by the City's Representative and incorporated into a Change Order, but in finishing the Work, the City may negotiate for materials, Equipment and services to complete the Work and will not be required to obtain the lowest figure for Work performed.

Where the Contractor services have been so terminated by the City, the termination shall not affect rights of the City against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies due the Contractor by the City will not release the Contractor from liability.

In exercising the City's right to prosecute the Physical Completion of the Work, the City shall have the right to exercise its sole discretion as to the manner, method, and reasonableness of the costs of completing the Work. In the event that the City takes Bids for remedial Work or Physical Completion of the project, the Contractor shall not be eligible for the Award of such Contracts.

If the City terminates this agreement for default, and it is thereafter determined that the Contractor had not so failed to perform its obligations or defaulted in any way, the termination shall then be deemed to have been made for the convenience of the City pursuant to 1-08.10(2) TERMINATION FOR PUBLIC CONVENIENCE. In that event, any adjustment of Contract Sum shall be in accordance with the Contract Documents.

The Contractor covenants and agrees that in the event suit is instituted by the City for any default on the part of the Contractor and the Contractor is adjudged by court of competent jurisdiction to be in default, the Contractor shall pay to the City all costs, expenses expended or incurred by the City in connection therewith.

1-08.10(2) Termination for Public Convenience

Delete all of 1-08.10(2) and substitute the following:

Without prejudice to any other remedy it may have under law or the provisions of the Contract, or both, the City may terminate this Contract for convenience, with or without cause, in whole or in part, at any time by giving written Notice to the Contractor. Termination will be effective upon receipt of such Notice by the Contractor. The Contractor shall immediately discontinue work and take all reasonable steps with its suppliers and subcontractors to minimize cancellation charges and other costs.

In the event of termination for convenience, the Contractor shall be compensated as provided in 1-09.5 DELETED OR TERMINATED WORK. The Contractor will be entitled to no further payments whatsoever for the Work.

In the event of a breach or default by the Contractor, City may, at its sole option, terminate this Contract in whole or in part for convenience as provided herein. The City may pursue any and all contractual, legal and equitable remedies for such breach or default. Absent an express written agreement to the contrary, a termination for the City's convenience shall not be deemed a waiver or release of any rights by the City nor shall the City be estopped from any legal or equitable remedies that may be appropriate.

Supplement 1-08.10 by adding the following:

1-08.10(6) Termination by Contractor after Suspension

(*****)

If the Work has been wholly suspended pursuant to 1-08.6 SUSPENSION OF WORK for more than 90 calendar days as measured from the date of the Notice to suspend, then the Contractor may terminate this Contract by providing City with 14 calendar days' Notice that the Contractor shall deem the Contract to be terminated if the City does not provide Contractor with notice to resume Work within those 14 calendar days. Such termination shall be treated as a termination for the City's convenience pursuant to 1-08.10(2) TERMINATION FOR PUBLIC CONVENIENCE.

1-08.10(7) Contractor Obligations upon Termination

(*****)

On receipt of notice of termination, the Contractor shall immediately discontinue the Work but shall do such Extra Work as may be ordered by the City's Representative or City to safeguard the Work then completed and the materials and Equipment then delivered to the site of the Work and to leave the Work in a safe and useful condition. Payment for this Extra Work will be made in accordance with 1-09.4 EQUITABLE ADJUSTMENT.

1-08.10(8) Ownership of Materials upon Termination

(*****)

As of the termination date, whether effected by the City or Contractor as provided herein, all the Contractor's right, title, and interest in and to materials ordered by the Contractor prior to termination, whether or not they have been delivered to the site of Work, shall be vested in the City, and the Contractor shall, upon demand of the City, execute and deliver to the City all requisite bills of sale, assignments, and other documents of transfer that may be necessary to give effect to the intention of the termination procedures set forth above.

1-08.10(9) Opportunity to Cure**(*****)**

If the Contractor has not already had an opportunity to cure the default or breach the City shall specify the default or breach and may provide a reasonable period of time to allow the Contractor to cure the default or breach. The notice of termination will state the time period, if any, in which cure is permitted and other conditions as the City, in its sole judgment, shall deem appropriate. If (1) a time period is so provided and if Contractor fails to remedy the breach or default or any of the terms, covenants, or conditions of this Contract to the City's satisfaction within the time period specified or (2) no time period is provided, then the City shall have the right to terminate the Contract without any further obligation to the Contractor. Any such termination for default shall not in any way operate to preclude the City from also pursuing all available remedies against Contractor and its sureties for said breach or default.

1-08.10(10) Waiver of Remedies for Any Breach**(*****)**

In the event that the City elects to waive its remedies for any breach by Contractor or any covenant, term or condition of this Contract, such waiver by the City shall not limit the City's remedies for any succeeding breach of that or of any other term covenant, or condition of this Contract.

1-08.10(11) Possession and Use of Completed Portions of the Work**(*****)**

The City shall have the right to take possession of and use completed or partially completed portions of the Work even though the time for completing the Work for such portions may not have expired. Operations and maintenance costs of use of such work will be borne by the City. Such possession and use shall not be deemed as acceptance of the Work. If such prior possession or use increases the cost of the Work, the Contractor may be entitled to request extra compensation by giving Notice and following the procedures of 1-04.5 NOTICE BY THE CONTRACTOR and 1-09.11 DISPUTES AND CLAIMS within five calendar days of each occurrence. The Contractor shall not submit a Contract Claim for possession by the City of portions of the Work specifically required in the Contract Documents to be placed into use or operation or both before completion of the entirety of the Work.

1-08.10(12) Possession of Incomplete Portions of the Project**(*****)**

Should the Contractor fail to meet any date specified for Substantial Completion or Physical Completion of Work or any portion of Work requiring early possession and use by the City, the City may, after a 14 calendar day Notice to the Contractor, take over such portion or any Work that is behind schedule. In such case, the City's Representative will prepare a list of incomplete Work taken over by the City. The cost of City's work will be charged to and deducted from amounts due to the Contractor. The Substantial Completion date of the entire or a portion of the Project will be established as the date when the City actually begins using the Project or portion of the Project for its intended purpose. Division of responsibilities between City and Contractor, beginning of warranties, and any other issues relating to Substantial Completion shall be as specified in 1-08.5(2) SUBSTANTIAL COMPLETION.

Supplement Section 1-08 by adding the following:

1-08.11 Record Drawings
(***)****1-08.11(1) Description**

This section specifies the requirements for preparing record drawings. The Contractor, with the cooperation and assistance of the City Inspector, is responsible for marking up record drawings during the course of construction. The Contractor shall keep the record drawings up to date at all times during the course of construction.

The Inspector will verify the record drawings are accurate and complete before accepting the Contractors monthly pay request. If the record drawings are not current or accurate, the pay request will not be processed.

As the Contract approaches Final Acceptance, prepare, with the assistance of the Inspector, a complete and accurate set of record drawings. The Inspector must approve the record drawings prior to Final Acceptance. Final Acceptance will not be issued until the City accepts the record drawings.

1-08.11(2) Recording Changes

As a minimum, record the following items on the record drawings:

- a. Actual dimensions, arrangement and materials used when different than shown on the Plans.
- b. Changes made by Change Order or Field Order.
- c. Changes made by the Contractor.
- d. Horizontal and vertical locations of underground utilities and appurtenances shall be referenced to monumentation. The monumentation shall be based on NAD 83-91 for Horizontal Datum and NAVD 88 for Vertical Datum.
- e. Any changes in centerline profile and curb & gutter (top of curb), offsets and elevations.
- f. Details, Equipment or materials used that were not shown on the original Plans.
- g. The actual arrangement and routing of conduit, embedded conduit, raceways and piping relative to its location and proportioned to other work. The location needs to be dimensioned on the record drawings.
- h. Contractor prepared piping schematics and diagram drawings representing the Equipment orientation.
- i. Final location of all surface and subsurface improvements.
- j. Record on the drawings the location of all field run materials.
- k. All shoring systems left in place at the end of construction.

Contractor shall accurately show existing underground items including, but not limited to, piping, manholes, pull boxes, conduit, direct buried wire, foundations, equipment and obstructions found during construction on the record drawings. Note on the record drawings the actual size of all utilities and structures and types of material used. Locate all record drawing items by survey coordinates or dimensioned off NAD 83-91 for Horizontal Datum and NAVD 88 for Vertical Datum. Minimum requirements for accuracy are specified in the following chart.

Description	Horizontal Location	Elevation	Notes
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Gravity sewer and drain lines	Coordinates, stations, and offsets 0.1 ft.	I.E. 0.01 ft.	Recalculate actual slopes. All inverts in manholes. All angle changes.
Force mains, water mains and transmission lines	Coordinates and stations 0.1 ft.	I.E. 0.1 ft.	Record all angle points and finished ground elev. Above the invert elev.
All other items, incl. Electrical and Structural	0.1 ft.	0.1 ft.	Show dimensions on record drawings.

Use red pen or pencil to make changes on the record drawings. Notations are to be neat, legible, clear and concise.

Record information concurrently with the progress of construction. Conceal no work until the required information is verified and recorded.

1-09 MEASUREMENT AND PAYMENT

1-09.1 *Measurement of Quantities*

Supplement 1-09.1 by adding the following:

Measurement by the Ton: Where items are specified to be paid for by the ton it will be the Contractor's responsibility to see that a certified weight ticket is given to the City's Inspector on the Project at the time of delivery of materials for each truckload delivered. Pay quantities will be prepared on the basis of certified weight tickets delivered to the City's Inspector at time of delivery of materials. Tickets not received by the City's Inspector on day of delivery will not be honored for payment.

1-09.3 *Scope of Payment*

Supplement 1-09.3 by adding the following:

1-09.3(1) *Schedule of Values*

(*****)

The Contractor shall submit a Schedule of Values in accordance with 1-08.0(1) PRE-CONSTRUCTION CONFERENCE. If the Project contains Unit Price Work, in whole or in part, then the Schedule of Values for that portion of the Work shall also be based on unit prices. If the Proposal Form calls for a lump sum price, in whole or in part, then the Schedule of Values shall: reasonably allocate the Contract Sum among the various portions of the Work; be complete; be organized to include detailed breakdown of each major unit of the Work; be organized to correspond to Contractor's schedule; break down the Contract Sum showing the value assigned to each part of the Work; include an allowance for profit and Overhead; include Unit Price Work, if and to the extent indicated on the Proposal Form; be so organized as to facilitate assessment of Work and payment of Subcontractors; and be balanced. To the greatest extent possible, the breakdown shall use the same tasks or units as the Contractor's schedule. Contractor shall provide documentation substantiating the cost allocation if asked by the City's Representative. Upon acceptance of the Schedule of Values by the City's Representative, it shall be used as a basis for all requests for payment.

1-09.4 *Equitable Adjustment*

Supplement 1-09.4 by adding the following:

Other means to establish the reasonable cost of the Work not defined by unit prices include, and is not limited to, 1-09.6 FORCE ACCOUNT, the Schedule of Values, or estimating manuals.

1-09.4(1) General

(*****)

The following shall apply in determining the amount of an equitable adjustment of Contract Sum:

1. Except as otherwise expressly provided, Contractor will only be paid for costs it clearly and convincingly proves it actually and directly incurred, and shall not include consequential or indirect damages not otherwise expressly permitted by the Contract Documents. Costs and damages for which the City shall not be liable under any circumstances include, but are not limited to: (a) borrowing or interest costs, charges, or expenses of Contractor; (b) alleged lost profit or overhead on any other project; and (c) Contractor's failure or inability to obtain other work.
2. No Contract Claim for adjustment of Contract Sum or additional compensation for extra, affected, impacted or inefficient work will be allowed where the Contractor does not keep and maintain contemporaneous, complete and accurate time records for labor and equipment and contemporaneous, complete and accurate records for materials and where such records do not contemporaneously segregate and allocate by time, location and Work the time and costs for each item or element of such Work. Contractor's failure to keep and maintain such records constitutes a waiver of any Contract Claim or request by the Contractor for adjustment of Contract Sum for such costs or event.
3. To the extent the Contractor is entitled to an adjustment of Contract Sum due to any Delay or extension of Contract Time, Contractor shall be compensated as provided in 1-09.11A REMEDIES. Such compensation shall be full, adequate and complete compensation for all direct, indirect, cumulative, inefficiency, impact and ripple costs causing, arising out of, or relating to such Delays or extension.
4. Contractor and City agree that compensation to the Contractor for a Contract Claim shall not exceed the Contractor's costs based upon Force Account as described in 1-09.6 FORCE ACCOUNT. Contractor waives, releases, and agrees not to submit any request for adjustment of Contract Sum or Contract Claim based upon a "total cost" or "modified total cost" calculation, in whole or in part, but instead agrees that any and all requests for compensation shall be based upon accurate, complete and contemporaneous cost records that segregate and allocate costs (a) between base Contract work and the Work for which additional compensation is sought and (b) between each item of Work for which additional compensation is sought. Claims for inefficiency shall only be based and calculated by a comparison of productivity of similar Work performed in an unaffected or least affected area of the Project.
5. No claim for consequential damages of any kind will be allowed.

1-09.4(2) Unabsorbed and Extended Overhead
(***)**

Any Extended or Unabsorbed Overhead to which the Contractor may be entitled shall be calculated using the Eichleay formula by:

1. Determining the pro-rata amount of Overhead allocable to the subject project. This is accomplished by multiplying Overhead costs by the ratio of the subject project's billings to the Contractor's overall billings during the overall period of the subject Project's performance. The result is "Allocable Overhead." Any additional and unresolved direct cost claims presented by the Contractor concurrently with any request for Extended and/or Unabsorbed Overhead shall not be included in determining the ratio of the subject Project billings to overall Contractor billings for the period of project performance.
2. Determining the daily amount of Allocable Overhead for the subject Project. This is accomplished by dividing the Allocable Overhead for the subject Project by the number of days, (as contractually defined) of Contract performance. The result is the Daily Rate of Allocable Overhead.
3. Determining the gross amount of potential additional compensation for Home Office Overhead due to the project extension. This is accomplished by multiplying the Daily Rate of Allocable Overhead by the number of days of project extension caused solely by the City. This results in the Gross Amount of Additional Home Office Overhead Compensation.
4. Adjusting the Gross Amount of Additional Home Office Overhead Compensation for any additional contribution for Overhead received by the Contractor on any Change Orders that are being presented and resolved concurrently with the subject calculation for Unabsorbed and/or Extended Home Office Overhead. The necessary adjustment would be to reduce the Gross Amount of Additional Home Office Overhead Compensation by any additional compensation for Overhead included in any direct cost claims being resolved concurrently with any claim for Extended and/or Unabsorbed Home Office Overhead.

Contractor shall not receive compensation for cost of use of equity capital.

1-09.5 Deleted or Terminated Work

Delete the first paragraph, beginning with "The Engineer may delete", and the second paragraph, beginning with "Payment for completed items", and substitute the following:

The City's Representative may delete Work as provided in 1-04.4 CHANGES or may terminate the Contract in whole or part as provided in 1-08.10(2) TERMINATION FOR PUBLIC CONVENIENCE. When the Contract is partially terminated for the City's convenience, the partial termination shall be treated as a deductive Change Order for payment purposes under this section.

Payment for completed items will be at contract unit prices or pursuant to the Schedule of Values.

Delete the fourth paragraph, beginning with "Contract time shall be", and the fifth paragraph, beginning with "Acceptable materials ordered by", and substitute the following:

Acceptable materials ordered by the Contractor prior to the date the Work was terminated or deleted will either be purchased from the Contractor by the City at the actual cost and shall become the property of the City, or the City will reimburse the Contractor for the actual costs of returning these materials to the suppliers.

If Contractor disagrees with the adjustment of Contract Sum determined by the City's Representative, Contractor may submit a Contract Claim for the difference between the amount determined by the City's Representative and the amount sought by the Contractor.

Contractor shall not be entitled to any anticipated profits on deleted, terminated, or uncompleted Work.

1-09.6 Force Account

Supplement 1-09.6 by adding the following:

The City has estimated and included in the Proposal dollar amounts for all items to be paid per Force Account. This is done only to provide a common Bid for Bidders. All such dollar amounts are to become a part of Contractor's total bid. However, the City does not warrant expressly or by implication that the actual amount of Work will correspond with those estimates. Payment will be made on the basis of the amount of Work actually authorized by Engineer.

1-09.7 Mobilization

Supplement 1-09.7 by adding the following:

1. Construction Identification Signs: Upon commencement of Work, the Contractor shall furnish and erect two Project/Construction Identification Signs in accordance with COE Standard Drawing No. 714, one at each end of each work area at Engineer approved locations.
 - a. Contractor shall provide sign painting, lettering and detailing by a professional sign maker with Engineer approval prior to placement on job site.
 - b. Contractor shall provide a Project Information Sign for each of the two Project/Construction Identification Signs. Attach Project Information Sign to the surface of the sign face in accordance with COE Standard Plan No. 714. The Construction Identification Sign shall contain the following three lines of information that the Engineer will provide:

PROJECT NAME:
PROJECT FUNDING:
PROJECT COST:
 - c. Contractor shall maintain signs and sign frames in a clearly legible condition throughout the progress of the Work and shall completely remove signs upon project completion. Deliver signs to the City's storage area for future City use.
 - d. No separate payment for Project/Construction Identification Signs will be made. All costs associated with this item shall be merged with the unit contract price for "Mobilization."
2. Engineer's Field Office: The Contractor shall provide an office for the use of the Engineer that may be in conjunction or attached to the Contractor's field office. Sanitary facilities shall be nearby. The location of the office shall be adjacent to the project and at a location acceptable to the Contractor and the Engineer. The office shall be equipped with a desk, layout table, chairs, file cabinet, and telephone and suitable lighting, air conditioning and heating. A telephone shall be installed for the sole use of the Engineer. It shall be a separate unit with a different telephone number than the Contractor's phone. Mutually agreeable measures for the security of the office shall be arranged between the Contractor and Engineer. The Engineer's office

shall be on-site, connected to all utilities and fully prepared for occupancy prior to release of the first warrant to the Contractor. The contractor will also provide a dry, heated space for weekly construction meetings (two large tables and 10 chairs, typically in a 12' x 20' conference room) on-site.

- a. All costs for the Engineer's office, including telephone service for local calls only, shall be borne by the Contractor and shall be included in the mobilization cost.

1-09.9 Payments

Delete 1-09.9 and substitute the following:

1-09.9 Payments to Contractors

(*****)

1-09.9(1) Progress Payments

Contractor shall submit progress payment estimate for completed Work and material on hand based upon acceptable Work performed during the previous month, or since the last partial payment estimate was submitted. Submit progress payment estimate to City's Representative by the tenth day of each month, or by schedule mutually agreed upon in writing by the Contractor and City's Representative at the Pre-Construction Conference. Contractor shall make initial progress estimate not later than 30 days after the Work begins. Make successive progress estimates every month thereafter until the Completion Date.

Progress estimates made during progress of the Work are tentative, and made only for the purpose of determining progress payment. The progress estimates are subject to change at any time prior to the calculation of the Final Payment.

The value of the progress estimate will be the sum of the following:

1. Unit Price Items in the Proposal Form — the approximate quantity of acceptable units of work completed multiplied by the unit price.
2. Lump Sum Items in the Proposal Form — the estimated percentage complete multiplied by the Proposal Forms amount for each Lump Sum Item, or per the schedule of values for that item.
3. Materials on Hand — 100 percent of invoiced cost of material delivered to Job site or other storage area approved by the Engineer.
4. Change Orders — entitlement for approved extra cost or completed extra work as determined by the Engineer.

Progress payments will be made in accordance with the progress estimate less:

1. Retainage in accordance with 1-09.9(6) RETAINAGE,
2. The amount of Progress Payments previously made, and
3. Funds withheld by the City for disbursement in accordance with the Contract Documents.

Progress payments for Work performed shall not be evidence of acceptable performance or an admission by the City that any Work has been satisfactorily completed.

Payments will be made by warrants, issued by the City's fiscal officer, against the appropriate fund source for the Project. Payments received on account of Work performed by a Subcontractor are subject to the provisions of RCW 39.04.250.

Contractor's submission of a progress pay estimate constitutes the Contractor's material representation that Contractor performed all of the Work described in the progress pay estimate during the relevant time period in a conformance with these Plans and Specifications and that the materials or Equipment for which payment is requested reasonably conform to the Specifications and are either on the job site or have been installed. If requested by the City's Representative, provide additional data as may be reasonably required to support the payment estimate. Additional data may include, but not be limited to, satisfactory evidence of payment for Equipment, materials and labor, including payments to Subcontractors and suppliers. Certified invoices by the suppliers shall accompany a request for payment for delivered Equipment and material. Such Equipment and material shall be suitably and safely stored at the site of the Work. Payment requests shall summarize accepted operating and maintenance material with request for Equipment payment.

A progress payment is preliminary only. By making a progress payment, the City does not waive or release its right, nor is it estopped from asserting, that previous progress payments were not earned or were in error, whether in whole or in part.

1.09.9(2) Review Procedures

The City's Representative will review the estimate and either indicate in writing to the City his or her concurrence with the estimate and his or her recommendation that payment be made, or indicate in writing to the Contractor his or her reasons for not concurring with the estimate. If the City's Representative recommends payment and the City concurs, the City will pay the Contractor a progress payment on the basis of the approved partial payment estimate, less retainage and any amounts the City may withhold pursuant to Contract or law. The recommendation of the City's Representative is not conclusive, final or binding upon the City.

In the event the City's Representative does not concur with the estimate, the Contractor may make the changes necessary to obtain the City's Representative's concurrence and resubmit the partial payment estimate, or submit the original progress payment estimate directly to the City, indicating in writing its reasons for refusing to make the changes necessary to obtain concurrence.

1.09.9(3) Withholding Payment

The City's Representative may refuse to recommend the whole or any part of any payment if in the City's Representative's opinion it would be incorrect to make such recommendation to the City. The City's Representative may also refuse to recommend any such payment, or because of subsequently discovered evidence or the result of tests, may nullify any such payment previously recommended to such extent as may be necessary in the City's Representative's opinion to protect the City from loss as a result of:

1. Defective or damaged Work.
2. A deductive Change Order.
3. Persistent failure of the Contractor to perform the Work in accordance with the Contract Documents, including failure to maintain the progress of the Work in accordance with the construction schedule. Persistent failure to maintain the progress of the Work shall mean that for a period of two consecutive months following a written notice from the City's Representative or City, the Contractor fails to correct a behind-schedule condition at a rate that would reasonably indicate that it will finish the Project on schedule.

4. Disregard of authority of the City or City's Representative or the laws of any public body having jurisdiction.
5. Liquidated damages.
6. Misrepresentation of the quality of materials or Equipment installed or amount of Work performed.
7. Discovery that a previous pay estimate erred with respect to the amount of Work performed or Equipment or materials installed, irrespective of the City's Representative's recommendation at the time of the progress pay estimate.

The City may refuse to make payment of the full amount recommended by the City's Representative because of Contract Claims made against the City on account of Contractor's performance or furnishing the Work or because of liens filed in connection with the Work or other set offs entitling City to reduce the amount recommended. In such case, the City shall give Contractor prompt written notice with copy to the City's Representative stating the reasons for each action.

1-09.9(4) Final Payment Procedure

Upon receipt of Contractor's written Notice that the Work is ready for final inspection and acceptance and upon receipt of a Final Contract Voucher Certification, the City's Representative will inspect the Work. If the City's Representative finds the Work acceptable under the Contract Documents and the Contract fully performed and if the Contractor has signed a Final Contract Voucher Certification, the City's Representative will issue a final Certificate for Payment. The Certificate for Payment will state that to the best of the City's Representative's knowledge, information and belief, the Work appears to have been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable.

Final payment shall not become due until the Contractor submits to the City's Representative the following;

1. an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the City or the City's property might be responsible or encumbered, less amounts withheld by City, have been paid or otherwise satisfied,
2. a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 calendar days' prior written Notice has been given to the City,
3. a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents,
4. consent of Surety, if any, to final payment,
5. request to Sublet Work Agreements for all Subcontractors,
6. certified payrolls from the Contractor and all Subcontractors,
7. "Statement of Intent to Pay Prevailing Wages and Affidavit of Wages Paid" from Contractor and each Subcontractor filed with the City and the Department of Labor and Industries,

8. Certification of Use or Deferred Sales Tax Paid or both, and
9. if required by the City, other data establishing payment or satisfaction of obligations, including, but not limited to, receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the City. If a Subcontractor refuses to furnish a release or waiver required by the City, the Contractor may furnish a bond satisfactory to the City to indemnify the City against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the City all money that the City may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

Prior estimates and payments, including those relating to Extra Work or Work omitted, will be subject to correction by the final payment.

If, after Physical Completion of the Work, Final Acceptance thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting Final Acceptance, and the City's Representative so confirms, the City may, upon application by the Contractor and certification by the City's Representative, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of Surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the City's Representative prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

Acceptance of final payment by the Contractor, a Subcontractor or material or Equipment supplier shall constitute a waiver of Contract Claims by that payee, except those Contract Claims previously timely and completely submitted that remain pending at the time of final payment, provided that Contractor specifically so notifies the City in writing prior to the City making such final payment. Payment by the City shall not release the Contractor or its Surety from any obligation under the Contract or under the payment and performance bond.

Upon completion of all Work and after final inspection, the amount due the Contractor under the Contract will be paid based upon the final estimate made by the Engineer and presentation of a Final Contract Voucher Certification signed by the Contractor. Such voucher shall be deemed a release of all claims of the Contractor unless a claim is filed in accordance with the requirements of 1-09.11 DISPUTES AND CLAIMS and is expressly excepted from the Contractor's Certification on the Final Contract Voucher Certification.

If the Contractor fails, refuses, or is unable to sign and return the Final Contract Voucher Certification or any other documentation required for completion and final acceptance of the Contract, the City reserves the right to establish a Completion Date (for the purpose of meeting the requirements of RCW 60.28) and unilaterally accept the Contract. Unilateral final acceptance will occur only after the Contractor has been provided the opportunity, by written request from the City, to voluntarily submit such documents. If voluntary compliance is not achieved, formal notification of the impending establishment of a Completion Date and unilateral final acceptance will be provided by certified mail or by email with delivery confirmation from the City to the Contractor, which will provide 30 calendar days for the Contractor to submit the necessary documents. The 30 calendar day period will begin on the date the certified mail or email with delivery confirmation is

received by the Contractor. If Contractor compliance is not achieved by the end of such 30-day period, the City will unilaterally sign the Final Contract Voucher Certification. The date the City Council accepts the Work shall constitute the Completion Date and the final acceptance date. The reservation by the City to unilaterally accept the Contract will apply to Contracts that are Physically Completed in accordance with Section 1-08.5, or for Contracts that are terminated in accordance with Section 1-08.10. Unilateral final acceptance of the Contract by the City does not in any way relieve the Contractor of its responsibility to comply with all Federal, State, tribal, or local laws, ordinances, and regulations that affect the Work under the Contract.

1-09.9(5) Back Charges to Contractor

The Contractor shall pay the City on demand everything charged to it under the terms of this Contract. Such charges may be deducted by the City from money due or to become due to the Contractor under the Contract. The City may recover such charges from the Contractor or from its Surety.

Contractor agrees to pay the costs of overtime or excessive inspection and observation costs incurred by the City. Overtime inspection shall include inspection required during Saturdays, Sundays, City holidays and weekdays in excess of 40 hours per week or outside of normal working hours and inspections or observations that result in an inspector or observer working more than 40 hours in a week. Costs of such overtime or excessive inspection or observation include architecture, engineering, construction management services, inspection, general supervision and overhead expenses that are directly chargeable to the overtime or excessive work. Contractor agrees that City will deduct such charges from payments due the Contractor. In the event the City issues a Change Order requiring the Contractor to work in excess of the established schedule of working hours, the City will not charge the Contractor for associated inspection costs.

The Contractor shall be compensate the City for the actual costs of engineering, inspection, general supervision, right-of-way costs, permit fees, overhead expenses, and any other ascertainable direct costs to the City that are directly chargeable to the Work and that accrue during the period of such extension. The actual costs do not include charges for final inspection and preparation of the final payment by the City.

1-09.9(6) Retainage

Pursuant to RCW Chap. 60.28, a sum of five percent of the monies earned by the Contractor will be retained from progress estimates. In addition to protecting the interests of those identified in RCW Chap. 60.28, such retainage will be used as a trust fund for the protection of the City.

At the option of the Contractor, monies retained under the provisions of RCW 60.28 will be:

1. Retained in a fund by the City, or
2. Deposited by the City in an interest-bearing escrow account in a bank, mutual saving bank, or savings and loan association. Interest on monies so retained shall be paid to the Contractor in accordance with requirements of this section. Deposits are to be in the name of the City and may not be withdrawn without the City's written authorization. The City will issue a check representing the sum of the monies reserved, payable to the bank or trust company. Such check shall be converted into bonds and securities chosen by the Contractor as the interest accrues Bank and Contractor will execute an escrow agreement in the form provided by the City.

3. Released after submission of fully executed retainage bond in the form provided by the City.

The Contractor shall designate the option desired at the time the Contract is executed. If the Contractor chooses option 2, deposit in escrow account, Contractor agrees to assume full responsibility to pay all costs that may accrue from escrow services, brokerage charges or both, and further agrees to assume all risks in connection with the investment of the retained percentages in securities. The City may also, at its option, accept a bond in lieu of retainage.

Retainage will be released when all of the following conditions are satisfied:

1. Sixty days have elapsed following the completion of all Work specified in the Contract; and
2. The Contractor fulfilled all of all obligations of the Contractor under the Contract, including, but not limited to, the Contractor's furnishing all documentation required by Contract and law; and
3. A release has been obtained from the Washington State Department of Revenue; and
4. Affidavits of Wages Paid for the Contractor and all Subcontractors are on file with the City (RCW 39.12.040); and
5. A release has been obtained from the Washington State Department of Labor & Industries and the Washington State Employment Security Department; and
6. All claims, as provided by law, filed against the retainage have been resolved. In the event claims are filed and provided the conditions one through five are met, the Contractor will be paid the retained percentage less an amount sufficient to pay any such claims together with a sum determined by the City sufficient to pay the cost of claims and attorney's fees.
7. All other conditions required by law are satisfied.

For the purposes of retainage, the date of "completion of all work" is deemed to be the same date as the date of Final Acceptance.

1-09.11 Disputes and Claims

Delete all of 1-09.11 and substitute the following:

1-09.11(1) Disputes

(*****)

When a Dispute occurs during the Contract, the Contractor shall pursue resolution through the City's Representative. The Contractor shall follow the procedure outlined in section 1-09.11(2) CONTRACT CLAIMS herein and 1-08.3 PROGRESS SCHEDULE and 1-08.8 EXTENSIONS OF TIME for issues regarding the schedule and Contract Time. Timely and adequate Notice is a condition precedent to a Contract Claim. Timely and complete submission of a Contract Claim is a condition precedent to any entitlement by the Contractor to an adjustment of Contract Sum or Contract Time. Unless waived in writing by the City, mediation is a condition precedent to the filing of any lawsuit, action or proceeding that seeks to recover on a Contract Claim, whether in whole or in part. The costs of any such mediation will be borne equally by the parties. Unless otherwise agreed by the parties, the mediation shall take place in Everett, Washington.

1-09.11(2) Contract Claims**(*****)****1-09.11(2)A General**

If the Contractor requests or believes for any reason that it is entitled to adjustment of Contract Sum or Contract Time, or if the Contractor has a Dispute with the City and wants the City to take some action, or refrain from taking action, the Contractor shall file a Contract Claim as provided in this section. A timely and complete Contract Claim is a condition precedent to any entitlement by the Contractor to an adjustment of Contract Sum or Contract Time. No Contract Claim shall be allowed unless the Contractor has given Notice as required under the Contract Documents. The Contractor waives any Contract Claim if: (a) Notice was not timely given; (b) the City's Representative is not afforded reasonable access by the Contractor to complete records, including, but not limited to, correspondence, job diaries, and actual cost and additional time incurred; (c) a Contract Claim is not timely filed as required by the Contract Documents; or (d) adequate, accurate, contemporaneous and segregated supporting time and expense records are not kept and maintained. The fact that the Contractor provided proper and timely Notice, provided a properly filed Contract Claim, or provided the City's Representative access to records of actual cost, shall not in any way be construed as proving or substantiating the validity of the Contract Claim. If the City determines the Contract Claim has merit in whole or in part, the City's Representative will make an adjustment of Contract Sum or Contract Time required for the Work, or both. If the City's Representative finds the Contract Claim to be without merit, no adjustment will be made.

The Contractor shall keep full, complete, accurate and contemporaneous records of the costs and additional time incurred for any Contract Claim. The Contractor shall permit the City's Representative to have access to those records and any other records as may be required by the City's Representative to determine the facts or contentions involved in the Contract Claim. City is not obligated to respond to a Contract Claim unless the Contractor is in full compliance with all the provisions of the Contract Documents and the formal Contract Claim document has been submitted

Full compliance by the Contractor with the provisions of this section is a contractual condition precedent to the Contractor's right to sue or seek any recovery against the City in any legal proceeding.

1-09.11(2)B Contents

All Contract Claims filed by the Contractor shall be in writing, verified under penalty of perjury by an officer or principal of the Contractor, and in sufficient detail to enable the City's Representative to ascertain the basis and amount of the Contract Claim. All Contract Claims shall be submitted to the City's Representative. At a minimum, each Contract Claim shall include:

1. A detailed factual statement of the Contract Claim for an adjustment to the Contract Sum or Contract Time, if any, providing all necessary dates, locations, and items of Work affected by the Contract Claim.
2. The dates of all facts related to the Contract Claim.
3. The name of each City's individual, official, or employee involved in or knowledgeable about the Contract Claim.
4. The specific provisions of the Contract that support the Contract Claim and a statement of the reasons why such provisions support the Contract Claim.

5. If the Contract Claim relates to a decision of the City's Representative that the Contract leaves to the City's Representative's discretion or as to which the Contract provides that the City Representative's decision is final, the Contractor shall set out in detail all facts supporting its position relating to the decision of the City's Representative.
6. Identification of any documents and the substance of any oral communications that support the Contract Claim.
7. Copies of any identified documents that support the Contract Claim, other than City documents and documents previously furnished to the City by the Contractor. Standard industry manuals may be incorporated by reference.
8. If Contractor seeks an extension of Contract Time:
 - a. The specific amount of time, including days and dates, sought.
 - b. The specific reasons the Contractor believes an extension of Contract Time should be granted, including, but not limited to, compliance with the requirements of 1-08.3 PROGRESS SCHEDULE and 1-08.8 EXTENSIONS OF TIME; and
 - c. The specific provisions of the Contract Documents under which it is sought.
9. If Contractor seeks an increase in the Contract Sum, the exact amount sought and a breakdown of that amount into the following categories:
 - a. Labor
 - b. Materials
 - c. Direct Equipment. The actual cost for each piece of equipment for which a Contract Claim is made or in the absence of actual cost, the rates established by the AGC/WSDOT Equipment Rental Agreement that was in effect when the Work was performed. In no case shall the amounts sought or paid for each piece of equipment exceed the rates established by the Equipment Rental Agreement even if the actual cost for such equipment is higher. The City may audit the Contractor's cost records to determine actual equipment cost. The following information shall be provided for each piece of equipment:
 - Detailed description (e.g., Motor Grader Diesel Powered Caterpillar 12 "G", Tractor Crawler ROPS & Dozer Included Diesel, etc.)
 - The hours of use or standby; and
 - The specific day and dates of use or standby;
 - Job overhead.
 - Overhead (general and administrative).
 - Subcontractor's Contract Claims (in the same level of detail as specified herein is required for any subcontractor's Contract Claims); and
 - Other categories as specified by the Contractor or the City.
10. A notarized statement shall be submitted to the City's Representative containing the following language:

Under the penalty of law for perjury or falsification, the undersigned,

(name) _____ (title) _____
of _____
(company)

hereby certifies that the Contract Claim for an adjustment of the Contract Sum and/or Contract Time, if any, made herein for Work on this Contract is a true and complete statement of the factual basis of the Contract Claim and all actual costs incurred and time sought, and is fully documented and supported under the Contract between the parties.

Date _____/s/ _____

Subscribed and sworn before me this _____ day of _____

Notary Public

My Commission Expires: _____

1-09.11(2)C False Or Omitted Information

The Contractor waives each Contract Claim for which it presents material information that it knows, or in the exercise of reasonable care should know, is false, or omits or fails to disclose material information relating to such Contract Claim. In such case, Contractor shall reimburse the City for any and all fees and expenses incurred in investigating any such Contract Claim.

1-09.11(3) Time Limitation and Jurisdiction

(*****)

The parties intend that all claims and Disputes be dealt with promptly and expeditiously when they arise. The parties intend that all claims and Disputes be resolved quickly and expeditiously and desire to avoid claims and Disputes that relate back to events or Work occurring months before. The parties desire to avoid litigation and the costs and expense of claims and Disputes at the end of the Project.

Any Contract Claim for adjustment of Contract Sum or Contract Time, or any Dispute or Contract Claim of any kind whatsoever, shall be submitted, if at all, to the City or City's Representative no later than 30 calendar days after Notice was first required to be given by the Contractor as provided in 1-04.5 NOTICE BY THE CONTRACTOR. Failure to submit a Contract Claim within the 30 calendar days of the date Notice was required pursuant to 1-04.5 NOTICE BY THE CONTRACTOR constitutes a complete waiver of and bar to the Contract Claim, and Contractor is estopped from later asserting a Contract Claim or seeking any relief or remedy relating to the Dispute for which it failed to submit a Claim.

Contractor may not sue, cross-claim, claim, or bring any action of any kind whatsoever against the City on any Contract Claim or Dispute after the expiration of 180 calendar days from Physical Completion.

1-09.11(4) COVID-19 Contract Claims: Baseline COVID-19 Requirements

(*****)

Contractor shall in no event be entitled to assert a Contract Claim for increase to the Contract Sum for any direct or indirect costs (including without limitation Delay, cumulative impact, inefficiency or ripple costs) incurred by the Contractor to comply with the COVID-19 Requirements.

The Contractor shall be entitled to an extension of Contract Time for Delays to the extent caused by COVID-19 Requirements. Extension of Contract Time shall be determined pursuant to 1-08.8 EXTENSIONS OF TIME. This Contract Time extension is the Contractor's sole remedy if the Contract Time in the Contract Documents is insufficient to complete the Work because of Baseline COVID-19 Requirements.

All other Contract Claims regarding COVID-19 are governed by Section 1-09.11A(3)D1 CAUSED SOLELY BY THIRD PARTIES OR FORCE MAJEURE, including 4 without limitation Contract Claims relating to unavailable or delayed labor, materials, equipment or subcontractors to the extent caused by COVID-19.

Supplement Section 1-09 by adding the following:

1-09.11A Remedies

(*****)

1-09.11A(1) General

If a Contract Claim has merit in whole or in part, then Contractor's sole remedies shall be those provided in this subsection. Contractor shall timely and strictly comply with the requirements of 1-04.5 NOTICE BY THE CONTRACTOR and 1-09.11(2) CONTRACT CLAIMS and all other Contract Documents relating to the Contract Claim. Adjustments to Contract Time shall be determined pursuant to 1-08.3 PROGRESS SCHEDULE and 1-08.8 EXTENSIONS OF TIME. Failure to comply strictly and timely shall be deemed a waiver of the Contract Claim.

1-09.11A(2) Extra Work

1-09.11A(2)A Adjustment of Contract Sum

If the Contractor is entitled to an adjustment of Contract Sum because of Extra Work, the adjustment shall be calculated and paid as provided in 1-09.4 EQUITABLE ADJUSTMENT. This amount includes jobsite and home office Overheads for such Work, including any schedule delays relating to such Work. Therefore, no compensation in addition to that provided in 1-09.6 FORCE ACCOUNT shall be paid for such things as Extended Overhead or other costs or damages.

1-09.11A(2)B Extension of Contract Time

Extensions of Contract Time caused by Extra Work shall be determined as provided in 1-08.3 PROGRESS SCHEDULE and 1-08.8 EXTENSIONS OF TIME.

1-09.11A(3) Delays

1-09.11A(3)A City Caused Delay Unrelated to Extra Work

1-09.11A(3)A1 Adjustment of Contract Sum

If the Contractor is entitled to an adjustment of Contract Sum because of a Delay solely caused by the City that does not relate to Extra Work, Contractor shall only be compensated for the items below, less all funds paid pursuant to any change in the Contract Sum that contributed to the Delay:

1. Documented, incurred cost of nonproductive field supervision or labor extended because of the Delay;
2. Documented, incurred cost of home office supervision to attend jobsite meetings;

3. Documented, incurred cost of temporary facilities or equipment rental extended because of the Delay;
4. Documented, incurred cost of insurance extended because of the Delay;
5. General and administrative overhead in an amount to be agreed upon, but not to exceed three percent of original Contract Sum divided by the Contract Time for each day of the Delay.

City shall not owe Contractor compensation for Extended Overhead or other delay costs to the extent Contractor or anyone other than the City contributed to or is concurrently responsible for the Delay.

1-09.11A(3)A2 Adjustment of Contract Time

If the Contractor is entitled to an adjustment of Contract Time because of a Delay solely caused by the City that does not relate to Extra Work, Contractor shall be entitled to an adjustment of Contract Time to the extent the Delay increases the duration of the Project, as measured by the critical path and as demonstrated pursuant to the requirements of 1-08.8 EXTENSIONS OF TIME.

1-09.11A(3)B Contractor Caused Delay

If the Contractor is solely responsible for any Delay to any interim milestone, Substantial Completion, Physical Completion, or the Completion Date, the City shall be entitled to liquidated or other damages as provided elsewhere in the Contract Documents. The Contractor accepts the risk of any Delays caused by strikes, work slowdowns, job actions and labor unrest of any kind. Contractor shall not be entitled to any increase in Contract Sum or Contract Time due to a Delay it caused.

1-09.11A(3)C Delays Concurrently Caused by Contractor and City

If the City and the Contractor cause a Delay concurrently, neither the City nor the Contractor shall be liable to the other except as provided herein.

1-09.11A(3)C1 Adjustment of Contract Sum

The Contractor shall not be entitled to any adjustment in Contract Sum for Delays concurrently caused by the City and the Contractor.

1-09.11A(3)C2 Adjustment of Contract Time

The Contractor shall be entitled to an extension of Contract Time for the City caused portion of any Delay concurrently caused by the City and Contractor to the extent the City caused the Delay to extend longer than if the Contractor had solely caused the Delay.

1-09.11A(3)D Third Party Caused Delays and Force Majeure

For the purposes of this section 1-09.11A(3)D, a "Force Majeure Event" is defined as earthquake, flood, pandemic (and governmental laws, regulations, requirements, and orders resulting therefrom), natural disasters, acts of war or acts of terrorism. Pandemic in the preceding sentence includes without limitation the COVID-19 pandemic.

For the purposes of this section 1-09.11A(3)D, a "Third Party" is defined as a third party for whom neither the Contractor nor the City is responsible.

1-09.11A(3)D1 Adjustment of Contract Sum

The City and the Contractor shall not be responsible to compensate each other financially for any Delay to the extent caused by a Third Party or a Force Majeure Event. A Delay caused by a utility's failure to provide service or relocate its lines (despite a timely request for such service or relocation) is an example of this kind of Delay for which neither the Contractor nor the City is financially responsible to the other. Mislocated utility lines or utility lines not located are another example of a Delay for which neither the Contractor nor the City is responsible to the other. However, the Contractor's failure to request a utility locate or relocation in a timely way is not, and any resulting Delay would be the responsibility of the Contractor. Because the Contractor is responsible for ordering materials and Equipment, Contractor shall not be entitled to an adjustment of Contract Time or Contract Sum due to Delays caused by the lack of materials or Equipment. A strike, job action, slowdown, work to rule, or other job action or labor dispute or problem is not a Delay caused by a Third Party.

1-09.11A(3)D1 Adjustment of Contract Time

The Contractor shall be entitled to an extension of Contract Time for Delays to the extent caused by a Third Party or a Force Majeure Event. Extension of Contract Time shall be determined pursuant to 1-08.8 EXTENSIONS OF TIME.

1-09.11A(4) Extended or Unabsorbed Overhead**1-09.11A(4)A General**

To present a request for additional compensation for Extended or Unabsorbed Overhead, the Contractor has the burden of keeping and maintaining accurate documentation to support any such claim. If the Contractor fails to provide or keep adequate financial data for an accurate and fair Eichleay calculation, Contractor waives and releases any claim for Unabsorbed or Extended Overhead. In presenting any claim under this section of the Contract, the Contractor agrees to provide to the City any and all financial data needed by the City, or its representative, to review, substantiate and evaluate any claim for Extended or Unabsorbed Home Office Overhead, or both. Failure to provide the requested information shall constitute waiver by the Contractor.

If Contractor is entitled to an adjustment of Contract Sum for Unabsorbed or Extended Overhead, it shall be calculated as provided in these Special Provisions.

1-09.11A(4)A1 Elements

Contractor shall only be entitled to an adjustment of Contract Sum for Unabsorbed or Extended Overhead if it clearly and convincingly demonstrates all of the following:

1. The City solely caused a Delay to the Completion Date as measured by analysis of the project duration by the critical path method pursuant to 1-08.3 PROGRESS SCHEDULE;
2. Because of the Delay described in subsection (1), the Contractor was forced to suspend or significantly interrupt its performance so that it was on standby or idled, and the City required the Contractor to be ready to resume performance on short notice. Extended time of performance of Work, such as

extensions caused by changes, inefficiencies, or extra Work, does not constitute suspension or significant interruption of performance.

3. The Contractor could not and did not use resources, including, but not limited to, labor, equipment, materials and tools, standing by or idled on this or other project for any work during the period of Delay;
4. The Contractor's Overhead costs did not materially vary from its usual seasonal Overhead costs during the period of Delay; and
5. The Delay did not cause over absorbed Overhead in the period the delayed Work was completed.

1-09.11A(4)A1a Resources

To demonstrate the Contractor could not and did not use resources, including, but not limited to, labor, equipment, materials and tools from this Project for any other work on this or any other project during the period of Delay in accordance with item 3 of 1-09.11A(4)A1 of these Special Provisions, the Contractor shall:

1. Affirmatively represent and warrant that it did not perform substitute work;
2. Identify the specific resources that were idled; and
3. Show that those resources did not, and could not, work on other contracts or projects during the Delay.

1-09.11A(4)A1b No Material Variations

To demonstrate the Contractor's Overhead costs did not materially vary from its usual seasonal Overhead costs during the period of Delay in accordance with item 4 of 1-09.11A(4)A1 of these Special Provisions, the Contractor shall;

1. Affirmatively represent and warrant that the completion of the subject Work was extended and that such extension prevented the performance of other work during both the period of Delay and the later period of time required to complete the extended Work,
2. Disclose the details of Contractor generated billings and Contractor Overhead Costs, as defined in these Special Provisions, throughout the actual Project performance. The details of such information should be no less than specific identification of the sources and amounts of revenue on no greater than a monthly basis and specific identification of the types and amounts of Contractor Overhead Costs on no greater than a monthly basis for the actual Project duration.

1-09.11A(4)A1c Overabsorbed Overhead

To demonstrate that Contractor did not incur Overabsorbed Overhead in the period following the Delay, in accordance with item 5 of 1-09.11A(4)A1. of these Special Provisions, the Contractor shall:

1. Affirmatively represent and warrant that completion of the delayed Work prevented the performance of other Work;
2. Identify the critical resource unavailable for other Work due to completion of the delayed Contract; and
3. Showing that unavailability of this critical resource precluded the performance of other Work.

1-09.11A(5) Inefficiencies**1-09.11A(5)A Adjustment of Contract Sum**

To the extent Contractor is entitled to an increase in Contract Sum because of inefficiencies or impaired productivity, then compensation due, if any, shall be calculated as provided in 1-09.4 EQUITABLE ADJUSTMENT. There is no entitlement to increase in Contract Sum for inefficiencies to the extent caused by a Third Party or a Force Majeure Event.

1-09.11A(5)B Adjustment of Contract Time

To the extent Contractor is entitled to an extension of Contract Time because of inefficiencies or impaired productivity, then the extension shall be determined as provided in 1-08.8 EXTENSIONS OF TIME.

Delete all of 1-09.12 and substitute the following:

1-09.12 Audits

(*****)

1-09.12(1) General

The Contractor's records relating to this Project, including, but not limited to, wage, payroll, and cost records, shall be open to inspection or audit by representatives of the City during the Project and for a period of not less than six years after the date of Final Acceptance of the Contract. The Contractor shall retain these records for that period. The Contractor shall also guarantee that Project records of Subcontractors, suppliers, and lower tier subcontractors, including, but not limited to, the wage, payroll, and cost records, shall be retained and open to similar inspection or audit for the same period of time. The audit may be performed by employees or representatives of the City or by an auditor chosen by the City. The Contractor, Subcontractors, or lower tier subcontractors shall provide adequate facilities, reasonably acceptable to auditor, for the audit during normal business hours. The Contractor, Subcontractors, or lower tier subcontractors shall make a good faith effort to cooperate with the auditors. If an audit is to be commenced more than 60 calendar days after the Final Acceptance date of the Contract, the Contractor will be given 20 calendar days' notice of the time when the audit is to begin. If any litigation, claim, or audit arising out of, in connection with, or related to this Contract is initiated, the Project records shall be retained until the later of (a) completion of litigation, claim, or audit or (b) six years after the date of Final Acceptance.

1-09.12(2) Claims

All Contract Claims filed against the City shall be subject to audit at any time following the filing of the Contract Claim. Failure of the Contractor, Subcontractors, or lower tier subcontractors to maintain and retain sufficient records to allow the auditors to verify all or a portion of the Contract Claim or to permit the auditor access to the books and records of the Contractor, Subcontractors, or lower tier subcontractors shall constitute a waiver of a Contract Claim and shall bar recovery in connection with the Contract.

1-09.12(3) Required Documents for Audits

An audit may be performed by employees of the City or a representative of the City. The Contractor and its Subcontractors shall provide adequate facilities acceptable to the City for the audit during normal business hours. The Contractor and all Subcontractors shall cooperate with the City's auditors.

As a minimum, the auditors shall have available to them the following documents:

1. Daily time sheets and supervisor's daily reports.
2. Collective Bargaining Agreements.
3. Insurance, welfare, and benefit records.
4. Payroll registers.
5. Earnings records.
6. Payroll tax forms.
7. Material invoices and requisitions.
8. Material cost distribution worksheet.
9. Equipment records (list of company equipment, rates, etc.)
10. Vendors', rental agencies', Subcontractors' and lower tier subcontractors' invoices.
11. Contracts between the Contractor and each of its Subcontractors, and all lower tier subcontractor contracts and supplier contracts.
12. Subcontractors' and lower tier subcontractors' payment certificates.
13. Canceled checks, including payroll and vendors.
14. Job cost reports, including monthly totals.
15. Job payroll ledger.
16. General ledger.
17. Cash disbursements journal.
18. Financial statements for all years reflecting the operations on this Contract. In addition, the City may require, if it deems appropriate, additional financial statements for three years preceding execution of the Contract and three years following Final Acceptance of the Contract.
19. Depreciation records on all company equipment whether these records are maintained by the company involved, its accountant, or others.
20. If a source other than depreciation records is used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents that support the amount of damages as to each Contract Claim.
21. Worksheets or software used to prepare the Contract Claim establishing the cost components for items of the Contract Claim including but not limited to labor, benefits and insurance, materials, equipment, Subcontractors, all documents that establish the time periods, individuals involved, the hours for the individuals, and the rates for the individuals.
22. Worksheets, software, and all other documents used by the Contractor to prepare its Bid. The employees or representatives of the City may audit these documents. The Contractor and its Subcontractors shall provide adequate facilities acceptable to the City for the audit during normal business hours. The Contractor and all Subcontractors shall cooperate with the City's auditors.
23. Correspondence, notes, and memoranda.

24. Job diaries.

25. All documents which relate to each and every claim together with all documents which support the amount of damages as to each claim.

1-09.13 Claims Resolution

Delete all of 1-09.13 and substitute the following:

Prior to seeking claim resolution through litigation, the Contractor shall proceed under the procedures in Sections 1-04.5 and 1-09.11 and elsewhere in the Contract Documents for resolution of disputes. These must be complied with in full, as a condition precedent, to the Contractor's right to seek claim resolution through litigation.

Supplement Section 1-09 by adding the following:

1-09.14 Patents and Royalties

(*****)

Should the Contractor, its agent, employee or any of them be enjoined from furnishing or using any invention, article, material or plans supplied or required to be supplied or used under this Contract, Contractor shall promptly pay such royalties and secure requisite licenses; or, subject to acceptance by City, substitute other articles, materials, or appliances in lieu thereof that are of equal efficiency, quality, finish, suitability and market value to those planned or required under the Contract. Descriptive information of these substitutions shall be submitted to the City's Representative for determination of general conformance to the design concept and the construction Contract. Should City elect to refuse the substitution, Contractor agrees to pay such royalties and secure such valid licenses as may be requisite for the City, its officers, agents and employees or any of them, to use such invention, article, material or appliance without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof.

Costs involved in fees, royalties, or claims for any patented invention, article, process or method that may be used upon or in a manner connected with the Work under this Contract or with use of completed Work by the City shall be paid by the Contractor. The Contractor and its sureties shall protect and hold the City, and City's Representative, together with its officers, agents, and employees, harmless from any and all loss, defense cost, and expenses and against any and all demands made for such fees or claims brought or made by the holder of any invention or patent. Before final payment is made on the account of this Contract, the Contractor shall, if requested by the City, furnish acceptable proof of a proper release from all such fees or claims.

1-10 TEMPORARY TRAFFIC CONTROL

1-10.1 General

1-10.1(2) Description

Supplement 1-10.1(2) as follows:

The Contractor shall provide a uniformed off-duty Police Officer to control traffic for work at signalized intersections and other critical situations as determined by the Engineer.

1-10.2 Traffic Control Management**1-10.2(1) General**

Delete the first sentence of the third paragraph of 1-10.2(1) and substitute the following:

The primary and alternate TCS shall be certified as worksite traffic control supervisors by one of the organizations listed below:

- Evergreen Safety Council (800) 521-0778
- Northwest Laborers Union (800) 240-9112
- American Traffic Safety Services Association (877) 642-4637

1-10.2(2) Traffic Control Plans

Delete the first paragraph of 1-10.2(2) and substitute the following:

Contractor may use City's Standard Traffic Control Plans included in COE Standard Drawings, Series 700. The City does not represent or warrant that the Standard Plans are sufficient, adequate or complete for the Contractor's means, methods or plan of Work. If a new or additional Traffic Control Plan is necessary, prepare detailed Traffic Control Plan complying with COE Standard Drawings, Series 700, the MUTCD, Part 6, and the most current edition of the PROWAG (Public Rights-of-Way Accessibility Guidelines). Plan preparation shall be at Contractor's sole cost and submitted to the City for approval at least 14 calendar days before starting Work. Work may not begin until Contractor is in receipt of City approved Traffic Control Plan.

1-10.3 Traffic Control Labor, Procedures and Devices

Delete 1-10.3 and substitute the following:

**1-10.3 Flagging, Signs, and All Other Traffic Control Devices
(*****)****1-10.3(1) General**

The Contractor shall provide all flaggers, signs and other traffic control devices. The Contractor shall erect and maintain all construction signs, warning signs, detour signs, and other traffic control devices necessary to warn and protect the public at all times from injury or damage as a result of the Contractor's operations that may occur on highways, roads, or streets. No Work shall be done on or adjacent to the roadway until all necessary signs and traffic control devices are in place.

Flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. The flagging card shall be immediately available and shown upon request by the City.

1-10.3(2) Maintenance and Protection of Traffic Control

When the Bid proposed includes an item for "Maintenance and Protection of Traffic Control", the Work required for this item shall be to:

1. Furnish and maintain signs, cones, barricades, flasher, and other channelization devices;
2. Provide supervisory personnel for all labor for traffic control;
3. Provide labor and necessary vehicle(s) for set-up and removal of construction signs and the traffic control devices that are placed daily;

4. Provide labor and vehicles for patrolling and maintaining in position all of the construction signs and the traffic control devices;
5. Provide labor, material, and equipment necessary for cleaning up, removing and replacing all construction signs and traffic control devices that are destroyed, damaged or lost during the life of the project;
6. Provide flagging or use of police officers for the convenience of the Contractor, such as facilitating movement of equipment on the site, laying out or relocating traffic control devices and signs.
7. Cost associated with preparation and distribution of public notices involving parking, street access or traffic issues.

Upon failure of the Contractor to immediately provide flaggers, erect, maintain, and remove signs; or provide, erect, maintain, and remove other traffic control devices when ordered to do so by the Engineer, the City may without further notice to the Contractor or the Surety, perform any of the above and deduct all or the costs from the Contractor's payments.

The Contractor shall be responsible for providing adequate flaggers, signs, and other traffic control devices for the protection of the worker and the public at all times regardless of whether or not the flaggers, signs, and other traffic control devices are ordered by the Engineer, or paid for by the City. The Contractor shall be liable for injuries and damages to persons and property suffered by reason of the Contractor's operations or negligence in connection therewith.

1-10.3(3) No Passing Zones

The striping of no passing zones that are to be obliterated in excess of 150-feet by paving operations shall be replaced by "Do Not Pass" and "Pass With Care" signs. The signs shall be located not less than 2-feet outside the usable shoulder nor less than 7-feet above the edge of pavement. The number of necessary signs will be specified in the Special Provisions.

The Contractor shall provide and install the signs and sign posts. The signs shall be maintained by the Contractor until construction operations are complete. When the project includes striping by the Contractor, the signs and posts shall be removed by the Contractor when the no passing zones are re-established by striping.

When the Contractor is not responsible for striping, the signs and posts shall be removed by the Contractor when the "No Passing Zones" are re-established by striping. Payment to perform the Work required for this subsection will be under the item "Maintenance and Protection of Traffic Control."

1-10.3(4) Traffic Control Labor

The Contractor shall furnish all personnel for flagging to control traffic during construction operations. Flaggers shall have a current certification (Flagging Card) from the State Department of Labor and Industries (WAC 296-155-305). Employees of the Contractor engaged in flagging or traffic control shall wear reflective vests and hard hats. During hours of darkness, white coveralls or white or yellow rain gear shall also be worn. The vests and other apparel shall be in conformance with Section 1-07.8. The Contractor shall furnish the MUTCD standard Stop/Slow paddles, except the minimum width shall be 24-inches, for the flagging operations. During hours of darkness flagger stations shall be illuminated to insure that flaggers can be easily seen without causing

glare to the traveling public. The Contractor shall develop and use a method to ensure that flaggers have adequate warning of objects approaching from behind the flagger.

All flaggers shall start a new job with an on-site orientation. This orientation must include, but not be limited to, the flagger's role and location on the job site, equipment, traffic patterns, communications and hazards specific to the work site.

If off-duty uniformed police officers are not available for traffic control for Work within signalized intersections, Contractor may provide four flaggers. Flaggers are not permitted within the intersection. Each flagger shall control only one approach and be stationed near the stop bar. Provide a minimum of a series of three warning signs in advance of each flagger. Narrow multi-lane approaches to a single lane approaching the flagger. Provide and require all flaggers use two-way radios to signal each other to prevent conflicts and hold traffic when construction activities require.

When the Bid proposed includes an item for "Traffic Control Labor," the Work covered by this item shall be for the labor actually used when authorized by the Engineer for:

1. The services of flaggers at both ends of a 2-way, single lane operation; or
2. The services of flaggers at signalized intersections if off-duty uniformed police officers are not available, or when otherwise specifically directed by the Engineer.

The hours eligible for "Traffic Control Labor" shall be for the hours actually worked, plus 1 hour of on-site orientation per flagger. "Show-up time" will not be counted. The labor to perform the Work described in the item "Maintenance and Protection of Traffic Control" is specifically excluded from this Work. No adjustment will be made to the unit price for "Traffic Control Labor" for overtime or holiday hours worked.

1-10.3(4)A Traffic Control - Off-Duty Police Officer

Contractor shall provide off-duty uniformed Police Officer for traffic control at all signalized intersections. Acceptable sources for off-duty uniformed Police Officers are as follows in order of preference:

1. City of Everett Police Department, contact either,
 - a. Officer Rey Palacol, (360) 850-9507
 - b. Detective Todd Israel, (425) 740-4951
 - c. Officer Omar Estrada, (425) 512-7186
2. Puget Sound Executive Service, 625 B 5th Ave, Ste 4, Sequim, WA 98382
 - a. Contact Nick Janssen, (360) 681-7737

1-10.3(5) Construction Signs

All signs required by the approved traffic control plan(s) as well as any other appropriate signs prescribed by the Engineer will be furnished by the Contractor and be paid under the item "Maintenance and Protection of Traffic Control." The Contractor shall erect them on posts or supports and maintain them in a clean, neat, and presentable condition until the necessity for them has ceased. All non-applicable signs shall be removed or covered with either metal or plywood during periods when they are not needed. When the need for any of these signs has ceased, the Contractor, upon approval of the Engineer, shall take down these signs, posts, or supports. All signs, posts, and supports shall be removed from the project and shall remain the property of the Contractor.

There shall be no separate classification of signs. All construction signs, whether used throughout the construction, during a major phase of construction or removed daily shall be paid under the item "Maintenance and Protection of Traffic Control." Portable or temporary mountings may require added weight for stability. If it is necessary to add weight to the signs, only a bag of sand that will rupture on impact shall be used. The bag of sand shall have a maximum weight of 40 pounds and shall be suspended no more than 1-foot from the ground.

The Work to provide the construction signing shall be:

1. Furnishing all construction signs.
2. Furnishing, removing, and disposing of the posts or supports for the signs.
3. Initial installation and subsequent removal of all construction signs.
4. Furnishing labor and materials for maintaining the signs in a clean and presentable condition;
5. All other incidentals necessary for providing the construction signs according to the approved traffic control plan(s).

Signs, posts, or supports that are lost, stolen, destroyed, or which the Engineer deems to be unacceptable, while their use is required on the project, shall be replaced by the Contractor without additional compensation.

1-10.4 *Measurement*

Delete 1-10.4 and substitute the following:

1-10.4 *Measurement*

1-10.4(1) General

(*****)

When the Bid Proposal does not include an item for any necessary traffic control, all costs for traffic control shall be included, by the Contractor, in the unit contract price for the various other items of Work in the Bid Proposal. The Contractor shall estimate these costs based on the contemplated work procedures.

When traffic control items are included in the Bid Proposal, payment is limited to the following areas:

The entire project area under the Contract and for a distance to include the initial warning signs for the beginning of the Project and the end of construction. Warning signs for side roads on the approved traffic control plan are also included. If the project consists of two or more sections, the limits will apply to each section individually.

A detour provided in the Plans or approved by the Engineer for by-passing all or any portion of the construction, irrespective of whether or not the termini of the detour are within the limits of the Contract.

The provisions of Section 1-04.6 will not apply to traffic control or traffic control items. However, the item "Maintenance and Protection of Traffic Control" will be considered for an equitable adjustment only when the total Contract price increases or decreases by more than 25 percent.

The measurement and payment for the items included in the Bid Proposal for traffic control costs incurred within the limits of 1 and 2 above will be made to the Contractor by the City as described in these Special Provisions.

1-10.4(2) Measurement
(***)**

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

1-10.5 Payment

Delete 1-10.5 and substitute the following:

1-10.5 Payment
(***)**

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

ADD NEW SECTION 1-11

1-11 MISCELLANEOUS
(***)****1-11.1 Construction**

Contractor acknowledges that it has read the Contract Documents, understands them and agrees to be bound by them.

1-11.2 Applicable Law and Choice of Forum

This Contract and the parties' obligations hereunder shall be governed, construed, and enforced in accordance with the laws of the State of Washington. The parties agree that Snohomish County Superior Court, in the State of Washington, shall be the exclusive forum for any action.

1-11.3 Severability

In the event that any provision of the Contract Documents is held invalid, void, illegal or unenforceable, the remainder of the Contract Documents shall not be impaired or affected thereby, and each term, provision, and part shall continue in full force and effect.

1-11.4 Headings for Convenience

The section and subsection headings used herein are for referral and convenience only, and shall not be used to construe or interpret the Contract Documents.

1-11.5 Waiver

No waiver of one right or remedy shall act as a waiver of any other right or remedy or as a subsequent waiver of the same right or remedy. The waiver by either party of any term or condition of this Contract shall not be deemed to constitute a continuing waiver thereof nor of any further or additional right that such party may hold under this Contract.

1-11.6 City of Everett Business License

Contractor and Contractor's Subcontractors shall have a City of Everett business license prior to performing any Work pursuant to this Agreement.

1-11.7 Compliance with Federal, State and Local Laws

Contractor shall comply with and obey all federal, state and local laws, regulations, and ordinances applicable to the operation of its business and to its performance of Work

hereunder. If, and to the extent, this Contract receives financial assistance from federal, state or private agencies, Contractor shall comply with all terms and conditions prescribed for third party contracts in the grant and all said terms and conditions shall be deemed incorporated in the Contract Documents. Terms and conditions of any such grant take precedence over conflicting terms and conditions in the Contract Documents.

1-11.8 Complete Agreement

These Contract Documents contain the complete and integrated understanding and Agreement between the parties and supersedes any understanding, agreement or negotiation, whether oral or written, not set forth herein.

1-11.9 Successors Bound

The grants, covenants, provisions and claims, rights, powers, privileges and liabilities contained in the Contract Documents shall be read and held as made by and with, and granted to and imposed upon, the Contractor and the City and their respective heirs, executors, administrators, successors and assigns.

1-11.10 Effective Date

When duly executed by both the City and Contractor, this Contract shall be effective as of the date the Contract is signed by the Mayor of the City of Everett.

1-11.11 Contractor Registration

Contractor represents and warrants it is a contractor duly registered and in good standing with the Washington State Department of Labor and Industries.

1-11.12 Electronic Signature

Signatures on Change Orders or any other Contract Document or any other document referred to herein may be by ink signature, AdobeSign, DocuSign, or any other e-signature method or any pdf scan thereof, and any such signature will have full force and effect.

END OF DIVISION 1

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DIVISION 2 – EARTHWORK

2-01 CLEARING, GRUBBING AND ROADSIDE CLEANUP

2-01.2 Disposal of Usable Material and Debris

Supplement 2-01.2 by adding the following:

When requested by the property owner, trim trees of sufficient size for firewood, cut into two-foot rounds and neatly stack on adjacent property. Remove and dispose of stumps, large roots, limbs and branches.

2-01.2(1) Disposal Method No.1 – Open Burning

Delete the first paragraph and substitute the following.

Opening burning is not permitted within the city limits.

2-01.4 Measurement

Delete all paragraphs of 2-01.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

2-01.5 Payment

Delete all paragraphs in 2-01.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

If there is no bid item to cover clearing and grubbing, then clearing and grubbing shall be included with other work with no direct compensation made.

2-02 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

2-02.1 Description

Delete 2-02.1 and substitute the following:

The Work shall consist of the removal, disposal or abandoning in-place of various existing improvements including, but not limited to, pavements, structures, pipe, curbs, curb and gutter, gutter, valves, manholes, catch basins and other items necessary for the accomplishment of the improvement.

All Work with asbestos-cement pipe shall conform to the "Recommended Standard Asbestos-Cement Pipe Work Practice Procedure and Training Requirements," latest edition, as published by the American Water Works Association, Pacific Northwest Section. Remove and dispose of Asbestos-Cement pipe in accordance with the practices specified by the State of Washington Department of Ecology and the Snohomish County Solid Waste Division.

2-02.3 Construction Requirements

2-02.3(2) Removal of Bridges, Box Culverts and Other Drainage Structures

Supplement 2.02.3(2) by adding the following:

When removing structures such as manholes, inlets, or vaults that interfere with the construction, properly plug all pipe openings abandoned in-place watertight with Commercial Concrete, or with mortar and masonry, blocks or brick.

Backfill voids with suitable job excavated material where structures are removed. Compact suitable backfill material in accordance with 2-03.3(14)C.

If the Engineer determines the job-excavated material unsuitable for backfill then Contractor shall obtain Gravel Borrow or CDF as directed, to complete backfilling the voids. If a pay item for Gravel Borrow or CDF is not included in the Proposal, then providing Gravel Borrow or CDF for backfill shall be considered as Extra Work under 1-04.4.

2-02.3(3) Removal of Pavement, Sidewalks, Curbs, and Gutters

Delete 2-02.3(3) and substitute the following:

2-02.3(3) Removal of Existing Street Improvements (***)**

2-02.3(3)A Description

The Work shall consist of the removal and disposal of various existing improvements including, but not limited to, pavements, curb, curb and gutter, gutter and other items necessary for the accomplishment of the improvement.

2-02.3(3)B Removal of Pavement

Remove full depth existing permanent type pavement and driveway pavement shown on the Plans or as directed by the Engineer.

Replace, at no expense to the City, existing pavement designated to remain that is damaged during the pavement or concrete base removal.

2-02.3(3)B1 Sawcutting

Make vertical full depth saw cut between existing asphalt concrete pavement, to remain and the portion to be removed.

Where asphalt concrete pavement overlays cement concrete pavement base, saw cut in accordance with 2-02.3(6) Sawing and Line Drilling.

2-02.3(3)C Removal of Curb, Curb and Gutter

Remove existing curbs where shown on the Plans or where encountered in the Work and designated by the Engineer.

Existing curb and gutter includes, but is not limited to, cement concrete, cement concrete curb with a brick gutter and a cement concrete back, or other combinations of rigid materials. Remove the entire curb and gutter section, regardless of material composition.

2-02.3(3)C1 Sawcutting

Make vertical full depth saw cut between existing curb or curb and gutter to remain and the portion to be removed.

2-02.3(3)D Removal of Cement Concrete Sidewalks

Concrete slabs that average four-inches or less in thickness will be considered as sidewalk removal.

Protect existing concrete walk that is to remain in place, from equipment damage by using planking or cover with rock free eight-inch thick blanket of excavated soil.

Provide Engineer with proposed pavement breakers before use and do not begin breaking pavement without Engineer's approval of the pavement breakers.

2-02.3(3)D1 Sawcutting

Make vertical full depth saw cut between existing cement concrete sidewalk to remain and the portion to be removed at the nearest scribe marks beyond the neat line limits, or to the nearest joint.

No diagonal cuts in sidewalk will be allowed unless otherwise indicated on the Plans or directed by the Engineer.

2-02.3(3)E Removal of Catch Basins, Manholes, Inlets or Sumps

Excavate and completely remove the structure including, but not limited to, casting and outlet trap, concrete encasement and bricks, as applicable to each removal item listed in the Proposal.

Plug existing connecting pipes that remain by filling with Commercial Concrete a minimum length of 24-inches into the pipe. Backfill shall be Gravel Borrow as specified in 9-03.14(1). Compact backfill to a minimum of 95 percent maximum density in accordance with 2-03.3(14)D.

2-02.3(4) Obliteration of Pavement Markings

(*****)

Remove pavement markings where shown on the Plans or where designated by the Engineer. Obliterate pavement marking until blemishes caused by the pavement marking removal conform to the coloration of the adjacent pavement. If the pavement is materially damaged by pavement marking removal operation, Contractor shall repair the pavement damage, at the Contractor's expense, to a condition equal to existing pavement that had no markings obliterated. Remove sand or other material deposited on the pavement as a result of removing stripes and markings as the Work progresses to avoid hazardous conditions. Accumulation of sand or other material that might interfere with drainage will not be permitted.

2-02.3(5) Abandon Pipe In-place

(*****)

Plug pipe ends of pipes designated on Plans being abandoned in-place using commercial concrete. If designated on Plans, fill abandoned in-place pipe with Controlled Density Fill as specified in 2-09.3(1)E.

2-02.3(6) Sawing and Line Drilling

(*****)

Saw-cut to full depth mortared decorative or special pavement including, but not limited to, brick, cobblestone or paver block along a neat line with intent of salvaging as many units as possible.

When line drilling, drill holes at maximum center-to-center spacing of six-inches. Drill holes perpendicular to the surface and penetrate completely through the pavement.

When the Plans indicate, or the Engineer requires, saw-cutting pavement that is comprised of a rigid base and asphalt overlay, saw cut the rigid base to the minimum depth as follows:

- a. For concrete rigid base, saw cut to a depth of 2/3 the thickness of the rigid base.
- b. For rigid base constructed with mortared decorative or special pavement including, but not limited to, brick, cobblestone, or paver block, or a combination of such materials saw cut to full depth of the rigid base along a neat line with intent to salvage as many special pavement units as possible.

2-02.3(7) Salvage**(*****)**

Carefully salvage and deliver to the Owner in good condition, all materials of recoverable value taken from the discarded facilities, unless otherwise indicated. Materials and things deemed of no value by the Engineer shall become the Contractor's property to be removed and properly disposed.

Remove excess concrete, debris and dirt from castings and other materials the Engineer designates suitable for salvage and that are not to be re-used elsewhere on the Project. Deliver salvage castings and materials to the location designated by the Engineer.

2-02.3(8) Waste Disposal**(*****)**

Provide waste site for disposal of materials not required for construction. Arrange waste disposal at no expense to the City. Waste disposal shall meet the requirements of 2-03.3(7)C of the Standard Specifications.

2-02.3(9) Abandon Existing Water Valves In-place**(*****)**

Prior to abandoning existing water valves in-place, coordinate with City to have City forces close valve. After City forces verify valve is closed, remove valve box and extension, if any, and backfill with Gravel Borrow as specified in 9-03.14(1). Compact backfill to a minimum of 95 percent maximum density in accordance with 2-03.3(14)D.

2-02.4 Vacant

Revise 2-02.4 as follows:

2.02.4 Measurement

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

For curb and gutter cement removal with concrete pavement, the curb and gutter will be considered as pavement removal and the measurement for payment will be to the back of the curb.

2-02.5 Payment

Delete all paragraphs in 2-02.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

If there is no bid item to cover pavement removals, then they shall be included with the construction of the respective Work including, but not limited to, combined sewer pipe,

water main, water service line, manhole, side sewer pipe, storm drainpipe, catch basins, and underground utility vaults.

Include curb and gutter and sidewalk removal with construction of the respective Work including, but not limited to, combined sewer pipe, water main, water service line, manhole, side sewer pipe, storm drainpipe, catch basins, and underground utility vaults with no direct compensation made.

If there is no pay item for pipe abandonment, then it shall be included with the construction of the respective Work including, but not limited to, sewer or storm drainpipe, water main, manhole, catch basin or side sewer with no direct compensation made.

If there is no pay item for existing valve abandonment, then it shall be included with the construction of other items of Work with no direct compensation made.

2-03 ROADWAY EXCAVATION AND EMBANKMENT

2-03.1 Description

Supplement 2-03.1 by adding the following:

This Work applies to street pavement patching and street reconstruction after completion of utility work. Grading for street reconstruction shall conform to COE Standard Drawing No. 302, unless otherwise noted on the Plans. Grading for pavement patching shall conform to COE Standard Drawing No. 326, unless otherwise noted on the Plans.

2-03.2 Vacant

Revise 2-03.2 as follows:

2.03.2 Materials

Materials shall meet the requirements of the following:

Foundation Material Class A or B	9-03.17	Standard Specifications
Gravel Borrow	9-03.14(1)	Standard Specifications

2-03.3 Construction Requirements

Supplement 2-03.3 by adding the following:

Blasting is not allowed within the City limits of Everett.

Use suitable excavated material for roadway embankments. Dispose of surplus excavated material or unsuitable material in accordance with 2-03.3(7).

Engineer will not approve payment for unauthorized excavation or embankment, or both, beyond the limits indicated on the Plans. Return areas of unauthorized excavation or embankment, or both, to their original conditions or better at the Contractor's expense.

Fine grading in fill or backfill areas shall begin within the top six inches of subgrade. Final grading shall produce a uniform surface within established tolerances and without abrupt changes in grade.

Construction requirements for pavement patching authorized by Engineer outside of Project limits shall be in accordance with Section 5-04 and City Standard Drawing No. 326 for existing asphalt concrete over prepared grade.

Provide temporary drainage to keep the subgrade free from standing water.

Ensure the top six inches of subgrade is free from rocks or cemented lumps larger than 2-1/2 inches in greatest dimension.

Excavate for curbs and gutters by accurately cutting to the cross-sections, grades, and elevations shown. Take care not to excavate below the specified grades. Maintain all excavations free from accumulation of detrimental quantities of leaves, brush, sticks, trash, and other debris.

2-03.3(2) Rock Cuts

Delete entire section."

2-03.3(3) Excavation Below Subgrade

Supplement 2-03.3(3) by adding the following:

Proof Rolling: Proof roll subgrade under the roadway with a fully loaded tandem truck following trench backfilling and grading to subgrade to identify soft or loose areas in the subgrade. In areas where the subgrade does not stand up to the proof roll, over excavate the subgrade and replace with imported Foundation Material Class A or B or Gravel Borrow, as determined by the Engineer, to bring the subgrade up to the proper compaction and grade. Compact backfill material in accordance with 2-03.3(3).

2-03.3(7) Disposal of Surplus Material

2-03.3(7)C Contractor-Provided Disposal Site

Delete the first paragraph of 2-03.3(7)C and substitute the following:

Make arrangements for disposal of surplus and other materials. All costs for disposal of surplus and other materials shall be included with the respective Bid items of the Contract with no direct compensation being made.

Dispose of Asbestos-cement pipe in accordance with the requirements of the State of Washington Department of Ecology and the Snohomish County Solid Waste Division.

2-03.4 Measurement

Delete all paragraphs under 2-03.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Items Descriptions and provided in Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

2-03.5 Payment

Delete all paragraphs under 2-03.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

There will be no direct compensation made for haul on material moved within or from the Project site and the Contractor shall include the cost of hauling in his various unit contract prices.

There will be no direct compensation made for "Proof Rolling" as required in this section for excavated portions of the roadway and the Contractor shall include costs in his various unit Contract prices.

Payment for over excavation below subgrade and disposal of over excavated materials as required in this section shall be included in the Bid item for Foundation Material.

Imported material required in this section shall be paid for by the unit Bid price for that material. Payment for placement and compaction of import material shall be included in the unit price per ton of import material.

2-04 HAUL

2-04.1 Description

Delete the first paragraph of 2-04.1 and substitute the following:

This Work shall consist of transporting excavated material from its original site to its final place on the Project or to a Contractor arranged waste site.

2-04.3 Vacant

Revise 2-04.3 to read as follows:

2-04.3 Construction Requirements

Off-highway earth-moving equipment shall not haul on or across streets, roadways, driveways, trails, sidewalks or parking lots not being improved in the Contract.

2-04.4 Measurement

Revise 2-04.4 to read as follows:

Haul work will not be measured.

2-04.5 Payment

Revise 2-04.5 to read as follows:

All costs for the Work described in Section 2-04 shall be included with excavation work with no direct compensation made.

2-06 SUBGRADE PREPARATION

Supplement 02-06 by adding the following:

The contractor will prepare the subgrade by rough grading and compacting it to 95% compaction so it is ready for placement of base materials. See Division B for measurement and payment of "Site Grading"

2-07 WATERING

2-07.3 Construction Requirements

Supplement 2-07.3 by adding the following:

Only Everett Public Works Department Water Division personnel and the Project Inspector may authorize the operation of City fire hydrants or making connections to City water mains. Upon obtaining City permission, the following shall apply:

1. Use only those agency designated hydrants in strict accordance with City's requirements for hydrant use. Obtain a temporary hydrant permit from the City's Public Works Department Water Division. Temporary hydrant permits are available for a \$1,200.00 deposit by contacting the City of Everett's Utility Billing at 425-257-8999 from 8:00 a.m. to 5:00 p.m. Monday through Friday. Deposit is refundable. Provide backflow prevention assembly approved by the City.

2. Secure permission from and comply with all requirements of the City's water utility before obtaining water from the fire hydrants. Notify the Engineer of City's permission as soon as granted.
3. Use hydrant wrenches only to open hydrants. Make certain the hydrant valve is fully open because "cracking" the hydrant valve causes damage to the hydrant valve. Provide an approved auxiliary valve on the outlet line for control purposes. Close fire hydrant valves slowly to avoid a surge in the system that creates excess pressure on water lines. Carefully note the importance of following these directions.
4. If Contractor's employees use the wrong wrench to open a hydrant causing damage the hydrant valve stem or operating nut or both, the Contractor shall be responsible for costs associated with repairing the damaged hydrant valve stem or operating nut or both. Immediately notify the City's water utility so that the damage can be repaired as quickly as possible.
5. Notify City water utility immediately upon completing the use of the hydrants so the hydrants may be inspected for possible damage. City water utility will repair damage resulting from the use of the hydrants by the Contractor. Contractor shall be responsible for repair cost and cost, if necessary, shall be withheld from the final payment to the Contractor.
6. City water utility will fine Contractor for violation of these requirements. Contractor shall also be liable for damage suits resulting from malfunctioning of Contractor damaged fire hydrants not being operational in the event of fire.
7. There will be no charge for the volume of water used.

2-07.4 Measurement

Revise 2-07.4 to read as follows:

Water will not be measured.

2-07.5 Payment

Revise 2-07.5 to read as follows:

All costs for the Work described in Section 2-07 shall be included with the Work with no direct compensation made.

2-09 STRUCTURE EXCAVATION

2-09.2 Materials

Supplement 2-09.2 by adding the following at end of the materials list:

Foundation Material Class A or B 9-03.17 Standard Specifications

2-09.3 Construction Requirements

2-09.3(1) General Requirements

2-09.3(1)C Removal of Unstable Base Material

Delete all paragraphs in 2-09.3(1)C and substitute the following:

When the material at the bottom of an excavation is not stable enough to support the Structure, the Contractor shall excavate below grade to the depth required by the Engineer and replace the unstable material with Foundation Material Class A or B.

Place Foundation Material Class A or B in layers not more than six inches thick and compact to minimum of 90-percent maximum density as determined by 2-03.3(14)D.

Dispose of unsuitable material removed to make room for foundation material by hauling to a waste site obtained and provided by the Contractor in accordance with 2-03.3(7)C.

2-09.3(1)D Disposal of Excavated Material

Delete the second paragraph in 2-09.3(1)D and substitute the following:

All costs for disposing of excavated material, whether within the Project limits or hauled to a disposal site, shall be incidental to the other Bid items in the Proposal. The City will not pay for hauling. Disposal of excavated material shall meet the requirements of 2-03.3(7)C.

2-09.3(1)E Backfilling

Delete the fourth paragraph in 2-09.3(1)E and substitute the following:

Provide CDF having minimum 28-day strength of 50 psi and maximum 28-day strength not to exceed 300-psi. Provide wet or flowable CDF with consistency having approximate slump between three to ten inches.

Controlled Density Fill used for excavation backfill may be placed dry or wet. Use wet, or flowable, CDF for filling abandoned pipes in-place.

Supplement 2-09.3(1)E by adding the following:

Where CDF is used in lieu of other materials such as foundation material, gravel borrow, washed sand or crushed surfacing top course, the respective limits for trench width or backfill dimensions shall be approved by the Inspector.

2-09.3(3)B Excavation Using Open Pits – Extra Excavation

Supplement 2-09.3(3)B, Submittals and Design Requirements, with the following:

The Contractor shall submit Type 3E Working Drawings with supporting calculations showing the geometry and construction sequencing of the proposed excavation slopes.

2-09.3(3)D Shoring and Cofferdams

Revise the fifth paragraph to read as follows:

Submittals and Design Requirements – The Contractor shall submit Type 3E Working Drawings with supporting calculations showing the proposed methods and construction details of structural shoring or cofferdams in accordance with Sections 1-05.3 and 6-02.3(16).

2-09.4 Measurement

Delete all paragraphs in 2-09.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

2-09.5 *Payment*

Delete all paragraphs in 2-09.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

When there is no bid item for “Structure Excavation” in the Proposal, all Work in this section shall be included with the respective Bid Items of the Contract with no direct compensation made.

2-11 TRIMMING AND CLEANUP

2-11.3 *Construction Requirements*

Supplement 2-11.3 by adding the following after item 6:

7. Keep City streets clean and free from mud, dirt and other debris.

Further supplement 2-11.3 by adding the following:

Keep the Project site in a neat and orderly condition during the process of construction with as little disruption to the adjoining properties as practical under the conditions.

Promptly and as often as needed cleanup debris resulting from Contractor’s operations from drainage facilities such as inlets, catch basins, culverts and open ditches.

Remove and dispose of all construction stakes.

Upon Project completion, clean Project area and neatly dress slopes to present a uniform appearance blending into the contour of adjacent properties. Remove trash of all kinds resulting from construction operations.

2-11.4 *Vacant*

Revise 2-11.4 to read as follows:

2-11.4 *Measurement*

Delete all paragraphs in 2-11.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

2-11.5 *Payment*

Delete all paragraphs in 2-11.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

When there is no bid item for “Trimming and Cleanup” in the Proposal, all Work in this section shall be included with other Work with no direct compensation made.

END OF DIVISION 2

DIVISION 5 – SURFACE TREATMENTS AND PAVEMENTS

5-04 HOT MIX ASPHALT

Delete 5-04 and substitute the following:

5-04.1 Description

Work shall consist of providing and placing one or more layers of plant-mixed hot mix asphalt (HMA) on a prepared foundation or base in accordance with these Specifications and the lines, grades, thicknesses, and typical cross-sections shown in the Plans. The manufacture of HMA may include warm mix asphalt (WMA) processes in accordance with these Specifications. WMA processes include organic additives, chemical additives, and foaming.

Provide HMA composed of asphalt binder and mineral materials as may be required, mixed in the proportions specified to provide a homogeneous, stable, and workable mixture.

5-04.2 Materials

Provide materials meeting the requirements of the following sections:

Asphalt Binder	9-02.1(4)	Standard Specifications
Cationic Emulsified Asphalt	9-02.1(6)	Standard Specifications
Anti-Stripping Additive	9-02.4	Standard Specifications
HMA Additive	9-02.5	Standard Specifications
Aggregates	9-03.8	Standard Specifications
Recycled Asphalt Pavement	9-03.8(3)B	Standard Specifications
Mineral Filler	9-03.8(5)	Standard Specifications
Recycled Material	9-03.21	Standard Specifications
Portland Cement	9-01	Standard Specifications
Sand	9-03.1(2)	Standard Specifications
(As noted in 5-04.3(5)C for crack sealing)		
Joint Sealant	9-04.2	Standard Specifications
Foam Backer Rod	9-04.2(3)A	Standard Specifications

The Contractor may use up to 20 percent RAP by total weight of HMA with no additional sampling or testing of the RAP. Sample and test the RAP at a frequency of one sample for every 1,000 tons produced and not less than two samples per project. Report the asphalt content and gradation test data to the City when submitting the mix design for approval on the QPL. Include the RAP as part of the mix design as defined in these Specifications.

Provide the grade of asphalt binder as required by the Contract. Blending of asphalt binder from different sources is not permitted.

The Contractor may only use warm mix asphalt (WMA) processes in the production of HMA with 20 percent or less RAP by total weight of HMA. Submit to the Engineer for approval the process that is proposed and how it will be used in the manufacture of HMA.

For production of aggregates comply with the requirements of Section 3-01.

For preparation of stockpile site, the stockpiling of aggregates, and the removal of aggregates from stockpiles comply with the requirements of Section 3-02.

5-04.2(1) How to Get an HMA Mix Design on the QPL

If the contractor wishes to submit a mix design for inclusion in the Qualified Products List (QPL), please follow the WSDOT process outlined in Standard Specification 5-04.2(1).

5.40.2(1)A Vacant**5-04.2(2) Mix Design – Obtaining Project Approval**

Do NOT begin paving prior to the approval of the mix design by the Engineer.

Nonstatistical evaluation will be used for all HMA not designated as Commercial HMA in the Contract Documents.

Commercial evaluation will be used for Commercial HMA and for other classes of HMA in the following applications: sidewalks, road approaches, paths, trails, and pavement repair. Obtain approval from Project Engineer for other nonstructural applications of HMA accepted by commercial evaluation. Sampling and testing of HMA accepted by commercial evaluation will be at the option of the Project Engineer. The Proposal quantity of HMA that is accepted by commercial evaluation will be excluded from the quantities used in the determination of nonstatistical evaluation.

Nonstatistical Mix Design. Provide fifteen days prior to the first day of paving one of the following mix design verification certifications for City review;

- a. The WSDOT Mix Design Evaluation Report from the current WSDOT QPL, or one of the mix design verification certifications listed below.
- b. The proposed HMA mix design on WSDOT Form 350-042 with the seal and certification (stamp & signature) of a valid licensed Washington State Professional Engineer.
- c. The Mix Design Report for the proposed HMA mix design developed by a qualified City or County laboratory that is within one year of the approval date.**

**The mix design shall be performed by a lab accredited by a national authority such as Laboratory Accreditation Bureau, L-A-B for Construction Materials Testing, The Construction Materials Engineering Council (CMEC's) ISO 17025 or AASHTO Accreditation Program (AAP) and shall supply evidence of participation in the AASHTO: resource proficiency sample program.

Mix designs for HMA accepted by Nonstatistical evaluation shall;

- a. Have the aggregate structure and asphalt binder content determined in accordance with WSDOT Standard Operating Procedure 732 and meet the requirements of Sections 9-03.8(2), except that Hamburg testing for ruts and stripping are at the discretion of the Engineer, and 9-03.8(6).
- b. Have anti-strip requirements, if any, for the proposed mix design determined in accordance with AASHTO T 283 or T 324, or based on historic anti-strip and aggregate source compatibility from previous WSDOT lab testing.

At the discretion of the Engineer, City may accept verified mix designs older than 12 months from the original verification date with a certification from the Contractor that the materials and sources are the same as those shown on the original mix design.

Commercial Evaluation: Approval of a mix design for "Commercial Evaluation" will be based on a review of the Contractor's submittal of WSDOT Form 350-042 (For commercial mixes, AASHTO T 324 evaluation is not required) or a Mix Design from the

current WSDOT QPL or from one of the processes allowed by this section. Testing of the HMA by the City for mix design approval is not required.

For the Bid Item Commercial HMA, select a class of HMA and design level of Equivalent Single Axle Loads (ESAL's) appropriate for the required use.

5-04.2(2)B Using Warm Mix Asphalt Process

The Contractor may elect to use additives that reduce the optimum mixing temperature or serve as a compaction aid for producing HMA. Additives include organic additives, chemical additives and foaming processes. The use of Additives is subject to the following:

- a. Do not use additives that reduce the mixing temperature more than allowed in Section 5-04.3(6) in the production of mixtures.
- b. Before using additives, obtain the Engineer's approval using WSDOT Form 350-076 to describe the proposed additive and process.

5-04.3 Construction Requirements

5-04.3(1) Weather Limitations

Do not place HMA for wearing course on any Traveled Way beginning October 1st through March 31st of the following year without written concurrence from the Engineer.

Do not place HMA on any wet surface, or when the average surface temperatures are less than those specified in Table 1, or when weather conditions otherwise prevent the proper handling or finishing of the HMA.

Table 1 - Minimum Surface Temperature for Paving

Compacted Thickness (Feet)	Wearing Course	Other Courses
Less than 0.10	55°F	45°F
0.10 to .20	45°F	35°F
More than 0.20	35°F	35°F

5-04.3(2) Paving Under Traffic

Apply the requirements of this Section when the Roadway being paved is open to traffic.

Keep intersections open to traffic at all times, except; when paving the intersection or paving across the intersection. During such time, and provided that there has been an advance warning to the public, the intersection may be closed for the minimum time required to place and compact the mixture. In hot weather, the Engineer may require the application of water to the pavement to accelerate the finish rolling of the pavement and to shorten the time required before reopening to traffic.

Before closing an intersection, place advance warning signs and signs marking the detour or alternate route.

During paving operations, maintain temporary pavement markings throughout the project. Install temporary pavement markings on the Roadway prior to opening to traffic. Provide temporary pavement markings in accordance with Section 8-23.

Include all costs in connection with performing the Work in accordance with these requirements, except the cost of temporary pavement markings, in the unit Contract prices for the various Bid items involved in the Contract.

5-04.3(3) Equipment**5-04.3(3)A Mixing Plant**

Provide plants used for the preparation of HMA conforming to the following requirements:

1. **Equipment for Preparation of Asphalt Binder** – Equip tanks for the storage of asphalt binder to heat and hold the material at the required temperatures. Accomplish the heating by steam coils, electricity, or other approved means so that no flame is in contact with the storage tank. Provide the circulating system for the asphalt binder designed to ensure proper and continuous circulation during the operating period. Provide a valve for the purpose of sampling the asphalt binder placed in either the storage tank or in the supply line to the mixer.
2. **Thermometric Equipment** – Provide an armored thermometer, capable of detecting temperature ranges expected in the HMA mix, fixed in the asphalt binder feed line at a location near the charging valve at the mixer unit and location convenient and safe for access by Inspectors. Provide plant equipped with an approved dial-scale thermometer, a mercury actuated thermometer, an electric pyrometer, or another approved thermometric instrument placed at the discharge chute of the drier to automatically register or indicate the temperature of the heated aggregates. Provide device in full view of the plant operator.
3. **Heating of Asphalt Binder** – Provide heating so the temperature of the asphalt binder does not exceed the maximum recommended by the asphalt binder manufacturer nor be below the minimum temperature required to maintain the asphalt binder in a homogeneous state. Provide method to heat the asphalt binder in a manner that will avoid local variations in heating and provide a continuous supply of asphalt binder to the mixer at a uniform average temperature with no individual variations exceeding 25°F. Also, when a WMA additive is included in the asphalt binder, the temperature of the asphalt binder shall not exceed the maximum recommended by the manufacturer of the WMA additive.
4. **Sampling and Testing of Mineral Materials** – Provide HMA plant equipped with a mechanical sampler for the sampling of the mineral materials meeting the requirements of Section 1-05.6 for the crushing and screening operation. Provide for the setup and operation of the field testing facilities of the City as provided for in Section 3-01.2(2).
5. **Sampling HMA** – Provide for sampling HMA by one of the following methods:
 - a. A mechanical sampling device attached to the HMA plant.
 - b. Platforms or devices to enable sampling from the hauling vehicle without entering the hauling vehicle.

5-04.3(3)B Hauling Equipment

Provide trucks used for hauling HMA having tight, clean, smooth metal beds and a cover of canvas or other suitable material of sufficient size to protect the mixture from adverse weather. Securely attach cover whenever the weather conditions during the work shift include, or are forecast to include, precipitation or an air temperature less

than 45°F or when time from loading to unloading exceeds 30 minutes to protect the HMA.

Provide an environmentally benign means to prevent the HMA mixture from adhering to the hauling equipment. Drain excess release agent prior to filling hauling equipment with HMA. Do NOT use petroleum derivatives or other coating material that contaminate or alter the characteristics of the HMA. For live bed trucks, the conveyer shall be in operation during the process of applying the release agent.

5-04.3(3)C Pavers

Provide HMA pavers that are self-contained, power-propelled units, with an internally heated vibratory screed and shall be capable of spreading and finishing courses of HMA plant mix material in lane widths required by the paving section shown in the Plans.

Provide HMA paver in good condition and have the most current equipment available from the manufacturer for the prevention of segregation of the HMA mixture installed in good condition and in working order. Provide equipment certification listing the make, model, and year of the paver and note retrofitting of any equipment.

Operate the screed in accordance with the manufacturer's recommendations and so it effectively produces a finished surface of the required evenness and texture without tearing, shoving, segregating, or gouging the mixture. Provide a copy of the manufacturer's recommendations upon City's request. Extensions producing the same results, including ride, density, and surface texture as obtained by the primary screed will be allowed. Do NOT use extensions without augers and an internally heated vibratory screed in the Traveled Way.

When specified in the Contract, reference lines for vertical control will be required. Place lines on both outer edges of the Traveled Way of each Roadway. Horizontal control utilizing the reference line will be permitted. Control the grade and slope for intermediate lanes automatically from reference lines or by means of a mat referencing device and a slope control device. When the finish of the grade prepared for paving is superior to the established tolerances and when, in the opinion of the Engineer, further improvement to the line, grade, cross-section, and smoothness can best be achieved without the use of the reference line, a mat referencing device may be substituted for the reference line. Substitution of the device will be subject to the continued approval of the Engineer. A joint matcher may be used subject to the approval of the Engineer. The reference line may be removed after the completion of the first course of HMA when approved by the Engineer. Whenever the Engineer determines that any of these methods are failing to provide the necessary vertical control, the reference lines will be reinstalled by the Contractor.

Furnish and install all pins, brackets, tensioning devices, wire, and accessories necessary for satisfactory operation of the automatic control equipment.

If the paving machine in use is not providing the required finish, the Engineer may suspend Work as allowed by Section 1-08.6. Thoroughly remove any cleaning or solvent type liquids spilled on the pavement before paving proceeds.

5-04.3(3)D Material Transfer Device or Material Transfer Vehicle

Provide a Material Transfer Device/Vehicle (MTD/V) with the Engineer's approval, unless otherwise required by the Contract.

Where an MTD/V is required by the contract, the Engineer may approve paving without an MTD/V, at the Contractor's request. The Engineer will determine if an equitable adjustment in cost or time is due.

Mix the MTD/V when used with the HMA after delivery by the hauling equipment and prior to laydown by the paving machine. Sufficiently mix the HMA to obtain a uniform temperature throughout the mixture. The length of the windrow for windrow elevator may be limited in urban areas or through intersections at the discretion of the Engineer.

To be approved for use, provide an MTV meeting the following:

1. Self-propelled vehicle, separate from the hauling vehicle or paver.
2. Not be connected to the hauling vehicle or paver.
3. May accept HMA directly from the haul vehicle or pick up HMA from a windrow.
4. Ability to mix the HMA after delivery by the hauling equipment and prior to placement into the paving machine.
5. Ability to mix the HMA sufficiently to obtain a uniform temperature throughout the mixture.

To be approved for use, provide an MTD meeting the following:

1. Ability to be positively connected to the paver.
2. May accept HMA directly from the haul vehicle or pick up HMA from a windrow.
3. Ability to mix the HMA after delivery by the hauling equipment and prior to placement into the paving machine.
4. Ability to mix the HMA sufficiently to obtain a uniform temperature throughout the mixture.

5-04.3(3)E Rollers

Provide vibratory, oscillatory steel wheel rollers, or pneumatic tire type rollers, in good condition and capable of reversing without backlash. Operate roller in accordance with the manufacturer's recommendations. When ordered by the Engineer for any roller planned for use on the project, provide a copy of the manufacturer's recommendation for the use of that roller for compaction of HMA. Provide sufficient number and weight of rollers to compact the mixture in compliance with the requirements of Section 5-04.3(10). The use of equipment that results in crushing of the aggregate will not be permitted. Rollers producing pickup, washboard, uneven compaction of the surface, displacement of the mixture or other undesirable results will not be permitted.

5-04.3(4) Preparation of Existing Paved Surfaces

Bring any irregular existing pavement surface or old base surface to a uniform grade and cross-section as shown on the Plans or approved by the Engineer.

Accomplish preleveling of uneven or broken surfaces over which HMA is to be placed by using an asphalt paver, a motor patrol grader, or by hand raking, as approved by the Engineer.

Provide compaction of preleveling HMA to the satisfaction of the Engineer and may require the use of small steel wheel rollers, plate compactors, or pneumatic rollers to

avoid bridging across preleveled areas by the compaction equipment. Provide Engineer approved compaction equipment used for the compaction of preleveling HMA.

Clean the entire surface of the pavement before construction of HMA on an existing paved surface. Entirely remove all fatty asphalt patches, grease drippings, and other objectionable matter from the existing pavement. Thoroughly clean all pavements or bituminous surfaces of dust, soil, pavement grindings, and other foreign matter. Fill all holes and small depressions with an appropriate class of HMA. Level and thoroughly compact the patched area surface. Obtain Engineer approval of the surface prior to the application of tack coat or paving.

Apply an asphalt tack coat to all paved surfaces that HMA is to be placed or abutted; except, that tack coat may be omitted from clean, newly paved surfaces at the Engineer's discretion. Uniformly apply tack coat to cover the existing pavement with a thin film of residual asphalt free of streaks and bare spots at a rate between 0.02 and 0.10 gallons per square yard of retained asphalt. Obtain application rate approval from Engineer. Apply a heavy application of tack coat to all joints. For Roadways open to traffic, limit the application of tack coat to surfaces that will be paved during the same working shift. Provide spreading equipment equipped with a thermometer to indicate the temperature of the tack coat material.

Do NOT allow equipment to operate on tacked surfaces until the tack has broken and cured. Repair tack coat if the Contractor's operation damages the tack coat prior to placement of the HMA.

Provide tack coat consisting of CSS-1 or CSS-1h emulsified asphalt. The CSS-1 and CSS-1h emulsified asphalt may be diluted once with water at a rate not to exceed one part water to one part emulsified asphalt. Provide tack coat having sufficient temperature such that it may be applied uniformly at the specified rate of application and not exceed the maximum temperature recommended by the emulsified asphalt manufacturer.

5-04.3(4)A Crack Sealing

5-04.3(4)A1 General

When the Proposal includes a pay item for crack sealing, seal all cracks 1/4- inch in width and greater.

Cleaning: Ensure that cracks are thoroughly clean, dry and free of all loose and foreign material when filling with crack sealant material. Use a hot compressed air lance to dry and warm the pavement surfaces within the crack immediately prior to filling a crack with the sealant material. Do NOT overheat pavement. Do NOT use direct flame dryers. Routing cracks is not required.

Sand Slurry: For cracks that are to be filled with sand slurry, thoroughly mix the components and pour the mixture into the cracks until full. Add additional CSS-1 cationic emulsified asphalt to the sand slurry as needed for workability to ensure the mixture will completely fill the cracks. Strike off the sand slurry flush with the existing pavement surface and allow the mixture to cure. Top off cracks that were not completely filled with additional sand slurry. Do NOT place the HMA overlay until the slurry has fully cured.

Provide sand slurry consisting of approximately 20 percent CSS-1 emulsified asphalt, approximately 2 percent portland cement, water (if required), and the remainder clean Class 1 or 2 fine aggregate per section 9-03.1(2). Thoroughly mix components and then pour into the cracks and joints until full. The following

day, top off any cracks or joints that are not completely filled with additional sand slurry. After the sand slurry is placed, strike off filler flush with the existing pavement surface and allow to cure. Do NOT place the HMA overlay until the slurry has fully cured. The requirements of Section 1-06 will not apply to the portland cement and sand used in the sand slurry.

In areas where HMA will be placed, use sand slurry to fill the cracks.

In areas where HMA will not be placed, fill the cracks as follows:

- a. Cracks 1/4- inch to 1 inch in width - fill with hot poured sealant.
- b. Cracks greater than 1 inch in width – fill with sand slurry.

Hot Poured Sealant: For cracks that are to be filled with hot poured sealant, apply the material in accordance with these requirements and the manufacturer's recommendations. Furnish a Type 1 Working Drawing of the manufacturer's product information and recommendations to the Engineer prior to the start of work, including the manufacturer's recommended heating time and temperatures, allowable storage time and temperatures after initial heating, allowable reheating criteria, and application temperature range. Confine hot poured sealant material within the crack. Clean any overflow of sealant from the pavement surface. If, in the opinion of the Engineer, the Contractor's method of sealing the cracks with hot poured sealant results in an excessive amount of material on the pavement surface, stop and correct the operation to eliminate the excess material.

5-04.3(4)A2 Crack Sealing Areas Prior to Paving

In areas where HMA will be placed, use sand slurry to fill the cracks.

5-04.3(4)A3 Crack Sealing Areas Not to be Paved

In areas where HMA will not be placed, fill the cracks as follows:

- a. Cracks 1/4 inch to 1 inch in width - fill with hot poured sealant.
- b. Cracks greater than 1 inch in width – fill with sand slurry.

5-04.3(4)B Vacant

5-04.3(4)C Vacant

5-04.3(6) Mixing

After the required amount of mineral materials, asphalt binder, recycling agent and anti-stripping additives have been introduced into the mixer, mix the HMA until complete and uniform coating of the particles and thorough distribution of the asphalt binder throughout the mineral materials is ensured.

Ensure the temperature of the HMA when discharged does not exceed the optimum mixing temperature by more than 25°F as shown on the reference mix design report or as approved by the Engineer. Also, when a WMA additive is included in the manufacture of HMA, ensure the discharge temperature of the HMA does not exceed the maximum recommended by the manufacturer of the WMA additive. A maximum water content of 2 percent in the mix, at discharge, will be allowed providing the water causes no problems with handling, stripping, or flushing. If the water in the HMA causes any of these problems, reduce the moisture content in accordance with Engineer's directions.

Storing or holding of the HMA in approved storage facilities for less than 24 hours will be permitted with Engineer's approval. Engineer will reject HMA held for more than 24 hours after mixing. Dispose of rejected HMA at no expense to the City. Provide the storage facility having an accessible device, indicating the amount of material in storage, located at the top of the cone or about the third point. Engineer will NOT accept HMA from the storage facility when the HMA in storage is below the top of the cone of the storage facility; except, as the storage facility is being emptied at the end of the working shift.

Size recycled asphalt pavement (RAP) utilized in the production of HMA prior to entering the mixer to produce a uniform and thoroughly mixed HMA. If there is evidence of the recycled asphalt pavement not breaking down during the heating and mixing of the HMA, immediately suspend the use of the RAP until Engineer approves changes necessary to provide adequate RAP breakdown and mixing. After introducing the required amount of mineral materials, RAP, new asphalt binder and asphalt rejuvenator into the mixer, mix the HMA until complete and uniform coating of the particles and thorough distribution of the asphalt binder throughout the mineral materials, and RAP is ensured.

5-04.3(7) Spreading and Finishing

Lay the mixture upon an approved surface, spread, and strike off to the established grade and elevation. Provide HMA pavers complying with Section 5-04.3(3) to distribute the mixture. Unless Engineer directs otherwise, provide the nominal compacted layer depth to NOT exceed the following:

HMA Class	Course	Maximum Compacted Layer Depth (FT)
1 inch	NA	0.35
3/4 & 1/2 inch	Wearing	0.30
3/4 & 1/2 inch	Other	0.35
3/8 inch	NA	0.15

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the paving may be done with other equipment or by hand.

When more than one JMF is being utilized to produce HMA, place the material produced for each JMF using separate spreading and compacting equipment. Do NOT intermingle HMA produced from more than one JMF. During a work shift place each strip of HMA to a single JMF established for the class of HMA specified, unless there is a need to make an adjustment in the JMF.

5-04.3(8) Aggregate Acceptance Prior to Incorporation in HMA

For HMA accepted by nonstatistical evaluation the aggregate properties of sand equivalent, uncompacted void content and fracture will be evaluated in accordance with Section 3-04. Sampling and testing of aggregates for HMA accepted by commercial evaluation will be at the Engineer's option.

5-04.3(9) HMA Mixture Acceptance

Engineer will use nonstatistical, or commercial evaluation for determining acceptance of HMA.

Engineer will use nonstatistical evaluation for the HMA acceptance, unless Contract specifies Commercial Evaluation.

Engineer will use Commercial evaluation for Commercial HMA and for other classes of HMA in the following applications: sidewalks, road approaches, paths, trails, temporary pavement, and pavement repair. Engineer will need to approve other nonstructural applications of HMA accepted by commercial evaluation. Sampling and testing of HMA accepted by commercial evaluation will be at the Engineer's option.

The mix design will be the initial JMF for the class of HMA. The Contractor may request a change in the JMF. Any adjustments to the JMF will require the Engineer's approval and may be made in accordance with this section.

5-04.3(9)A Test Sections

Delete this section and replace with the following.

5-04.3(9)A HMA Tolerances and Adjustments

(****)

Replacement

1. **Job Mix Formula Tolerances** – Provide mixture at the time of acceptance within the following tolerances:

For Asphalt Binder and Air Voids (Va), the acceptance limits are determined by adding the tolerances below to the approved JMF values. These values will also be the Upper Specification Limit (USL) and Lower Specification Limit (LSL) required in Section 1-06.2(2)D2.

Property	Non-Statistical Evaluation	Commercial Evaluation
Asphalt Binder	+/- 0.5%	+/- 0.7%
Air Voids, Va	2.5% min. and 5.5% max	N/A

For Aggregates in the mixture:

- a. First, determine preliminary upper and lower acceptance limits by applying the following tolerances to the approved JMF.

Aggregate Percent Passing	Non-Statistical Evaluation	Commercial Evaluation
1", ¾", ½", and 3/8" sieves	+/- 6%	+/- 8%
No. 4 sieve	+/- 6%	+/- 8%
No. 8 Sieve	+/- 6%	+/- 8%
No. 200 sieve	+/- 2.0%	+/- 3.0%

- b. Second, adjust the preliminary upper and lower acceptance limits determined from step (a) the minimum amount necessary so that none of the aggregate properties are outside the control points in Section 9-03.8(6). The resulting values will be the upper and lower acceptance limits for aggregates, as well as the USL and LSL required in Section 1-06.2(2)D2.

2. **Job Mix Formula Adjustments** – An adjustment to the aggregate gradation or asphalt binder content of the JMF requires Engineer's approval.

Adjustments to the JMF will only be considered if the change produces material of equal or better quality and may require the development of a new mix design if the adjustment exceeds the amounts listed below.

- a. **Aggregates** – 2 percent for the aggregate passing the 1½", 1", ¾", ½", ¾", and the No. 4 sieves, 1 percent for aggregate passing the No. 8 sieve, and 0.5 percent for the aggregate passing the No. 200 sieve. Provide the adjusted JMF within the range of the control points in Section 9-03.8(6).

- b. **Asphalt Binder Content** – The Engineer may order or approve changes to asphalt binder content. The maximum adjustment from the approved mix design for the asphalt binder content is 0.3 percent.

5-04.3(9)B Vacant

5-04.3(9)C Mixture Acceptance – Nonstatistical Evaluation

The City will evaluate the HMA mixture accepted by Nonstatistical Evaluation by dividing the HMA tonnage into lots.

5-04.3(9)C1 Mixture Nonstatistical Evaluation – Lots and Sublots

A lot is represented by randomly selected samples of the same mix design being tested for acceptance. A lot is defined as the total quantity of material or work produced for each Job Mix Formula placed. Only one lot per JMF is expected. A subplot will be equal to one day's production or 800 tons, whichever is less; except, the final subplot will be a minimum of 400 tons and may be increased to 1200 tons.

Collectively evaluate all test results obtained from the acceptance samples from a given lot. If the Contractor requests a change to the JMF that is approved, the material produced after the change will be evaluated on the basis of the new JMF for the remaining sublots in the current lot and for acceptance of subsequent lots. For a lot in progress with a CPF less than 0.75, a new lot will begin at the Contractor's request after the Engineer is satisfied that material conforming to the Specifications can be produced.

Perform sampling and testing for evaluation on the frequency of one sample per subplot.

5-04.3(9)C2 Mixture Nonstatistical Evaluation Sampling

Obtain samples for acceptance testing when ordered by the Engineer. Sample the HMA mixture in the presence of the Engineer and in accordance with AASHTO T 168. Take a minimum of three samples for each class of HMA placed on a project. If used in a structural application, test at least one of the three samples taken.

Sampling and testing HMA in a Structural application where quantities are less than 400 tons is at the Engineer's discretion.

For HMA used in a structural application and with a total project quantity less than 800 tons but more than 400 tons, perform a minimum of one acceptance test. In all cases, obtain a minimum of three samples at the point of acceptance. Test a minimum of one of the three samples for conformance to the JMF:

1. If the test results are found to be within specification requirements, additional testing will be at the Engineer's discretion.

5-04.3(9)C3 Mixture Nonstatistical Evaluation – Acceptance Testing

Testing of HMA for compliance of Va will be the City's option. If tested, compliance of Va will use WSDOT SOP 731.

Testing for compliance of asphalt binder content will be by WSDOT FOP for AASHTO T 308.

Testing for compliance of gradation will be by FOP for WAQTC T 27/T 11.

5-04.3(10) HMA Compaction Acceptance

Compact HMA mixture accepted by nonstatistical evaluation being used in traffic lanes; including lanes for intersections, ramps, truck climbing, weaving, and speed change, and having a specified compacted course thickness greater than 0.10-foot, to a specified level of relative density. The specified level of relative density shall be a Composite Pay Factor (CPF) of not less than 0.75 when evaluated in accordance with Section 1-06.2, using a LSL of 92.0 (minimum of 92 percent of the maximum density). Use WSDOT FOP for AASHTO T 729 to determine maximum density. The specified level of density attained will be determined by the evaluation of the density of the pavement. Use WSDOT FOP for WAQTC TM 8 to determine the density of the pavement; except, Engineer will have discretion regarding gauge correlation using the nuclear density gauge and WSDOT SOP 736 when using cores to determine density.

Tests for the determination of the pavement density will be taken in accordance with the required procedures for measurement by a nuclear density gauge or roadway cores after completion of the finish rolling.

If the City uses a nuclear density gauge to determine density, the City will use the test procedures FOP for WAQTC TM 8 and WSDOT SOP T 729 on the day the mix is placed and prior to opening to traffic.

Roadway cores for density may be obtained by either the City or the Contractor in accordance with WSDOT SOP 734. Provide minimum 4-inch core diameter, unless Engineer approves otherwise. The City will test Roadway cores in accordance with WSDOT FOP for AASHTO T 166.

If the Contract includes the Bid item "Roadway Core", obtain the cores in the presence of the Engineer on the same day the mix is placed and at Engineer designated locations. If the Contract does not include the Bid item "Roadway Core", then the City will obtain the cores.

For a lot in progress with a CPF less than 0.75, a new lot will begin at the Contractor's request after the Engineer is satisfied that material conforming to the Specifications can be produced.

Compact HMA mixture accepted by commercial evaluation and HMA constructed under conditions other than those listed above on the basis of a test point evaluation of the compaction train. Perform the test point evaluation in accordance with instructions from the Engineer. Use the number of passes with an approved compaction train required to attain the maximum test point density on all subsequent paving.

Thoroughly compact HMA for preleveling. Compact HMA used for preleveling wheel rutting with a pneumatic tire roller unless Engineer approves otherwise.

5-04.3(10)A Test Results

For a subplot that has been tested with a nuclear density gauge that did not meet the minimum of 92 percent of the reference maximum density in a compaction lot with a CPF below 1.00 and thus subject to a price reduction or rejection, the Contractor may request that a core be used for determination of the relative density of the subplot. The relative density of the core will replace the relative density determined by the nuclear density gauge for the subplot and will be used for calculation of the CPF and acceptance of HMA compaction lot.

When City takes cores at the Contractor's request, the City must receive request by noon of the next workday after the Contractor is provided with nuclear density test

results for the subplot. City will obtain core(s) from locations outside of wheel paths and as the Engineer determines. Provide traffic control in accordance with Engineer's direction. Failure by the Contractor to provide the requested traffic control will result in forfeiture of the request for cores. If the CPF for the lot based on the results of the HMA cores is less than 1.00, the City will deduct the cost for the coring from any monies due or that may become due the Contractor under the Contract at the rate of \$200 per core. In addition, the cost of the traffic control will also be the Contractor's responsibility.

5-04.3(10)B HMA Compaction – General Compaction Requirements

Compact mixture only when the mixture is in the proper condition so that no undue displacement, cracking, or shoving occurs. Compact areas inaccessible to large compaction equipment by other mechanical means. Remove and replace HMA that becomes loose, broken, contaminated, shows excess or deficiency of asphalt, or is in any way defective, with new hot mix. Immediately compact to conform to the surrounding area.

Provide type of rollers and their relative position in the compaction sequence to attain the specified densities. Operate rollers shall only in the static mode when the internal temperature of the mix is less than 175°F unless Engineer approves otherwise. Do NOT operate a roller, regardless of mix temperature, in a mode that results in checking or cracking of the mat. Only operate rollers in static mode on bridge decks.

5-04.3(10)C HMA Compaction – Cyclic Density

Low cyclic density areas are defined as spots or streaks in the pavement that are less than 90 percent of the theoretical maximum density. At the Engineer's discretion, the Engineer may evaluate the HMA pavement for low cyclic density and when doing so will follow WSDOT SOP 733. A \$500 Cyclic Density Price Adjustment will be assessed for any 500-foot section with two or more density readings below 90 percent of the theoretical maximum density.

5-04.3(10)D Vacant

5-04.3(10)E HMA Compaction – Test Point Evaluation

Replace this section with the following.

5-04.3(10)E HMA Nonstatistical Compaction

5-04.3(10)E1 HMA Nonstatistical Compaction – Lots and Sublots

City will perform acceptance testing on HMA compaction that is accepted by nonstatistical evaluation by dividing the project into compaction lots.

A lot is represented by randomly selected samples of the same mix design that will be tested for acceptance. A lot is defined as the total quantity of material or work produced for each Job Mix Formula placed. Only one lot per JMF is expected. A subplot is equal to one day's production or 400 tons, whichever is less, except; the final subplot will be a minimum of 200 tons and may be increased to 800 tons. Testing for compaction will be at the rate of 5 tests per subplot per WSDOT T 738.

Engineer will determine the subplot locations within each density lot. For a lot in progress with a CPF less than 0.75, Contractor may request a new lot begin after

the Engineer is satisfied that material conforming to the Specifications can be produced.

Compact HMA mixture accepted by commercial evaluation and HMA constructed under conditions other than those listed above on the basis of a test point evaluation of the compaction train. Perform the test point evaluation in accordance with instructions from the Engineer. Use the number of passes with an approved compaction train required to attain the maximum test point density on all subsequent paving.

Thoroughly compact HMA for preleveling. Compact HMA used to prelevel wheel ruts with a pneumatic tire roller unless Engineer approves.

5-04.3(10)E2 HMA Compaction Nonstatistical Evaluation – Acceptance Testing

Engineer will randomly select the location of the HMA compaction acceptance tests from within each subplot, with one test per subplot.

5-04.3(10)E3 HMA Nonstatistical Compaction – Price Adjustments

For each compaction lot with one or two sublots where all sublots attain a relative density that is 92 percent of the reference maximum density the HMA, City will accept at the unit Contract price with no further evaluation. If a subplot does not attain a relative density that is 92 percent of the reference maximum density, the City will evaluate the lot in accordance with Section 1-06.2 to determine the appropriate CPF, with the maximum CPF being 1.00. However, lots with a calculated CPF in excess of 1.00 will be used to offset lots with CPF values below 1.00 but greater than 0.90. Lots with CPF lower than 0.90 will be evaluated for compliance per 5-04.3(11). Additional testing by either a nuclear moisture-density gauge or cores will be completed as required to provide a minimum of three tests for evaluation.

For compaction below the required 92% a Non-Conforming Compaction Factor (NCCF) will be determined. The NCCF equals the algebraic difference of CPF minus 1.00 multiplied by 40 percent. The Compaction Price Adjustment will be calculated as the product of CPF, the quantity of HMA in the compaction control lot in tons, and the unit Contract price per ton of mix.

5-04.3(11) Reject Work

5-04.3(11)A Reject Work General

City will reject defective or non-conforming Work. The Contractor may propose, in writing, alternatives to removal and replacement of rejected material. Engineer has sole discretion to determine acceptability of such alternative proposals. Submit corrective action proposal for Engineer approval for rejected HMA not conforming to the requirements in Section 1-06.2(2) and this specification.

5-04.3(11)B Rejection by Contractor

The Contractor may, prior to sampling, elect to remove any defective material and replace it with new material. Any such new material will be sampled, tested, and evaluated for acceptance.

5-04.3(11)C Rejection Without Testing (Mixture or Compaction)

The Engineer may, without sampling, reject any batch, load, or section of Roadway that appears defective. Do NOT incorporate material rejected before placement into the pavement. Remove any rejected section of Roadway.

No payment will be made for the rejected materials or the removal of the materials unless the Contractor requests testing of the rejected material. If the Contractor elects to have the rejected material tested, obtain and test a minimum of three representative samples. Acceptance of rejected material will be based on conformance with the nonstatistical acceptance Specification. If the CPF for the rejected material is less than 0.75, no payment will be made for the rejected material and Contractor will bear the cost of sampling and testing. If the CPF is greater than or equal to 0.75, the City will bear the cost of sampling and testing. If the material is rejected before placement and the CPF is greater than or equal to 0.75, compensation for the rejected material will be at a CPF of 0.75. If rejection occurs after placement and the CPF is greater than or equal to 0.75, compensation for the rejected material will be at the calculated CPF with an addition of 25 percent of the unit Contract price added for the cost of removal and disposal.

5-04.3(11)D Rejection - A Partial Sublot

In addition to the random acceptance sampling and testing, the Engineer may also isolate from a normal subplot any material that is suspected of being defective in relative density, gradation or asphalt binder content. Such isolated material will not include an original sample location. Engineer will obtain a minimum of three random samples of the suspect material to test. The material will then be statistically evaluated as an independent lot in accordance with Section 1-06.2(2).

5-04.3(11)E Rejection - An Entire Sublot

Engineer may reject an entire subplot suspected of being defective. When a subplot is rejected, obtain a minimum of two additional random samples from this subplot. Evaluate these additional samples and the original subplot as an independent lot in accordance with Section 1-06.2(2).

5-04.3(11)F Rejection - A Lot in Progress

Shut down operations and do NOT resume HMA placement until such time as the Engineer is satisfied that material conforming to the Specifications can be produced:

- a. When the Composite Pay Factor (CPF) of a lot in progress drops below 1.00 and the Contractor is taking no corrective action, or
- b. When the Pay Factor (PF) for any constituent of a lot in progress drops below 0.95 and the Contractor is taking no corrective action, or
- c. When either the PFi for any constituent or the CPF of a lot in progress is less than 0.75.

5-04.3(11)G Rejection - An Entire Lot (Mixture or Compaction)

Engineer will reject an entire lot with a CPF of less than 0.75.

5-04.3(12) Joints**5-04.3(12)A HMA Joints****5-04.3(12)A1 Transverse Joints**

Conduct operations such that the placing of the top or wearing course is a continuous operation or as close to continuous as possible. Unscheduled transverse joints will be allowed and the roller may pass over the unprotected end of the freshly laid mixture only when the placement of the course must be discontinued for such a length of time that the mixture will cool below compaction temperature. When resuming the Work, cut back the previously compacted mixture to produce a slightly beveled edge for the full thickness of the course.

Construct a 20H:1V temporary wedge of HMA where a transverse joint, as a result of paving or planing, is open to traffic. Separate the HMA in the temporary wedge from the permanent HMA by strips of heavy wrapping paper or other methods Engineer approves. Remove the wrapping paper and the joint. Trim to a slightly beveled edge for the full thickness of the course prior to resumption of paving.

Remove and dispose of the cut away material and place new mix against the cut. Use rollers or tamping irons to seal the joint.

5-04.3(12)A2 Longitudinal Joints

Offset the longitudinal joint in any one course from the course immediately below by not more than 6 inches nor less than 2 inches. Locate all wearing course longitudinal joints at a lane line or an edge line of the Traveled Way. Construct a notched wedge joint along all longitudinal joints in the wearing surface of new HMA unless Engineer directs otherwise. Provide a notched wedge joint having a vertical edge of not less than the maximum aggregate size or more than 1/2 of the compacted lift thickness and then taper down on a slope not steeper than 4H:1V. Uniformly compact the sloped portion of the HMA notched wedge joint.

5-04.3(12)B Bridge Paving Joint Seals**5-04.3(12)B1 HMA Sawcut and Seal**

Prior to placing HMA on the bridge deck, establish sawcut alignment points at both ends of the bridge paving joint seals to be placed at the bridge ends, and at interior joints within the bridge deck when and where shown in the Plans. Establish the sawcut alignment points in a manner that they remain functional for use in aligning the sawcut after placing the overlay.

Submit a Type 1 Working Drawing consisting of the sealant manufacturer's application procedure.

Construct the bridge paving joint seal as specified in the Plans and in accordance with the detail shown in the Standard Plans. Construct the sawcut in accordance with the detail shown in the Standard Plan. Construct the sawcut in accordance with Section 5-05.3(8)B and the manufacturer's application procedure.

5-04.3(12)B2 Paved Panel Joint Seal

Construct the paved panel joint seal in accordance with the requirements specified in section 5-04.3(12)B1 and the following requirement:

- a. Clean and seal the existing joint between concrete panels in accordance with Section 5-01.3(8) and the details shown in the Standard Plans.

5-04.3(13) Surface Smoothness

Provide the completed surface of all courses having uniform texture, smooth, uniform as to crown and grade, and free from defects of all kinds. Provide wearing course completed surface that does NOT vary more than 1/8 inch from the lower edge of a 10-foot straightedge placed on the surface parallel to the centerline. Provide the transverse slope of the wearing course completed surface that does NOT vary more than 1/4 inch in 10 feet from the rate of transverse slope shown in the Plans.

When deviations in excess of the above tolerances are found that result from a high place in the HMA, correct the pavement surface using one of the following methods:

- a. Removal of material from high places by grinding with an approved grinding machine, or
- b. Removal and replacement of the wearing course of HMA, or
- c. By other method approved by the Engineer.

Carry out defect correction until there are no deviations anywhere greater than the allowable tolerances.

City will accept with a price adjustment deviations in excess of the above tolerances that result from a low place in the HMA and deviations resulting from a high place where corrective action, in the opinion of the Engineer, will not produce satisfactory results. The Engineer will deduct from monies due or that may become due to the Contractor the sum of \$500.00 for each and every section of single traffic lane 100 feet in length in which any excessive deviations described above are found.

When utility appurtenances such as manhole covers and valve boxes are located in the traveled way, adjust the utility appurtenances to the finished grade prior to paving. If Contractor requests, Engineer may waive this requirement or when the adjustment details provided in the project plan or specifications call for utility appurtenance adjustments after the completion of paving.

Include utility appurtenance adjustment discussions in the Pre-Paving planning (5-04.3(14)B3). Submit a written request to waive this requirement to the Engineer prior to the start of paving.

5-04.3(14) Planing (Milling) Bituminous Pavement

Engineer must approve the planing plan. Hold, with Engineer, a pre-planing meeting prior to the start of any planing. See Section 5-04.3(14)B2 for information on planing submittals.

Refer to the Plans for locations of existing surfacing being planed.

Where planing an existing pavement is specified in the Contract Documents, remove existing surfacing material and reshape the surface to remove irregularities. The finished product must be a prepared surface acceptable for receiving an HMA overlay.

Use the cold milling method for planing unless otherwise specified in the Contract. Do NOT use the planer on the final wearing course of new HMA.

Conduct planing operations in a manner that does not tear, break, burn, or otherwise damage the surface to remain. The finished planed surface must be slightly grooved or roughened and must be free from gouges, deep grooves, ridges, or other imperfections.

Repair any damage to the surface planing equipment makes using an Engineer approved method.

Repair or replace any metal castings and other surface improvements damaged by planing as confirmed by the Engineer.

Plane a tapered wedge cut longitudinally along curb lines sufficient to provide a minimum of 4 inches of curb reveal after placement and compaction of the final wearing course. The dimensions of the wedge must be as shown on the planing plan or as specified by the Engineer.

Plane a tapered wedge cut at transitions to adjoining pavement surfaces (meet lines) where butt joints are shown on the Plans. Cut butt joints in a straight line with vertical faces two inches or more in height, producing a smooth transition to the existing adjoining pavement.

After planing is complete, sweep and clean planed surface, and if Contract requires, patch and pre-level.

The Engineer may direct additional depth planing. Before performing this additional depth planing. Conduct a hidden metal in pavement detection survey as specified in Section 5-04.3(14)A.

5-04.3(14)A Pre-Planing Metal Detection Check

Before starting pavement planing and before any additional depth planing required by the Engineer, conduct a physical survey of existing pavement being planed with equipment that can identify hidden metal objects.

Promptly notify Engineer should such metal be identified.

See Section 1-07.16(1) regarding the protection of survey monumentation that may be hidden in pavement.

The Contractor is solely responsible for any damage to equipment resulting from the Contractor's failure to conduct a pre-planing metal detection survey, or from the Contractor's failure to notify the Engineer of any hidden metal that is detected.

5-04.3(14)B Paving and Planing Under Traffic

5-04.3(14)B1 General

In addition the requirements of Section 1-07.23 and the traffic controls required in Section 1-10, and unless the Contract specifies otherwise or the Engineer approves, comply with the following:

1. Intersections:
 - a. Keep intersections open to traffic at all times, except when paving or planing operations through an intersection requires closure. Keep such closure to the minimum time required to place and compact the HMA mixture or plane as appropriate. For paving, schedule such closure to individual lanes or portions thereof that accommodates the required the traffic volumes and schedule of traffic volumes noted in the approved traffic control plan. Schedule work so that adjacent intersections are not impacted at the same time and comply with the Traffic Engineer's traffic control restrictions. Address each individual intersection closure or partial closure in the traffic control plan that was submitted to and accepted by the Engineer in accordance with Section 1-10.2(2).

- b. When planing or paving and related construction must occur in an intersection, consider scheduling and sequencing such work into quarters of the intersection, or half or more of an intersection with side street detours. Be prepared to sequence the work to individual lanes or portions thereof.
 - c. Should closure of the intersection in its entirety be necessary keep such closure to the minimum time required to place and compact the HMA mixture, plane, remove asphalt, tack coat, and as needed.
 - d. Any work in an intersection requires advance warning in both signage and a number of Working Days advance notice as determined by the Engineer, to alert traffic and emergency services of the intersection closure or partial closure.
 - e. Allow new compacted HMA asphalt to cool to ambient temperature before allowing any traffic on it. Traffic is not allowed on newly placed asphalt until obtaining Engineer approval.
2. Comply with Section 8-23 for temporary centerline marking, post-paving temporary marking, temporary stop bars, and maintaining temporary pavement marking.
 3. Comply with Section 8-22 for permanent pavement marking.

5-04.3(14)B2 Submittals – Planing Plan and HMA Paving Plan

Submit a separate planing plan and a separate paving plan to the Engineer at least five Working Days in advance of each operation's activity start date. These plans must show the coordination of moving operation and traffic control as they will be discussed at the pre-planing briefing and pre-paving briefing. When requested by the Engineer, provide each operation's traffic control plan on 24 x 36 inch or larger size Drawings at a scale of 1 inch equals 20 feet showing both the area of operation and sufficient detail of traffic beyond the area of operation that may require detouring traffic. The scale on the Shop Drawings may be changed if the Engineer agrees sufficient detail is shown.

The planing operation and the paving operation include, but are not limited to, metal detection, removal of asphalt and temporary asphalt of any kind, tack coat and drying, staging of supply trucks, paving trains, rolling, scheduling, and as may be discussed at the briefing.

When intersections will be partially or totally blocked, provide adequately sized and noticeable signage alerting traffic of closures to come a minimum two Working Days in advance. Show on the traffic control plan the stationing of peace officers when signalization is or may be countermanded. Also show areas flaggers positioning.

Include, at a minimum, on the planing and paving plan:

1. A copy of the accepted traffic control plan, refer to Section 1-10.2(2), detailing each day's traffic control as it relates to the specific requirements of that day's planing and paving. Briefly describe the traffic control sequencing consistent with the proposed planing and paving sequence, and scheduling of placement of temporary pavement markings and channelizing devices after each day's planing, and paving.
2. A copy of each intersection's traffic control plan.

3. Haul routes from Supplier facilities and locations of temporary parking and staging areas, including return routes. Describe the complete round trip as it relates to the sequencing of paving operations.
4. Names and locations of HMA Supplier facilities to be used.
5. List of all equipment to be used for paving.
6. List of personnel and associated job classification assigned to each piece of paving equipment.
7. Description (geometric or narrative) of the planing and paving sequence schedule and intended area of planing and of paving for each day's work, the directions of proposed planing and paving, sequence of adjacent lane paving, sequence of skipped lane paving, intersection planing and paving scheduling and sequencing, and making of proposed timely notifications and coordination. Also show HMA joints relative to the final pavement marking lane lines.
8. Names, job titles, and contact information for field, office, and plant supervisory personnel.
9. A copy of the approved Mix Designs.
10. Tonnage of HMA to be placed each day.
11. Approximate times and days for starting and ending daily operations.

5-04.3(14)B3 Pre-Paving and Pre-Planing Briefing

At least two Working Days before the first paving operation and the first planing operation, or as scheduled by the Engineer for future paving and planing operations to ensure the Contractor has adequately prepared for notifying and coordinating as required in the Contract, the Contractor must be prepared to discuss that day's operations as they relate to other entities and to public safety and convenience, including driveway and business access, garbage truck operations, transit operations and working around energized overhead wires, school and nursing home and hospital and other accesses, other contractors who may be operating in the area, pedestrian and bicycle traffic, and emergency services. The Contractor, and Subcontractors that may be part of that day's operations must meet with the Engineer and discuss the proposed operation as it relates to the submitted planing plan and paving plan, approved traffic control plan, and public convenience and safety. Such discussion includes, but is not limited to:

1. General for both Paving Plan and for Planing Plan:
 - a. The actual times of starting and ending daily operations.
 - b. In intersections, how to break up the intersection, and address traffic control and signalization for that operation, including use of peace officers.
 - c. The sequencing and scheduling of paving operations and of planing operations, as applicable, as it relates to traffic control, to public convenience and safety, and to other contractors who may operate in the Project Site.
 - d. Notifications required of Contractor activities, and coordinating with other entities and the public as necessary.

- e. Description of the sequencing of installation and types of temporary pavement markings as it relates to planning and to paving.
 - f. Description of the sequencing of installation of, and the removal of, temporary pavement patch material around exposed castings and as may be needed
 - g. Description of procedures and equipment to identify hidden metal in the pavement, such as survey monumentation, monitoring wells, street car rail, and castings, before planning, refer to Section 5-04.3(14)B2.
 - h. Description of how flaggers will be coordinated with the planing, paving, and related operations.
 - i. Description of sequencing of traffic controls for the process of rigid pavement base repairs.
 - j. Other items the Engineer deems necessary to address.
5. Paving – additional topics:
- a. When to start applying tack and coordinating with paving.
 - b. Types of equipment and numbers of each type equipment to be used. If more pieces of equipment than personnel are proposed, describe the sequencing of the personnel operating the types of equipment. Discuss the continuance of operator personnel for each type equipment as it relates to meeting Specification requirements.
 - c. Number of JMFs to be placed, and if more than one JMF how the Contractor will ensure different JMFs are distinguished, how pavers and MTVs are distinguished if more than one JMF is being placed at the time, and how pavers and MTVs are cleaned so that one JMF does not adversely influence the other JMF.
 - d. Description of contingency plans for that day's operations such as equipment breakdown, rain out, and Supplier shutdown of operations.
 - e. Number of sublots to be placed, sequencing of density testing, and other sampling and testing.

5-04.3(15) Sealing Pavement Surfaces

Apply a fog seal where shown in the plans. Construct the fog seal in accordance with Section 5-02.3. Apply the fog seal prior to opening to traffic unless Engineer approves otherwise.

5-04.3(16) HMA Road Approaches

Construct HMA approaches at the locations shown in the Plans or where staked by the Engineer. Perform the Work in accordance with Section 5-04.

5-04.4 Measurement

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

5-04.5 *Payment*

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

Supplement Division 5 of the Standard Specifications by adding the following:

5-06 PAVEMENT PATCHING

(*****)

5-06.1 *Description*

This Work shall consist of the reconstruction and patching of trenches and other excavations in paved streets and other paved areas.

5-06.2 *Materials*

Provide materials conforming to the requirements specified for the materials in Sections 5-04 & 5-05 of the Standard Specifications except as modified by these Special Provisions.

For HMA pavement patching provide HMA CL 1/2", PG 64-22 as specified in Section 5-04 of the Standard Specifications.

Provide asphalt for temporary pavement patch as either: cold mix asphalt (MC 250) per Section 9-02 of the Standard Specifications or hot mix asphalt (HMA CL 1/2", PG 64-22). Mineral aggregate of MC 250 shall meet the same requirements as the aggregates used in HMA CL 1/2", PG 64-22.

For cement concrete base pavement patching provide high early strength cement concrete. Provide minimum 4000 psi mix having minimum 3000 psi compressive strength after curing time of three days.

Provide crushed surfacing top course used for pavement patching conforming to the requirements of 9-03.9(3) of the Standard Specifications.

5-06.3 *Construction Requirements***5-06.3(1) *General***

Schedule pavement patching to accommodate the demands of traffic and perform as rapidly as possible to provide maximum safety and convenience to public traffic.

Placing and compact the trench backfill and the preparation and compaction of the subgrade in accordance with the various applicable sections of the Standard Specifications except as modified by these Special Provisions.

Before the pavement patch is to be constructed saw cut the pavement so that the marginal edges of the patch will form a rectangular shape with straight edges and vertical faces.

Provide signs, barricades, lights and other warning devices in accordance with the requirements of the "Manual on Uniform Traffic Control Devices" and they maintain 24-hours a day until the patching work is completed and ready for traffic.

Complete subgrade compaction prior to the required patching. Compact subgrade to 95-percent as determined by the ASTM D2922 (nuclear method).

5-06.3(2) Cement Concrete Pavement Patch

Place cement concrete pavement in accordance with 5-05.3 of the Standard Specifications and these Special Provisions after the Crushed Surfacing Top Course subgrade for the pavement has been constructed and compacted to line and grade.

Perform all Work accordance with Section 5-05 of the Standard Specifications, except as modified by these Special Provisions and Standard Drawing No. 326.

Hand screeding and float finishing of cement concrete pavement patch is allowable.

Contractor will not be required to cut cores in accordance with 5-05.3(7) of the Standard Specifications.

Form transverse construction joints to match existing pavement transverse joints using a suitable power driven concrete saw.

Place cement concrete pavement directly against the bare sawcut vertical face of the adjacent concrete pavement.

Finish surface using broom in direction perpendicular to the centerline with a fiber brush.

Date stamping pavement will not be required.

Cure cement concrete pavement in accordance with 5-05.3(13) of the Standard Specifications.

Cement concrete pavement will be measured and paid for by the square yard of completed pavement patch.

5-06.3(3) Cement Concrete Pavement Resurfaced with HMA

Patch streets having cement concrete pavements surfaced with HMA as shown on Standard Drawing No. 326.

The thickness shall be one inch thicker than the existing concrete base or six inch, whichever is greater. The top surface of the concrete patch shall match the top surface of the existing concrete base; in no case shall the top of the concrete be higher than the top of the existing concrete base. Brush finishing will not be required. Joints shall be placed to match existing or as directed by the Engineer.

HMA plant mix shall not be placed until three days after the cement concrete base has been placed or otherwise permitted by the Engineer. The HMA plant mix shall not be placed until the concrete base has received a tack coat of CRS-2 at a rate of 0.12 to 0.20-gallons per square yard. The edges of the existing asphalt and castings shall also be painted with the tack coat. The HMA pavement shall then be placed, leveled, and compacted to conform to the surface of the existing HMA. Immediately thereafter, all joints between the new and original asphalt pavement shall be painted with CSS-1 asphalt emulsion and covered with dry sand before the asphalt solidifies.

Asphalt shall be compacted to 92-percent of maximum density as determined by WSDOT Test Method 705.

5-06.3(4) HMA on Granular Base

After the Crushed Surfacing Top Course subgrade has been leveled and compacted, HMA CL 1/2", PG 64-22 shall be placed to a thickness of one inch greater than the existing asphalt pavement depth or to a minimum of three inches, whichever is greater. Asphalt shall be compacted to 92-percent of maximum density as determined by WSDOT Test Method 705.

5-06.3(5) Untreated Roadway Surfaces

Existing crushed rock, gravel, and oil mat streets shall be restored with Crushed Surfacing Top Course to a compacted depth of four inches within the neat lines of the trench. Crushed surfacing shall be mixed, placed, spread and shaped in accordance with the requirements of Section 4-04 of the Standard Specifications.

5-06.3(6) Temporary Pavement Patching

The Contractor shall furnish, place and maintain temporary pavement patching as shown on the Plans and at locations as directed by the Engineer, until such time as a permanent patch of permanent paving can be made.

Provide a temporary patch as required to reopen roadway during construction as that withstands existing traffic loads and volumes. Options include, and are not limited to, cold mix asphalt (MC 250), hot mix asphalt (HMA CL 1/2", PG 64-22), or secured steel roadway plates.

Provide temporary asphalt patching where roadway or walk is needed for vehicular or pedestrian traffic, during the construction period, until permanent pavement and sidewalks can be constructed.

In the event that the temporary surface subsides after the initial placement, apply additional MC 250 or HMA (as approved by the Engineer) as necessary to maintain the surface.

Stockpile of plant mix and crushed surfacing for temporary patching shall be provided on the site by the Contractor.

Prior to final restoration of the pavement, the Contractor shall be responsible for removing and disposing of temporary pavement patching materials.

5-06.3(7) Incidental Pavement Patching

Incidental pavement patching shall be done only at the direction of the Engineer for patching and restoring areas between the back of new sidewalks and adjacent asphalt driveways, paving ramps at the ends of sidewalks, and gutters that are adjusted to grade.

Asphalt for incidental pavement patching shall be HMA CL 1/2", PG 64-22.

5-06.4 Measurement

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

5-06.5 Payment

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

END OF DIVISION 5

DIVISION 6 STRUCTURES**6-11 REINFORCED CONCRETE WALLS****6-11.1 Description**

(*****)

Section 6-11.1 is supplemented with the following:

This work consists of constructing cement concrete seat walls including those detailed in the contract plans.

6-11.3 Construction Requirements**6-11.3(4) Cast-In-Place Concrete Construction**

(*****)

Section 6-11.3(4) is supplemented with the following:

CIP Concrete Seat Wall Textured Face and Review

The textured face form liner shall be comprised of staggered and random 3-inch-wide and 5-inch-wide cedar boards. The general design intent is shown in the contract plans. The contractor shall receive approval for the first completed concrete seat wall prior to continuing to construct the remaining seat walls shown on the plans.

6-11.4 Measurement

Delete the first paragraph of 6-11.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

6-11.5 Payment

Delete all paragraphs in 6-11.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

6-23 TRANSIT SHELTER

(*****)

The Contractor will secure, assemble, and install four (4) Basco International Slimline – SL510-C Transit Bus Shelters per the plans and standard details. Alternative transit shelters will not be considered, no substitutions are allowed. Miscellaneous parts, screws, bolts, and anchors may need to be supplied for full installation of the Transit Shelters. Transit Shelters are to be bolted to 6-inch cement concrete slab/sidewalk section with house-rated foundation anchors and bolts.

6-24 RESTROOM BUILDING COMPLETE

(***)**

The contractor is to construct a fully functioning restroom building and furnish it per Architectural Plans and Specifications located in Appendix D.

END OF DIVISION 6

**DIVISION 7 – DRAINAGE STRUCTURES, STORM SEWERS, SANITARY SEWERS,
WATER MAINS, AND CONDUITS****7-04 STORM SEWERS****7-04.1 Description**

Revise the first paragraph in 7-04.1 to read as follows:

This Work consists of constructing storm sewers to lines and grades as shown on the Plans and in accordance with COE Standard Drawings, the Standard Specifications and these Special Provisions.

Supplement 7-04.1 as follows:

7-04.1(1) Submittals

(*****)

Provide Type 2 Working Drawings for all materials and Standard Plans.

7-04.2 Materials

Delete the first and second paragraphs in 7-04.2 and substitute the following:

Materials shall meet the requirements of the following sections:

Reinforced Concrete Storm Sewer Pipe	9-05.7(2)	Standard Specifications
Concrete Storm Sewer Pipe Joints	9-05.7(3)	Standard Specifications
Solid Wall PVC Storm Sewer Pipe & Joints	9-05.12(1)	Special Provisions
Profile Wall PVC Storm Sewer Pipe & Joints	9-05.12(2)	Standard Specifications
Corrugated Polyethylene Storm Sewer Pipe & Joints	9-05.20	Standard Specifications
Steel Rib Reinforced Polyethylene Storm Sewer Pipe	9-05.22	Standard Specifications
High-Density Polyethylene (HDPE) Pipe	9-05.23	Standard Specifications
Polypropylene Storm Sewer Pipe	9-05.24	Standard Specifications

Revise the last paragraph in 7-04.2 to read as follows:

When schedule A or B storm sewer pipe is specified in the Plans, provide the specified schedule and diameter of either concrete, PVC, or PE/PP materials shown in the Storm Sewer Pipe Schedules Table.

Contact the Olympia Service Center Materials Laboratory to determine if joints have been approved for pipe diameters larger than those listed.

On the web at: <http://www.wsdot.wa.gov/biz/mats/QPL/QPI.cfm>

Or by mail at:

P.O. Box 167
Olympia, WA 98507-0167
(360) 709-5442

7-04.4 Measurement

Delete the first paragraph of 7-04.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-04.5 Payment

Delete all paragraphs in 7-04.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-05 MANHOLES, INLETS, AND CATCH BASINS**7-05.1 Description**

Revise the first paragraph in 7-05.1 to read as follows:

This Work consists of constructing manholes, inlets, drywells, and catch basins and connecting to existing Structures of the types and sizes designated in accordance with the Plans, these Special Provisions, the Specifications, and the COE Standard Drawings, in conformity with the lines and grades staked.

Further supplement 7-05.1 as follows:

7-05.1(1) Submittals

(*****)

Provide Type 2 Working Drawings for all materials and Standard Plans.

7-05.2 Materials

Supplement 7-05.2 by adding the following at the end of the material list:

Mortar, nonshrink	9-20.3(2)	Standard Specifications
Commercial Concrete	6-02.3(2)B	Standard Specifications
Watertight Connection Boots	9-05.30	Special Provisions
Flexible Couplings	9-05.40	Special Provisions
Polypropylene Manhole Steps& Hand Holds	9-05.64	Special Provisions
Polypropylene Manhole Ladder	9-05.66	Special Provisions

7-05.3 Construction Requirements

Supplement 7-05.3 by adding the following after the last sentence of the third paragraph:

Install PAMREX, East Jordan Iron Works, or equal, hinged manhole frame and cover in accordance with manufacturer recommendations and applicable City standards and details.

Coordinate manhole cover and frame hinge location with manhole steps and traffic lanes. Hinge orientation to be determined during the shop drawing review of precast manhole structures.

Delete the tenth paragraph in 7-05.3.

Revise the eleventh paragraph in 7-05.3 to read as follows:

Provide Kor-N-Seal, or equal, watertight flexible pipe to manhole connectors for pipes up to 48-inch diameter connecting to new sanitary sewer manholes. Place no pipe joint in PVC or HDPE pipe within 10-feet of the outside face of the manhole.

Revise the last sentence in the sixteenth paragraph in 7-05.3 to read as follows:

Provide manholes, inlets, and catch basins that upon final acceptance of the Work conforms to the following COE Standard Drawings requirements:

1. Manholes No. 605A, 605B and 605C as applicable.
2. Inlets No. 401
3. Catch Basins No. 402, 403 and 404 as applicable.

Revise the last paragraph to read:

See Sections 7-05.3(3) and 7-08 for pipe connection requirements.

7-05.3(1) Adjusting Manholes and Catch Basins to Grade

Delete both paragraphs of 7-05.3(1) and substitute the following:

Adjust manholes, catch basins and other structures to final grade after completing pavement operations. Carefully re-establish the center of each structure from Contractor's previously established references.

Cut pavement in neat circle having a minimum diameter of 2-feet beyond the casting cover. Remove pavement and base material, maintaining the neat circle, to permit casting and frame removal. Adjust casting and frame to proper grade.

Place cast iron frame on concrete blocks or concrete adjusting rings and wedge up to the desired grade using plastic wedges. Wood or metal wedges are not allowed. The Backfill around finished casting frame to within 1-1/2 inches of finished pavement surface using commercial concrete.

After concrete has set a full 24-hours, paint the edges of the asphalt concrete pavement and the outer edge of the casting with hot asphalt cement. Place hot asphalt concrete to match finished pavement surface and compact with hand tampers and a patching roller. Asphalt concrete and cement concrete shall be considered incidental to the unit price of the structure being adjusted.

Match the new patch with existing paved surface for texture, density, and uniformity of grade. Carefully paint the joint between the patch and the existing pavement shall then be carefully painted with hot asphalt cement or asphalt emulsion and immediately cover with dry paving sand before the asphalt cement solidifies.

Thoroughly mortar and plaster the inside throat of the structure.

7-05.3(3) Connections to Existing Manholes

Delete all three paragraphs of 7-05.3(3) and substitute the following:

Verify existing manhole rim and invert elevations prior to construction. Provide verification documentation by means of a Submittal to the Engineer for approval. Submittal shall be in accordance with 1-05.3 of these Special Provisions. Immediately bring discrepancies in invert elevations to the attention of the Engineer.

Unless specified otherwise, match the new connection pipe crown elevation to the existing pipe or pipe crown elevation. Rechannel the existing manhole in accordance with COE Standard Drawing 605A to provide a flow transition free from rough, jagged or protruding edges that could catch debris.

Use safe and effective construction methods to prevent existing manhole from moving or tipping during excavation to make new connection.

Keep the manhole in operation at all times and take necessary precautions to prevent debris or other material from entering the sewer, including a tight pipeline bypass through the existing channel, if required.

Core drill for pipe connections less than 28-inch O.D. Line drill or wall saw an opening for pipe connection greater than 28-inch O.D. to accommodate the size of pipe to be inserted. Interconnect drilled holes where line drilling is the method used. Use a small core drill to accomplish line drilling. Jackhammer or rotary hammer shall not be used. For line drilling provide minimum 1-inch and maximum 2-inch clearance around the circumference of the pipe. Core drill opening to accept a watertight flexible pipe to manhole connection in accordance with manufacturer's recommendations. Place upstream pipes, except PVC and HDPE pipe, penetrating the manhole walls with the bell facing out and snug against the outside wall of the structure as the angle of penetration allows. Provide a flexible joint within 1/2 of a pipe diameter or 12-inches, whichever is greater for pipe, except PVC and HDPE pipe, leaving or entering manholes.

Place pipes entering or leaving the manhole on firmly compacted bedding. Take particular care in compacting bedding within the area of the manhole excavation that is normally deeper than the sewer trench. Take special care to ensure the annual opening around each pipe entering the manhole is completely and firmly rammed full of non-shrink grout to ensure water tightness. Non-shrink grout shall conform to requirements of 9-03.20.3(2) of the Standard Specifications.

Provide a watertight flexible pipe to manhole connector for pipe diameters less than or equal to 24-inches for PVC or HDPE pipes connecting to manhole. Place no PVC or HDPE pipe joint within 10-feet of the outside face of the manhole.

7-05.3(4) Drop Manhole Connections

Delete the first paragraph in 7-05.3(4) and substitute the following:

Construct outside drop connections where shown on Plans in accordance with these Special Provisions and 7-04, 7-05, and 7-17 of the Standard Specifications and COE Standard Drawing No. 608.

Construct inside drop connections where shown on the Plans, or as approved by Engineer, in 54-inch diameter manholes or larger in accordance with these Special Provisions and 7-04, 7-05, and 7-17 of the Standard Specifications and COE Standard Drawing No. 609.

Provide factory installed holes for drop connections for new manholes and core drill holes for existing manholes. Impact tools shall not be allowed for making holes in manhole walls.

Supplement 7-05.3 by adding the following:

7-05.3(5) Furnish and Install Solid Lid for Catch Basins

(*****)

Provide new solid lids on existing catch basins where shown on the Plans. Provide solid lids conforming to 9-05.15 of the Standard Specifications, 9-05.15(1) of these Special Provisions, and to COE Standard Drawing No. 406 and 410 for Type 1 and 1-L Catch Basins and COE Standard Drawing 611 for Type 2 Catch Basins.

7-05.4 Measurement

Delete all paragraphs of 7-05.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-05.5 Payment

Delete all paragraphs of 7-05.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-08 GENERAL PIPE INSTALLATION REQUIREMENTS**7-08.1 Description**

Further supplement 7-08.1 as follows:

**7-08.1(1) Submittals
(*****)**

Provide Type 2 Working Drawings for all materials and Standard Plans.

Provide Type 3E Working Drawings for dewatering plans, if any.

7-08.2 Materials

Delete material items listed in 7-08.2 and substitute the following:

Provide materials meeting the following requirements:

Foundation Material Class A or B	9-03.17	Standard Specifications
Gravel Borrow	9-03.14(1)	Standard Specifications
Controlled Density Fill	2-09.3(1)E	Special Provisions
Crushed Surfacing Base Course	9-03.9(3)	Standard Specifications

7-08.3 Construction Requirements**7-08.3(1) Excavation and Preparation of Trench****7-08.3(1)A Trenches**

Revise the second paragraph in 7-08.3(1)A and to read as follows:

Excavate trench in accordance with COE Standard Drawing No 614.

Delete the second sentence in the third paragraph in 7-08.3(1)A and substitute the following:

Contractor may excavate above the top of the pipe zone only as wide as necessary to meet OSHA requirements.

7-08.3(1)C Bedding the Pipe

Delete the second and third paragraphs in 7-08.3(1)C and substitute the following:

Provide pipe zone bedding in accordance with COE Standard Drawing 614 and 615.

If the Engineer determines the material existing in the trench bottom is satisfactory for bedding the pipe, then the bedding material specified in the COE Standard Drawing 615 is not required, provided the existing material is loosened, regraded, and compacted to form a dense, unyielding base.

Supplement 7-08.3(1) by adding the following:

7-08.3(1)D Trench Dewatering

(****)

This section specifies the definition, responsibilities and execution for dewatering associated with trench excavation for pipes, manholes, catch basins, cleanouts, side sewers and other buried utility work. Implement trench dewatering measures where necessary or directed by the Engineer. Implementation shall include, but not be limited to, the design, furnishing, installation, operation, maintenance, monitoring, reporting and removal of dewatering systems to achieve proper completion of Work performed under this Contract.

Prevent the flow of surface water runoff into the trench excavation. Control surface water and other erosion control measures associated the Work in accordance with 8-01 of the Standard Specifications and modified in these Special Provisions.

Maintain groundwater level at or below the bottom of the excavation in all Work areas during excavation, foundation preparation, pipe and structure installation and backfilling. Trench dewatering shall sufficiently control groundwater to prevent softening of the bottom of the excavations or formation of “quick” conditions or “boils” during excavation. Use gravel or non-moisture sensitive trench backfill in areas encountering groundwater. If foundation soils are disturbed or oversaturated with water, then over excavate and replace the affected areas with suitable fill at no additional cost to the Owner. Upon completion of dewatering operations, restore the normal water table to its natural level in such a manner as to not disturb the pipe, its foundation and structures. Contractor shall be solely responsible to control the rate and effect of the dewatering in a manner to avoid all objectionable settlement and subsidence.

Direct discharge flow from trench dewatering to a nearby sewer or storm drain system unless otherwise directed by the Engineer. Obtain, at no cost, a Discharge Authorization Permit from the City prior to discharging trench dewatering flows into the City sewer or storm drain system. Control groundwater by trench dewatering systems designed and operated to minimize turbidity of the discharged flow and to prevent removal of the natural soils or imported fill.

Soils data for use in planning the dewatering system is available from the Soil Boring Logs in Appendix E or the Contractor may perform its own soils investigation. Contractor shall be responsible for cost of additional investigative work Contractor requires for designing the dewatering system. Plan and implement trench dewatering systems using accepted and professional methods of design and engineering consistent with the best modern practice. Trench dewatering systems shall be comprised of gravel-lined sumps, dewatering pumps, piping and conveyance components necessary for complete and reliable function.

Before dewatering operations begin, the Contractor shall have available on the Work site sufficient pumping equipment, or other machinery, or both, to assure maintaining continuous operation of the trench dewatering system. Supply power service to dewatering pumps including, but not limited to, electrical, hydraulic, gas, or diesel, Maintain the dewatering system to allow for continuous operation without interruptions. If necessary, provide 24-hour supervision and follow-up by personnel skilled in the operation, maintenance, and replacement of dewatering system components. Damage to Work in place and the excavation, including damage to the trench bottom, due to “boiling”, material removal, or discharge pumping from the

excavated area, that may result from negligence, inadequate or improper installation, maintenance and operation of the dewatering system, or mechanical or electrical failure of the dewatering system shall be Contractor's responsibility to repair at no cost to the City.

Trench dewatering shall be included with the Work required for Sewer Pipe, Manholes, Side Sewer Connections, Storm Drain, Catch Basins, Utility Restoration or other excavation activity performed as part of this Contract with no direct compensation made.

7-08.3(2) Laying Pipe

7-08.3(2)A Survey Line and Grade

Delete both paragraphs of 7-08.3(2)A and substitute the following:

Provide surveys required to construct the sewer line including, but not limited to, alignment stakes, offset stakes, grade hubs, and intermediate staking. Use main survey control points shown on the Plans, unless Engineer directs otherwise. If a Bid item for "Surveying" is not listed in the Proposal, then this item shall be included with the Work with no direct compensation made.

Provide laser control equipment approved by the Engineer for setting pipe grades.

7-08.3(2)H Sewer Line Connections

Supplement 7-08.3(2)H by adding the following:

Reconnect existing storm drain lines to new sanitary sewer line in accordance with the Plans, these Special Provisions and the Standard Specifications.

Provide a minimum 8-inch diameter pipe for new storm drain line. Provide manufactured couplers for joining dissimilar size and type of existing storm drain line pipe.

Engineer will not allow vertical connections of drain lines to sewer main between manholes without Engineer's prior approval.

Reconnecting drain lines shall be included with the Work with no direct compensation made.

7-08.3(2)I Side Sewer Connections

Supplement 7-08.3(2)I by adding the following:

Make typical side sewer connections in accordance with COE Standard Drawing No. 602.

7-08.4 Measurement

Delete all paragraphs in 7-08.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-08.5 *Payment*

Delete all paragraphs in 7-08.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-09.3 *Construction Requirements***7-09.3(19) Connections****7-09.3(19)A Connections to Existing Mains**

Delete the last paragraph in 7-09.3(19)A and substitute the following:

Only City Utilities Department personnel may make connections to existing water mains after successful pressure testing, disinfection and flushing. Schedule arrangements with the City Utilities Department a minimum of five business days in advance of making connections to the existing water main. Assemble necessary materials, equipment, and labor necessary to properly complete the Work prior to beginning the connection.

Provide traffic control and expose the water main at the connection allowing sufficient room for COE forces to make connection, expose the water main at the connection, including properly shoring and sheeting the excavation in accordance with requirements of WISHA, RCW 49.17 including WAC 296-155. Should City personnel determine the excavation and shoring and sheeting do not meet the requirements of WISHA, RCW 49.17, including WAC 296-155, City personnel will notify Contractor to make necessary modifications to bring the excavation and shoring into compliance prior to City personnel entering the trench.

Repair damage to existing pipe caused by the Contractor's operations at Contractor's expense.

Proceed continuously once Work is started on a connection without interruption and as rapidly as possible until completed. City will not permit shutoff of mains overnight, over weekends, or on holidays.

Notify COE water customers affected by water shut off if the connection to the existing system involves turning off the water. Provide a minimum of 48-hours prior notice. The Engineer will advise which property owners to notify.

Depending upon the number of water customers affected by a shut-off, Contractor may need to perform the connection during times other than normal working hours. Do NOT operate valves on the existing system. Only City Utilities Department personnel may operate water system valves.

Refer to 7-12.3 of these Special Provisions for tapping assembly connections, if any.

7-15 SERVICE CONNECTIONS**7-15.1 *Description***

Delete the first paragraph of 7-15.1 and substitute the following:

This Work consists of installing residential and commercial service connections from the main to the private line for the premises served. Include the meter box and meter setter

for existing non-metered services. Include replacing existing meter boxes and meter setters as noted on the Plans and as directed by the Engineer.

Work also includes abandoning existing service connection and service connection pipe in-place.

7-15.1 Description

Supplement 7-15.1 as follows:

7-15.1(1) Submittals

(*****)

Provide Type 2 Working Drawings for all materials and Standard Plans.

7-15.2 Materials

Delete first paragraph and material list of 7-15.2 and substitute the following:

Provide materials meeting the requirements of the following sections:

Saddles	9-30.6(1)	Special Provisions
Corporation Stops	9-30.6(2)	Special Provisions
Service Pipe	9-30.6(3)	Special Provisions
Service Fittings	9-30.6(4)	Special Provisions
Meter Setters	9-30.6(5)	Special Provisions
Meter Boxes	9-30.6(7)	Special Provisions
Brass Nipples and Fittings	9-30.6(8)	Special Provisions

7-15.3 Construction Requirements

Revise the first paragraph in 7-15.3 to read as follows:

Provide new service connections to new water mains using specified saddles of the size and type suitable for use with the service pipe being installed. Install new service connection piping from the main to the meter box as shown on the Plans and directed by the City Inspector. Install service connection piping perpendicular to the main, unless shown otherwise on the Plans or directed by the City Inspector.

Revise the second paragraph in 7-15.3 to read as follows:

Provide trench depth adequate to maintain a minimum of 30-inches of cover over the top of the connecting service pipe. Exercise particular care to ensure that the main is not damaged by the Work undertaken to install the service. Excavate and backfill for service connections as specified in Section 7-09; except, use approved boring methods to install the service pipeline under cement concrete pavement, curbs, and sidewalks.

Supplement 7-15.3 by adding the following:

Provide service connections to water mains in accordance with COE Standard Drawings No. 501 and 502 as applicable.

Field verify actual service connection location, size and material as existing service information and locations shown on the Plans may not be accurate since this information is taken from existing records. Match the service size of the existing service connection with the minimum service size being 3/4-inch. Should the planned location require moving after verifying actual service connection in field, City Inspector and the City Utility Department personnel will make final decision as to its relocation.

Replace existing services from the main to the property line, including the meter box and meter setting if noted on the Plans.

Bore service connection lines, regardless of size, under pavement section, curbs and sidewalks where soil conditions and other existing buried utilities allow. The City Inspector will allow open-cut trench installation across pavement section, curbs and sidewalks only where soil conditions prohibit boring. Open-cut lawn areas and other non-pavement areas for service installation unless City Inspector directs otherwise. The City Inspector may, at the Contractor's request, allow tunneling under curb and sidewalk as long as it appears no structural damage will be done to curb or sidewalk as a result of the tunneling operations. Regardless of the method used, the Contractor shall maintain a minimum of 30-inch cover over the service connection line. Where open cut trench installation is allowed, keep the trench width to 24-inches or less.

At existing metered services noted for removal or replacement on the Plans, salvage existing meter and stockpile on-site at location approved by City Inspector. Notify City Inspector 24-hours prior to removal to allow City Inspector to document the meter number and address of meter being removed. Remove and dispose of existing meter box, meter setter, fittings and service piping. Where existing metered services are not being replaced, backfill with native soil, compact and restore the surface to match existing condition.

Abandon in-place existing service connections noted on the Plans by exposing and closing the corporation stop at the main and plugging the service line near the public right of way or easement.

7-15.3(1) Relocate Water Meter and Box
(***)**

Where shown on the Plans, or as directed by the City Inspector, salvage the existing water meter, meter box and the meter setter being relocated. Reinstall salvaged water meter, meter box and setter and provide new service connection pipe in accordance with City of Everett Standard Drawing Nos. 501 and 502 and adjust box to finish grade.

Abandon in-place existing service pipe connection by exposing and closing the corporation stop at the main and plugging the service line at the old meter box location.

7-15.4 Measurement

Delete first paragraph of 7-15.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-15.5 Payment

Delete all paragraphs of 7-15.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-17 SANITARY SEWERS

7-17.1 Description

Revise the first paragraph in 7-17.1 to read as follows:

This Work consists of constructing gravity sanitary or combined sewer mains using conventional open trench construction methods, as staked, in accordance with the Plans, these Specifications, and the COE Standard Drawings.

7-17.1 Description

Supplement 7-12.1 as follows:

7-17.1(1) Submittals
(***)**

Provide Type 2 Working Drawings for all materials and Standard Plans.

Provide Type 3E Working Drawings for construction of temporary by-passes.

7-17.2 Materials

Delete list of pipe materials in the first paragraph in 7-17.2 and substitute the following:

Use the following pipe materials for gravity sanitary and combined sewers:

Rigid	Thermoplastic
ABS Composite	
Ductile Iron	PVC (Polyvinyl Chloride)
	Polypropylene

Delete the list of material requirements in 7-17.2 and substitute the following:

Provide materials meeting the following requirements.

Solid Wall PVC Sanitary Sewer Pipe	9-05.12(1)	Special Provisions
Profile Wall PVC Sanitary Sewer Pipe	9-05.12(2)	Special Provisions
Ductile Iron Sewer Pipe	9-05.13	Special Provisions
ABS Composite Sewer Pipe	9-05.14	Special Provisions
Polypropylene Dual and Triple Wall Sanitary Sewer Pipe	9-05.21	Special Provisions

7-17.3 Construction Requirements**7-17.3(2) Cleaning and Testing****7-17.3(2)G Deflection Test for Thermoplastic Pipe**

Revise the first sentence of 7-17.3(2)G to read as follows:

After trench backfill and compaction are completed, perform deflection testing if CCTV testing reveals thermoplastic pipe being out of round.

7-17.3(2)H Television Inspection

Delete all three paragraphs of 7-17.3(2)H and substitute the following:

After trench backfill and compaction are completed the City will use their CCTV camera to inspect the interior of mains and the interior of existing lines having Contractor installed new manholes or new side sewers or both. Provide the City with three business days notice for each CCTV request. Begin final roadway surfacing AFTER notice from City Inspector of City Sewer Department approval of the CCTV inspection.

Prior to arranging with City for CCTV inspection, perform the following:

Clean lines and structures of all debris,

Channel manholes inverts.

Seal pipes entering structures according to these Special Provisions.

Correct deficiencies noted by the City Inspector and the CCTV inspection results to the satisfaction of the Engineer.

City will bear initial inspection costs. Contractor shall be responsible for re-inspection costs if CCTV equipment will not pass through the lines or structures on initial inspection. City will deduct cost for follow-up re-inspection after correction of deficiencies from Contractor's final payment on a direct cost basis.

7-17.3(2) Cleaning and Testing

Supplement 7-17.3(2) by adding the following:

7-17.3(2)I Final Acceptance
(*****)

City will require successful completion of the following items prior to issuing final acceptance, including, but not limited to:

1. Passing low pressure air testing.
2. Backfill and compaction in accordance with COE Standard Drawings No. 610, 611 and 615.
3. Line and grade to the tolerance of 7-08.2(2)B.
4. Manholes to the invert elevation, fully channelized, and cleaned.
5. Manhole casting set to final grade.
6. Manhole construction in accordance with 7-05.3.
7. Lines free of debris and obstructions.
8. Bell and spigot joints properly seated as evidenced by successful completion of CCTV testing.
9. HDPE bead removal, where required, is accomplished without leaving sharp and jagged edges.

7-17.4 Measurement

Delete both paragraphs of 7-17.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-17.5 Payment

Delete all paragraphs of 7-17.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-18 SIDE SEWERS**7-18.1 Description**

Delete the first paragraph in 7-18.1 and substitute the following:

This Work consists of constructing side sewers within the right of way in accordance with the Plans, the Specifications, these Special Provisions and the COE Standard Drawings at locations staked.

In some cases, minor adjustments in side sewer location and length will be required to adapt to field conditions.

7-18.2 Materials

Supplement 7-18.2 by adding the following:

Provide materials meeting the following requirements.

Inserta-Tee	9-05.22	Special Provisions
Gasketed PVC Saddle	9-05.12(3)	Special Provisions
Stainless Steel Clamp	9-05.23	Special Provisions

7-18.3 Construction Requirements

Supplement 7-18.3 by adding the following:

7-18.3(6) Contractor Submittals

(*****)

Submit all procedures or material descriptions requiring the Engineer's approval as Type 3 Working Drawings not less than 15 calendar days prior to mobilizing or commencing side sewer replacement activities at the Site Include Working Drawings for side sewer pipe, fittings, cleanouts, adapters, castings, couplings, method of connection to the replacement main, information on the CCTV and locating equipment, sample CCTV inspection report and sample public notice with Submittal.

Following side sewer connection and inspection work submit videotapes, inspection reports, and record drawing sketches of the side sewer replacement and inspection. Submit inspection information on a color, digital DVD with on-screen footage counter and site address of each side sewer together with a written CCTV inspection report. Re-inspect the side sewer, at no expense to the Owner, if video quality is not acceptable as determined by the Engineer. Reset the on-screen footage counter to zero at the beginning of each side sewer inspection.

7-18.3(7) CCTV

(*****)

For the CCTV inspection locate and identify all branch connections to the existing side sewer including drains, basement and foundation drains, and all other connections. Accomplish location of the side sewer pipe by using a suitable sonde transmitter attached to the camera. Provide temporary markers positioned on the ground surface and to measure accurately from to create a record drawing sketch and a photograph.

Provide CCTV equipment approved by the Engineer before inspection begins. Provide CCTV equipment with the following minimum criteria:

- a. Self-contained color television cameras with footage counter, color monitor, three-wire coaxial cable, power sources, and other equipment.
- b. Waterproof camera having a minimum 650 line resolution capable of inspecting side sewers 3-inches to 6-inches in diameter and up to 200 feet in length.
- c. Operate in 100% humidity.
- d. Camera lighting that minimizes relative glare.
- e. Picture quality providing a clear, in-focus color picture of the entire pipeline periphery for all work conditions.
- f. Equipped with a centering device to ensure view of full pipe diameter.

- g. Capable of traveling upstream or downstream at a steady uniform rate, stopping where necessary to ensure a proper assessment of pipe defects, blockages, direction changes, material changes, and branch connections.

If the camera fails to pass through the side sewer within City right-of-way, temporarily suspend inspection and notify the Engineer of the obstruction. The Engineer may direct the Contractor on further actions.

7-18.3(8) Record Drawing Sketch

(*****)

Prepare record drawing sketch for each side sewer connection and inspection using a City-furnished aerial photograph as a base plan, indicating the location, extent, depth and materials associated with the side sewer connection and the alignment, connections and defects encountered during CCTV inspection of the existing side sewer. Where necessary for clarity, take photographs of ground surface of the site, prepare an 8-1/2 inch x 11-inch print of the photo and mark locations of pipe, bends, fittings and defects.

In addition, inspect and document field observations associated with each side sewer pipe including, but not limited to, existing pipe material, pipe diameter, joint type, joint integrity, extent of pipe deterioration, grade and alignment, bedding and backfill, root intrusion, and debris accumulation.

7-18.3(9) Sewer Backwater Valve Installation

(*****)

At specific addresses identified on the Plans, provide a sewer Backwater Valve unit on the private side sewer line serving the home of the property owners to that executed an agreement with the City permitting the Contractor to do the Work. Appendix F contains a sample agreement. Plan, design and estimate the cost of labor and materials for each installation. Upon Engineer's approval of the estimate, the Engineer will instruct the Contractor to perform the Work. Locate the Backwater Valves upstream of yard and gutter drains that are connected to the side sewer line and at a location mutually agreed upon between the property owner and the Contractor. After City inspection and acceptance of the installed Backwater Valve, backfill all excavations, using backfill materials as required by the homeowner, such as gravel borrow, topsoil, sand, crushed rock, or native soil,. The homeowner is responsible for all remaining surface restoration on the private portion of the side sewer. Work for Backwater Valves installation will be paid as Force Account.

7-18.4 Measurement

Delete first paragraph of 7-18.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-18.5 Payment

Delete all paragraphs of 7-18.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-19 SEWER CLEANOUTS

7-19.1 Description

Revise the first paragraph in 7-19.1 to read as follows:

This Work consists of constructing sewer cleanouts within the right of way in accordance with the Plans, the Specifications, these Special Provisions and the COE Standard Drawings at locations staked.

7-19.1 Description

Supplement 7-19.1 as follows:

7-19.1(1) Submittals

(*****)

Provide Type 2 Working Drawings for all materials and Standard Plans.

7-19.2 Materials

Supplement 7-19.2 by adding the following:

Provide materials meeting the following requirements.

Metal Frame and Cover 9-05.15(4) Special Provisions

7-19.3 Construction Requirements

Supplement 7-19.3 by adding the following:

Provide cleanout in accordance with COE Standard Drawing 604.

7-19.4 Measurement

Delete first paragraph of 7-19.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-19.5 Payment

Delete all paragraphs of 7-19.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

Supplement Division 7 by adding the following Section:

7-20 SANITARY SEWER FORCEMAINS

7-20.3 Construction Requirements

7-20.3(1) Excavation and Preparation of Trench

Prepare trench for sanitary sewer forcemain installation in accordance with 7-08.3(1), 7-09.3(4), 7-09.3(5), 7-09.3(6), 7-09.3(7) and 7-09.3(8) of the Standard Specifications and these Special Provisions.

7-20.3(1)A Trench Dewatering

Dewater trench as necessary to install sanitary sewer forcemain in accordance with 7-08.3(1)D of these Special Provisions.

7-20.3(2) Laying Pipe**7-20.3(2)A Survey Line and Grade**

Provide survey line and grade for sanitary sewer forcemain in accordance with 7-08.3(2)A of the Standard Specifications and these Special Provisions.

7-20.3(2)B Bedding the Pipe

Provide pipe bedding for sanitary sewer forcemain accordance with 7-09.3(9) of the Standard Specifications and these Special Provisions.

7-20.3(2)C Pipe Laying - General

Lay pipe in general for sanitary sewer forcemain in accordance with 7-08.3(2)B of the Standard Specifications and these Special Provisions.

7-20.3(2)D Pipe Laying – HDPE

Provide HDPE leak proof, thermal, butt joints, except at field closures and other joint connections specifically identified or approved by the Engineer, and butt weld in accordance with manufacturer's recommendation and ASTM D 2657. Use tools recommended by the pipe supplier and approved by the Engineer for joint fusing. Provide manufacturer trained and certified operators for the joint fusing equipment. Provide a fusing machine having hydraulic pressure control for fusing two pipe ends together. Accurately trim the ends of pipe to form perpendicular faces prior to fusing. Provide on the fusing machine an electrically heated and thermostatically controlled heating plate containing a temperature gauge for monitoring temperature. Periodically inspect the heating plate, using a temperature stick, to assure even heating. For connections requiring flanged connections, provide a HDPE flange adapter with a 316 stainless steel follower ring with Class 125 flange bolt pattern.

Provide joints between pipe sections being even with pipe interior. Internal projection beads do not need be removed from each pipe joint. Provide a butt-fused joint having true alignment between the joined pipes with uniform roll back beads resulting from the use of proper temperature and pressure. Allow the joint adequate cooling time before removing pressure. Provide watertight fused joint having tensile strength equal to that of the pipe. Provide City with opportunity to inspection and accept each joint. Cut-out and replace defective joints at no cost to the City.

City will not allow or permit the following:

- Threaded or solvent–cement joints and connections.
- Fabrication of fittings in the field.
- Sleeve couplings, repair bands, mechanical joints, flanges and other types of pipe connections are not permitted unless shown on the Plans or authorized in advance by the Engineer or Inspector.

Provide trench construction in accordance with 7-08.3(1)A. Place pipe in the trench in accordance with 7-08.3(2)B and this section. Backfill in accordance with 7-08.3(3) and these Special Provisions. Backfill and compact when HDPE pipe is at the same temperature as the surrounding soil. If using flowable CDF for bedding or backfill, fill the pipe with water and anchor pipe to counteract buoyancy. City will not allow blocking under the pipe.

Provide continuous HDPE pipe entering manholes. City will not allow short PVC closure segments, except where explicitly shown on the Plans or approved by the

Engineer. Provide Kor-N-Seal Boots, or equal, to seal between the pipe and manhole wall.

7-20.3(2)E Rubber Gasket Joints

Lay sanitary sewer forcemain pipe having rubber gaskets in accordance with 7-08.3(2)E of the Standard Specifications and these Special Provisions.

7-20.3(2)F Plugs

Provide plugs for pipe branches, stubs or open pipe ends in accordance with 7-08.3(2)F of the Standard Specifications and these Special Provisions.7-20.3(2)G
Joining of Dissimilar Pipe

Join dissimilar pipes in accordance with 7-08.3(2)G of the Standard Specifications and these Special Provisions.

7-20.3(3) Backfilling

Place backfill material in accordance with 7-08.3(3), 7-09.3(10) and 7-09.3(11) of the Standard Specifications and these Special Provisions.

7-20.3(4) Handling of Pipe

Handle pipe in accordance with 7-09.3(13) of the Standard Specifications and these Special Provisions.

7-20.3(5) Cutting Pipe

Cut pipe in accordance with 7-09.3(14) of the Standard Specifications and these Special Provisions.

7-20.3(6) Laying of Pipe on Curves

Lay pipe on curves in accordance with 7-09.3(15) of the Standard Specifications and these Special Provisions.

7-20.3(7) Detectable Marking Tape

For nonmetallic pipe, provide detectable marking tape in accordance with 7-09.3(20) of the Standard Specifications and these Special Provisions.

7-20.3(8) Cleaning and Assembling Joint

Clean and assemble pipe ends, couplings, fittings and appurtenances in accordance with 7-09.3(16) of the Standard Specifications and these Special Provisions.

7-20.3(9) Concrete Thrust Blocking

Provide concrete thrust blocking, if Shown, in accordance with 7-09.3(21) of the Standard Specifications and these Special Provisions.

7-20.3(10) Restrained Joints

Provide restrained joints as Shown and in accordance with 7-09.3(25) of these Special Provisions.

7-20.3(11) Air/Vacuum Release Assembly

Provide combination air and vacuum release assemblies at all high points and the locations shown on the Plans and in accordance with these Special Provisions.

7-20.3(12) Hydrostatic Pressure Test

Test sanitary sewer forcemains in accordance with 7-09.3(23) of the Standard Specifications and these Special Provisions.

7-20.4 Measurement

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-20.5 Payment

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

Supplement Division 7 by adding the following Section:

7-21 TEMPORARY BYPASS PUMPING

(*****)

7-21.1 Description

This Work consists of furnishing, installing, and maintaining temporary facilities and equipment required to maintain the continual wastewater flow and to prevent wastewater discharge to the environment throughout the duration of constructing new or rehabilitating existing sanitary sewer or combined sewer mains, or both, within the Project.

7-21.1(1) Separated Sewer (SS)

The separated sewer (SS) network is generally located in the south portion of the City. Contact the Engineer to determine if the subject pipes are in the SS area and if sewer lift stations discharge to the subject sewer pipes. SS systems convey only sanitary sewer flows and are generally not affected by wet weather. The Engineer will furnish estimated bypass diurnal flow values for minimum (night) and maximum (peaks).

7-21.1(2) Combined Sewer (CS)

The combined sewer (CS) network is generally located in the north portion of the City. Contact the Engineer to determine if the subject pipes are in the CS area and if sewer lift stations discharge to the subject sewer pipes. CS systems are pipes that convey stormwater runoff and wastewater in the same pipe. Drain inlets in streets and many existing roof drains, and yard drains are connected to the CS sewer system. Even minor precipitation can produce very sudden and large increases in sewer flow. The Engineer will furnish estimated bypass flow values for “dry weather” and “wet weather” conditions in each pipe segment of the Project.

7-21.2 Materials

Provide bypass system including, but not limited to, the following.

1. Bypass pump(s) and motor(s).
2. Suction piping and temporary connections.
3. Provide screen sized to remove solids greater than 3-inch diameter.
4. Discharge piping or hoses, or both,
5. Discharge throttling plug valve(s) and check valve(s).

6. Temporary suction and discharge pipe restraint systems.
7. Level or pressure sensing equipment, or both.
8. Automatic primary and redundant control systems and accessories.

Provide pumps, motors, engines, controls, sensors, valves, piping and other bypass system components suitable for continual and intermittent automatic operation.

7-21.2(1) Pumps

Provide fully automatic, electric or diesel powered, self-priming pumps that do not require the use of foot-valves or vacuum pumps in the priming system.

Provide non-clogging pumps capable of passing 3-inch diameter solids.

Provide an additional standby bypass pumping system with 100-percent redundant pumping capacity onsite.

Provide separate automatic control systems and level sensors for the primary and redundant bypass systems. If the primary bypass system is powered from electricity from the local power utility, provide a diesel engine powered standby system with a level sensor for automatic operation upon rising wastewater level resulting from inadequate capacity of the primary system or loss of electrical power. Provide diesel engine driven equipment with "critical rated" silencers in sound attenuating enclosures.

7-21.3 Construction Requirements

7-21.3(1) General

Ensure sequence of Work and bypass operations to maintain continual wastewater flow. Wastewater flow is continuous and cannot be stopped or reduced. Specifically schedule and control all Work to be performed in the manner and at the time that will not disrupt the continual flow of wastewater.

Cooperate with City Inspector on inspection of bypass system components prior to and during setup and leakage and pressure testing and in evaluating suitability to confirm bypass system components are in reasonably good condition.

Anticipate, and inform Subcontractors, that the requirement to provide wastewater flow can hinder or complicate the Work. The Contractor shall be solely responsible for all costs to clean up and otherwise remedy the impact or cost of wastewater releases to the environment or private property as a result of Contractor's or Subcontractor's failure to maintain required bypass operation, including fines and claims against the City.

Provide screen upstream of pump intake capable of removing solids larger than 3-inch in diameter. Clean screen as necessary to prevent clogging and surcharging the upstream pipe and dispose of debris in accordance with current local, State and Federal laws and regulations.

Continually monitor bypass pump operation and take prompt action to address problems including, but not limited to, clearing debris at intake, re-fueling, and sealing leaks.

Obtain approval in advance from Engineer for discharge locations for bypass flows.

Use temporary sewer flow bypassing with pumps only while onsite and actively monitoring the bypass pump equipment. At the end of each workday, and whenever Contractor is not present on the Site, discontinue bypass pumping and provide a temporary gravity flow connection capable of conveying the maximum diurnal or wet weather flow volume to tie the existing sewer pipe to the new pipe.

The Contractor may modify site and structures as required for construction and bypass but shall make no modifications, excavations or storage of material that prevents continual wastewater flow. If elements of the facilities are eliminated for the convenience or necessity of construction, then provide an equivalent temporary facility, pipeline or equipment capable of performing the same function without adversely affecting continual wastewater flow.

Restrain in position and protect portions of the temporary bypass located above ground from damage. Provide temporary below grade crossing or traffic ramps at street and driveway crossings.

Construct fuel and oil containment berms surrounding diesel engine driven equipment.

7-21.3(2)A Separated Sewer (SS)

Provide temporary bypass system that at minimum accommodates conveying minimum and maximum estimated diurnal flows meeting or exceeding those listed on the Plans. Field verify by observing actual sewer flows in the subject pipes.

Discharge to storm drain systems is prohibited.

7-21.3(2)B Combined Sewer (CS)

To the extent possible conduct Work requiring sewer bypassing only during dry weather. Provide the bypass system with redundant pumps, each capable of conveying a minimum of the wet-weather flows as listed on the Plans. If required by the Engineer, connect redundant bypass pumps on-line, isolated from the primary system by a check valve. During wet weather bypass pumping, assign a qualified individual to be present around the clock at the location of the pump equipment that can and will take action as may be necessary to repair, maintain or manually operate the pump bypass system to prevent surcharging, backups and flooding. In addition, implement other effective measures including, but not limited to, temporary backflow valves or standby vactor equipment, or both, to prevent flooding and surcharge through side sewers.

Discharge to storm drain systems is prohibited, unless approved in writing by Engineer.

7-21.3(2) Demobilization

Do NOT remove temporary bypass pumping equipment, unless directed by the Engineer, from a newly constructed sewer reach until successfully completing required testing and the City completes its CCTV inspection for acceptance. Operate and maintain the bypass pump equipment and system during the City's CCTV inspection. The City will perform its inspection for acceptance within 3-days after receiving notice of required testing being successfully completed.

Disinfect and flush to the public sewer system bypass piping and components prior to removal from the Site or relocation within the Project, unless pipe ends are capped to prevent the discharge of wastewater to the environment. Pressure wash manholes, including upstream manholes surcharged during bypass operations, following the final removal of the bypass system.

7-21.3(3) Submittals

Submit a Type 3E Working Drawing detailed wastewater bypass plan for review and approval two weeks prior to the starting construction. Do NOT begin bypass operations until receiving written approval from the City.

Provide a specific and complete bypass plan including, but not limited to, sequencing, schedules, backup plan, locations, elevations, capacities of equipment, system curve determination and total dynamic head calculation, materials and other incidental items necessary and required to ensure proper protection of the bypass equipment from damage, and compliance with the requirements specified in these Special Provisions and required permit conditions.

Provide bypass plan details including, but not be limited to, the following:

1. Staging area for pumps.
2. Sewer plugging method and types of plugs.
3. Size, material, location and method of installation of suction and discharge piping.
4. Bypass pump sizes, capacity, number of each size, power requirements, and supporting calculations.
5. Calculations of friction losses and discharge pressures, including pump and system curves showing operating range.
6. Pump control system, logic and components, including float elevations and/or transducer equipment and settings.
7. Standby power generator size and location, if applicable.
8. Method of protecting discharge manholes or structures from erosion and damage.
9. Thrust restraint locations, including block sizes and bracing, if applicable.
10. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill, if applicable
11. Method of noise control for each pump and generator.
12. Temporary pipe supports and anchoring.
13. Schedule for installation and maintenance of bypass pumps and lines.

7-21.4 Measurement

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

7-21.5 Payment

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

Supplement Division 7 by adding the following Section:

END OF SECTION 7

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DIVISION 8 – MISCELLANEOUS CONSTRUCTION

8-01 EROSION CONTROL AND WATER POLLUTION CONTROL

8-01.1 Description

Revise the first paragraph in 8-01.1 to read as follows:

This Work consists of furnishing, installing, maintaining, removing and disposing of high visibility fence, and water pollution and erosion control items in accordance with the Standard Specifications, these Special Provisions, as shown in the Plans, as shown on COE Standard Drawings, or as designated by the Engineer.

8-01.2 Materials

Supplement the list of materials in 8-01.2 as follows:

Biodegradable Erosion Control Blanket 9-14.6(2)

8-01.3 Construction Requirements

8-01.3(1) General

Supplement 8-01.3(1) as follows:

The Contractor shall be responsible for all Work required for compliance with the Construction Stormwater General Permit (CSWGP) including annual permit fees.

Delete the first through eighth paragraphs and substitute the following:

The Contractor shall install a high visibility fence along the site preservation lines when shown in the Plans or as instructed by the Engineer.

Throughout the life of the project, the Contractor shall preserve and protect the delineated area, acting immediately to repair or restore any fencing damaged or removed.

Controlling pollution, erosion, runoff, and related damage requires the Contractor to perform temporary Work items including but not limited to:

1. Providing ditches, berms, culverts, and other measures to control surface water.
2. Building dams, settling basins, energy dissipaters, and other measures, to control downstream flows.
3. Controlling underground water found during construction.
4. Covering or otherwise protecting slopes and stockpiles until permanent erosion-control measures are working.

To the degree possible, the Contractor shall coordinate this temporary Work with permanent drainage and erosion control Work the Contract requires.

All sediment control devices including, but not limited to, sediment ponds, perimeter silt fencing, or other sediment trapping BMPs shall be installed prior to any ground

disturbing activity. Clearing, grubbing, excavation, borrow, or fill within the Right of Way shall never expose more erodible earth than as listed below:

Western Washington (West of the Cascade Mountain Crest)	
May 1 through September 30	17 Acres
October 1 through April 30	5 Acres

8-01.3(1)A Submittals

8-01.3(1)A1 Temporary Erosion and Sedimentation Control Plan

Revise 8-01.3(1)A1 to read as follows:

The Contractor shall prepare and submit a Temporary Erosion and Sediment Control (TESC) Plan consisting of a narrative section and plan sheets that meets Ecology's Stormwater Pollution Prevention Plan (SWPPP) requirement in the CSWGP. A draft SWPPP has been prepared for this project and is available upon request

The Contractor may adopt the TESC measures indicated in the Drawings in preparing the TESC Plan. The Contractor shall complete and modify the TESC Plan to meet the Contractor's schedule and method of construction. All TESC Plans shall meet the requirements of the current edition of the Department of Ecology's Stormwater Management Manual for Western Washington and be adapted as needed throughout construction based on site inspections and discharge samples to maintain compliance with the CSWGP. The Contractor shall develop a schedule for implementation of the TESC work and incorporate it into the Contractor's progress schedule.

TESC plan shall be continually updated as site conditions change and erosion control measures are adjusted. The Contractor shall provide an updated TESC plan for review when requested by the Engineer.

The Contractor's adoption of the TESC Plans as shown in the Plans shall be submitted as a Type 1 Working Drawing. Modified TESC Plans shall be submitted as Type 2 Working Drawings.

Failure to accept all or part of any such Plan will not make the Contracting Agency liable to the Contractor for any Work delays.

The Contractor shall prepare and submit a Temporary Erosion and Sediment Control (TESC) Plan consisting of a narrative section and plan sheets meeting the requirements of Chapter 2 of the DCSS.

The Contractor may adopt the TESC measures indicated in the Drawings in preparing the TESC Plan. The Contractor shall complete and modify the TESC Plan to meet the Contractor's schedule and method of construction, but the modified plan shall provide at least an equivalent level of erosion protection as the measures included in the Drawings. All TESC Plans shall be adapted as needed throughout construction based on site inspections. The Contractor shall develop a schedule for implementation of the TESC work and incorporate it into the Contractor's progress schedule.

At the request of the Engineer updated TESC Plans shall be prepared and provided to the City.

The Contractor's adoption of the TESC Plans as shown in the Plans shall be submitted as a Type 1 Working Drawing. Modified TESC Plans shall be submitted as Type 2 Working Drawings.

Failure to accept all or part of any such Plan will not make the Contracting Agency liable to the Contractor for any Work delays.

8-01.3(1)B Erosion and Sediment Control (ESC) Lead

Revise the second and third paragraphs in 8-01.3(1)B to read as follows:

The ESC Lead shall implement the TESC Plan. Implementation shall include, but is not limited to:

1. Installing and maintaining all temporary erosion and sediment control Best Management Practices (BMPs) included in the TESC Plan to assure continued performance of their intended function. Damaged or inadequate TESC BMP's shall be corrected immediately.
2. Updating the TESC Plan to reflect current field conditions.
3. Discharge sampling and submitting Discharge Monitoring Reports (DMRs) to Ecology in accordance with the CSWGP.
4. Develop and maintain the Site Log Book as defined in the CSWGP. As a part of the Site Log Book, the Contractor shall develop and maintain a BMP tracking table to show that identified TESC compliance issues are fully resolved within 10 calendar days. The table shall include the date an issue was identified, a description of how it was resolved, and the date the issue was fully resolved.

The ESC Lead shall also inspect all areas disturbed by construction activities, all on-site erosion and sediment control BMP's, and all stormwater discharge points at least once every calendar week and within 24-hours of runoff events in which stormwater discharges from the site. Inspections of temporarily stabilized, inactive sites may be reduced to once every calendar month. The Erosion and Sediment Control Inspection Form (WSDOT Form 220-030) shall be completed for each inspection and a copy shall be submitted to the Engineer no later than the end of the next working day following the inspection.

8-01.3(2) Temporary Seeding and Mulching

8-01.3(2)A Preparation For Application

Revise the first paragraph in 8-01.3(2)A to read as follows:

A cleated roller, crawler tractor, or similar equipment, which forms longitudinal depressions at least 2 inches deep shall be used for compaction and preparation of the surface to be seeded.

8-01.3(2)B Temporary Seeding

Supplement 8-01.3(2)B by adding the following:

Cultivate trench restoration in turf areas to 4-inch depth to provide firm yet friable seedbed. Provide topsoil if needed. Cultivate seeding restoration areas no sooner than one week prior to seeding.

Provide a smooth, consistent, friable surface acceptable for all areas being seeded by raking or similar treatment acceptable for seeding as determined by the Engineer.

Provide all areas being seeded free of all visible clods, rocks and debris measuring one-inch or larger in any dimension.

Use hydroseeding application method where feasible, uniformly apply a slurry of seed, fertilizer, mulch and water over all disturbed areas unless shown otherwise on the Plans.

Use Seed Mix #1, as specified in 9-14.2 of these Special Provisions in restoring areas not having established lawns. Use Seed Mix #2 or #3, as specified in 9-14.2 of these Special Provisions, for restoring areas with established lawns.

Apply permanent seed mixture #1 and #2 uniformly over the areas being restored at a rate of 4-pounds per 1,000 square feet.

Apply permanent seed mixture #3 uniformly over the areas being restored at a rate of 7-pounds per 1,000 square feet.

Apply temporary seed mixture uniformly over the areas being restored at a rate of 2-pounds per 1,000 square feet.

Apply starter fertilizer in accordance with Section 9-14.3 at a rate of 8 pounds per 1,000 square feet. For hydroseeding application, incorporate the fertilizer into the seed, mulch and water slurry and apply in accordance with these Special Provisions.

8-01.3(2)D Temporary Mulching

Supplement 8-01.3(2)D by adding the following:

Apply wood cellulose fiber at the rate of 60 pounds per 1,000 square feet.

8-01.3(8) Street Cleaning

Delete 8-01.3(8) and substitute the following:

Provide self-propelled pickup sweepers equipped with water spray systems for dust control and designed and operated to meet air quality standards for pavement cleaning and debris removal as required. The use of supplementary water to suppress dust while performing cleaning Work shall be held to a minimum unless designated otherwise by the Engineer.

Plan construction operation to minimize the need for street cleaning.

Sweep streets and roadways as needed at least once per day. Sweep all roadway areas subject to construction traffic within the Project area and connecting streets, preferably during non-peak use hours of the Project site. More frequent cleaning may be required, as directed by the City's Inspector, as conditions warrant.

Clean up spills immediately. Failure to clean streets or spills as required will result in City procuring street cleaning services, or cleaning streets themselves at City overtime rates. Either way, Contractor shall be responsible for reimbursing the City for cost incurred. If Contractor fails to promptly reimburse City then City will deduct cost, plus interest on unpaid balance, from Contractor's final payment.

8-01.3(9) Sediment Control Barriers

8-01.3(9)A Fencing

8-01.3(9)A2 Silt Fence

Delete the third paragraph in 8-01.3(9)A2 and substitute the following:

Provide steel posts consisting of U, T, L or C shape posts with a minimum weight of 1.35 lbs/ft, or other steel posts having equivalent strength and bending resistance to the posts listed. Provide silt fence conforming to COE Standard Drawing 214.

8-01.3(15) Maintenance

Delete the fifth paragraph of 8-01.3(15).

8-01.3(16) Removal

Revise the first paragraph of 8-01.3(16) to read as follows:

The Contractor shall remove all temporary BMPs and all associated hardware from the project limits prior to Physical Completion unless otherwise approved by the Engineer. All permanent stabilization of disturbed areas shall be completed prior to removal of temporary BMPs

At the request of the Contractor and at the sole discretion of the Engineer the CSWGP may be transferred back to the City. Approval of the Transfer of Coverage request will require the following:

1. All other Work required for Contract Completion has been completed.
2. All Work required for compliance with the CSWGP has been completed to the maximum extent possible. This includes removal of BMPs that are no longer needed and the site has undergone all Stabilization identified for meeting the requirements of Final Stabilization in the CSWGP.
3. An Equitable Adjustment change order for the cost of Work that has not been completed by the Contractor.
4. Submittal of the Washington State Department of Ecology Transfer of Coverage form (Ecology form ECY 020-87a) to the Engineer.

If the Engineer approves the Transfer of Coverage back to the City the requirement in 1-07.5(3) for the Contractor's submittal of the Notice of Termination form to Ecology will not apply.

8-01.4 Measurement

Delete all paragraphs in 8-01.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-01.5 Payment

Delete all paragraphs in 8-01.5 and substitute the following:

Payment for bid items of Work completed pursuant to the Contract Documents will be as described in Division B – Bid Item Descriptions of these Special Provisions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-02 ROADSIDE RESTORATION**8-02.1 Description**

Supplement 8-02.1 by adding the following:

All plant materials required by the Contract Documents shall be Plant Selection Including Plant Establishment (PSIPE) per the Standard Specifications.

8-02.2 Materials

Revise 8-02.2 by replacing the list of materials with the following:

Soils	9-14.2 (Special Provisions)
Topsoil Type A	9-14.2(2) (Special Provisions)
Root Barrier	9-14.8 (Special Provisions)
Seed	9-14.3 (Special Provisions)
Fertilizer	9-14.4
Bark or Wood Chip Mulch	9-14.5(3)
Mulch and Amendments	9-14.5
Erosion Control Devices	9-14.6
Plant Materials	9-14.7 (Special Provisions)
Compost	9-14.5(8) (Special Provisions)
Stakes, Guys, and Wrapping	9-14.8
Water	9-25.2

8-02.3 Construction Requirements**8-02.3(1) Responsibility During Construction**

Supplement 8-02.3(1) by adding the following:

No dumping or stockpiling of topsoil, compost or bark mulch on roadway surfaces will be allowed.

8-02.3(2) Work Plans**8-02.3(2)A Roadside Work Plan**

Supplement 8-02.3(2)A by adding the following:

Submit to the City a Roadside Work Plan meeting the requirements of the Standard Specifications a minimum of 30 calendar days prior to commencing the installation of topsoil, compost, seeding, bark mulch or landscape materials.

8-02.3(4) Topsoil

Revise the first paragraph of 8-02.3(4) to read as follows:

Spread topsoil evenly over the specified areas to the depth shown in the Plans or as otherwise ordered by the Engineer. Prior to spreading topsoil cultivate existing soil to a depth of six inches or as specified in the Special Provisions or Plans. After spreading topsoil rake up, remove and dispose of all large clods, hard lumps, and rocks 1 inch in diameter and larger.

Delete section 8-02.3(4)A in its entirety and substitute the following:

8-02.3(4)A Topsoil Type A – Imported

Provide Topsoil Type A – Imported in accordance with the 9-14.2(2) of the Special Provisions. Prepare planting area and place topsoil as described in these specifications.

8-02.3(5) Roadside Seeding, Lawn and Planting Area Preparation

8-02.3(5)C Planting Area Preparation

Supplement 8-02.3(5)C by adding the following:

When Post Construction Soil Quality and Depth is called for in the plans or Special Provisions all new and restored lawn and landscaping areas shall be prepared in accordance with City Standard Drawings 202 and 203. Select the preferred preparation option for each area. Different options may be selected for different parts of the project. Notify the Engineer in advance of the selected method for achieving Post-Construction Soil Quality and Depth prior to beginning clearing and grading. These requirements shall be in addition to the requirements in the remainder of Section 8-02.3. Where conflicts exist the more stringent requirement shall apply unless otherwise determined by the Engineer.

Amend soil in planting areas with four inches of Compost tilled six inches into the native soil. Lightly compact soil and establish a smooth and uniform finished grade that protects against obstruction to surface drainage.

8-02.3(11) Mulch

8-02.3(11)B Bark or Woodchip Mulch

Supplement 8-02.3(11)B by adding the following:

Place bark mulch over all planting areas to the depth shown on the Plans. Thoroughly water and hose down plants with a fine spray to wash the leaves of the plants immediately after application.

8-02.3(13) Plant Establishment

Supplement 8-02.3(13) by adding the following:

Plant establishment consists of insuring resumption and continued growth of all planted material including seeding for a period of one year. This includes, but is not limited to, labor and materials necessary for removal and replacement of any rejected plant material planted under this Contract. The Contractor shall be responsible for watering all seeded areas and planting areas sufficiently to establish and maintain a thriving condition throughout the duration of the plant establishment period.

Supplement 8-02.3 by adding the following:

8-02.3(17) Landscape Restoration

(*****)

Restore all disturbed areas to original condition or better. The Contractor is specifically reminded that unnecessary damage caused beyond the limits of clearing or construction shall be repaired in like or better condition at the Contractor's sole expense.

Restore grass areas with hydroseed where directed. Provide grass seed in accordance with these Special Provisions. Grass seed and hydroseeding will be incidental to the lump sum price for Landscape Restoration.

Provide Topsoil Type A – Import or General Turf Area Soil as the case may be in accordance with these Special Provisions incidental to the lump sum price for Landscape Restoration.

Provide Bark Mulch in accordance with these Special Provisions incidental to the lump sum price for Landscape Restoration.

Supplement 8-02.3 by adding the following:

8-02.3(18) Root Barrier

(*****)

Install the Root Barrier Fabric as shown on the COE standard detail 339 for tree pits in all project planting areas. Seal seams per manufacturer's recommendations.

8-02.4 Measurement

Delete all paragraphs in 8-02.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-02.5 Payment

Delete all paragraphs in 8-02.5 and substitute the following:

Payment for Bid items of Work completed pursuant to the Contract Documents will be as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-03 IRRIGATION SYSTEMS

8-03.1 Description

(*****)

Section 8-03.1 is supplemented with the following:

The work consists of installing a complete irrigation system in accordance with the standard specifications and details in the contract plans. The work also includes restoration / extension of existing irrigation into new or restored planting areas as indicated in the plans.

8-03.4 Measurement

Delete all paragraphs in 8-03.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-03.5 Payment

Delete all paragraphs in 8-03.5 and substitute the following:

Payment for Bid items of Work completed pursuant to the Contract Documents will be as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-04 CURBS, GUTTERS, AND SPILLWAYS**8-04.1 Description**

Revise the first paragraph in 8-04.1 to read as follows:

This work shall consist of construction of cement concrete curbs, curbs and gutters, gutters, and HMA asphalt Curbs in accordance with 8-04 of the Standard Specifications and as modified in these Special Provisions conforming to the Plans and COE Standard Drawings.

8-04.2 Materials

Supplement 8-04.2 by adding the following:

Liquid Membrane-Forming Concrete Curing Compounds	9-23.2	Special Provisions
Chemical Admixtures for Concrete	9-23.6	Special Provisions

8-04.3 Construction Requirements**8-04.3(1) Cement Concrete Curbs, Gutters, and Spillways**

Supplement 8-04.3(1) by adding the following:

Provide steel forms on tangent sections and wooden forms for curved sections and radii.

Provide 1/2-inch premolded filler in lieu of 3/8-inch premolded filler for through-expansion Provide through expansion joint at maximum 30-foot intervals.

Provide through expansion joint at each end of driveway.

Compact the subbase for curb and gutter sections to 95-percent maximum density at optimum moisture content before placing the curb and gutter.

The top surface of the finished concrete shall not deviate more than 1/8-inch as measured using a 10-foot straight edge.

The curb alignment shall not vary more than 1/4-inch as measured using a 10-foot straight edge.

Depress the cement concrete curb at locations shown on the Plans, or as directed by the Engineer, for concrete curb ramps and driveways, in accordance with COE Standard Drawings No., , 315, 316, 317, 318, 319, 320, 321 and 322.

Construct cement concrete curbs where shown on the Plans, or as directed by the Engineer, in accordance with COE Standard Drawing Nos. 307 308and 309.

Construct storm drainage frames and grates into cement concrete curb and gutter at locations shown on the Plans in accordance with COE Standard Drawings Nos. 407 and 412.

After finishing, spray cement concrete curb, gutters and spillways using transparent curing compound in accordance with 5-05.3(13)A of the Standard Specifications.

8-04.3(1)A Extruded Cement Concrete Curb

Supplement 8-04.3(1)A by adding the following:

Construct extruded cement concrete curb where shown on the Plans and in accordance with COE Standard Drawing No. 309.

8-04.3(2) Extruded Asphalt Concrete Curbs, and Gutters

Supplement 8-04.3(2) by adding the following:

Construct extruded asphalt concrete curbs" where shown on the Plans, or as directed by the Engineer, in accordance with COE Standard Drawing No. 310.

8-04.4 Measurement

Delete all paragraphs in 8-04.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-04.5 Payment

Delete all paragraphs in 8-04.5 and substitute the following:

Payment for Bid items of Work completed pursuant to the Contract Documents will be as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT, of the Standard Specifications.

8-14 CEMENT CONCRETE SIDEWALKS

8-14.2 Materials

Supplement 8-14.2 by adding the following:

Chemical Admixtures for Concrete 9-23.6 Special Provisions

8-14.3 Construction Requirements

Supplement 8-14.3 by adding the following:

Provide concrete mix with slump not exceeding 3-1/2 inches.

Add coloring agent for matching the color of newly constructed cement concrete sidewalks to the color of adjacent existing cement concrete sidewalks. Add to the concrete during mixing in an amount not to exceed 1-1/2 pounds per cubic yard of concrete. Do NOT use coloring agent in curb ramps.

8-14.3(1) Excavation

Supplement 8-14.3(1) by adding the following:

Obtain approval of the Engineer to provide, place and compact Gravel Borrow meeting the requirements of 9-03.14 of the Standard Specification if there is insufficient suitable native material on the Project to fill low areas for the sidewalk subgrade.

8-14.3(2) Forms

Supplement 8-14.3(2) by adding the following:

Before setting the forms, grade the subgrade to two inches below established grade to accommodate two inches of crushed surfacing top course.

Install sidewalk drains prior to placing forms if the Plans calls for sidewalk drains or the Engineer directs installation of sidewalk drains.

8-14.3(3) Placing and Finishing Concrete

Supplement 8-14.3(3) by adding the following:

Form joints by first cutting a groove in the concrete with a tee bar of a depth equal to, but not greater than the joint filler material, and then work the premolded joint filler into the groove. Position premolded joint filler for through and contraction joints in true alignment at right angles to the line of the sidewalk and be normal to and flush with the surface.

Edge joints using a 1/4 inch radius edger and tool the sidewalk edges using a 1/2-inch radius edger.

Obtain Engineer's approval of placing and finishing tools. Perform the concrete sidewalk placing and finishing under the control of the Engineer. Provide finished appearance by using an edging tool lightly on the sidewalk edges after the brush finish.

Provide standard locations for concrete sidewalk through joints in accordance with these Special Provisions, in addition to the Plans, at the following:

- a. At street margins produced and at 30-foot intervals.
- b. To separate concrete driveways, stairways, curb ramps and their landings from sidewalks.
- c. Around the vertical barrel of fire hydrants, around utility poles and large diameter underground utility cover castings when located in the sidewalk area.
 - (i) Provide 18-inch No. 4 rebar placed diagonally and at least 6-inches off each corner of through joint noted in (c).
- d. Longitudinally between concrete walks, curbs, paved planting strips and solid masonry or concrete walls where they abut.
- e. To match as nearly as possible the through joints in the adjacent pavement and curb when sidewalk abuts curb.

Construct transverse contraction joints with premolded material 3/8-inch by 1-1/2-inch wide and set at maximum 15-foot intervals, or as decided by the Engineer.

Provide 3/8-inch thick premolded non-extruding joint material, cut equal to the full depth of the concrete, plus 1/2-inch transverse and longitudinal through joints as shown on Standard Drawing No. 312. Install with top edge flush with the finished surface of the concrete, in a perpendicular plane to the surface and with the bottom edge embedded in the subgrade. Install joints in a straight alignment, except where placed in curved locations as required by the Plans.

Supplement 8-14.3(3) by adding the following:

8-14.3(3)A Curb Ramp
(*****)

Install WSDOT style cement concrete perpendicular curb ramp at locations specified in the contract plans.

Construct monolithic depressed curb and sidewalk as indicated on WSDOT Standard Plans. Construct curb ramps separate from the sidewalk to produce a definite break line between the ramp and the sidewalk. Install a 3/8-inch non-extruded through joint material between the curb and the sidewalk with edging as specified in Section 8-14.3(3).

Brush-finish the triangular shaped siding areas with brushing direction being parallel to the curb face. Do NOT extend the adjacent sidewalk "V" groove scoring pattern into the curb ramp siding areas.

Provide concrete for curb ramps that is not colored, overlaid or topped. Consider the curb ramps as beginning at a point flush with the pavement and terminating at a point flush with the sidewalk landing. Include the sloping triangular shaped sidings as part of the curb ramp.

8-14.3(4) Curing

Maintain sufficient protective covering on-site, such as waterproof paper or plastic membrane, to cover an entire day's pour in event of rain or other unsuitable weather.

Protect the concrete sidewalk against damage or defacement until Owner has been accepted the Work. Remove and replace sidewalk that is not acceptable to the Engineer because of damage or defacement at Contractor's expense.

After finishing, spray cement concrete sidewalk using transparent curing compound in accordance with 5-05.3(13)A of the Standard Specifications.

8-14.4 Measurement

Delete all paragraphs in 8-14.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-14.5 Payment

Delete all paragraphs in 8-14.5 and substitute the following:

Payment for Bid items of Work completed pursuant to the Contract Documents will be as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-20 ILLUMINATION, TRAFFIC SIGNAL SYSTEMS, INTELLIGENT TRANSPORTATION SYSTEMS, AND ELECTRICAL

8-20.4 Measurement

(*****)

Section 8-20.4 is deleted and replaced with the following:

"Security Camera System" shall be measured per lump sum for the total of all items for the complete security camera system as identified on the Plans. All items and labor necessary to supply, install, and test the conduit, wiring, terminations, junction boxes, poles and foundations, security cameras and mounting equipment, patch panels, Ethernet switches and power supply units, restoring facilities destroyed or damaged during construction, and all other components necessary to make a complete security camera system shall be included within the lump sum measurement.

Removal, re-installation, and salvage of existing security camera system components shall be included within the lump sum measurement. After construction is complete, it is the Contractor's responsibility to adjust and re-aim security cameras to their final position as shown on the Plans or as directed by the Contracting Agency, and shall be considered incidental to the lump sum measurement. All painting of components shall be considered incidental to the lump sum measurement. Excavation, trenching and

bedding, backfill of trenches, surface restoration of trenches and conduit/junction box installations shall be included in the lump sum measurement. No specific unit of measurement shall apply, but measurement will be made for the sum total of all items to be furnished and installed.

8-20.5 *Payment***(*****)**

Section 8-20.5 is deleted and replaced with the following:

Certification of manufactured material must be supplied to the Contracting Agency before any payment will be made for that item of Work. The Contractor shall forward to the Contracting Agency any manufacturer's guarantees for any materials purchased.

Payment will be made in accordance with Section 1-04.1 for each of the following Bid Items:

"Security Camera System Complete", per lump sum.

The lump sum price for "Security Camera System" shall be full pay for furnishing all labor, equipment, materials, tools, and supplies necessary or incidental to the construction to complete the work as specified in the Plans and as defined in the Standard Specifications and these Special Provisions. This includes and is not limited to all work related to the removal, re-installation, and salvage of existing security camera system equipment, and the installation of new security camera system equipment.

Coordination with Everett Transit IT Department shall be considered incidental to the bid items included in this section and no additional compensation will be made.

8-21 PERMANENT SIGNING**8-21.1 *Description***

Supplement 8-21.1 by adding the following:

Work involving installing traffic regulatory signs shall be in accordance with COE Standard Drawing 716 and street name signs in accordance with COE Standard Drawing 715 and 718 and as indicated on the Plans.

8-21.3 *Construction Requirements***8-21.3(4) Sign Removal**

Delete 8-21.3(4) and substitute the following:

Remove the existing signs and, if so indicated, the sign structures where shown in the Plans or ordered by the Engineer. Where indicated, remove concrete pedestals to a minimum of 1 foot below finished grade and backfill the hole to the satisfaction of the Engineer. After removing an existing sign post within a sidewalk area, finish the area to make the sidewalk continuous. Remove and properly dispose of wood signs, wood sign posts, wood structures, metal sign posts, wind beams, and other metal structural members. Salvage aluminum signs and return to the City of Everett's Public Works Department.

8-21.4 Measurement

Delete all paragraphs in 8-21.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-21.5 Payment

Delete all paragraphs in 8-21.5 and substitute the following:

Payment for Bid items of Work completed pursuant to the Contract Documents will be as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-22 PAVEMENT MARKING

8-22.1 Description

Supplement 8-22.1 by adding the following:

Provide 24-inch wide stop line.

Provide 24-inch wide solid white lines for crosswalks in accordance with COE Standard Drawing No. 721.

8-22.4 Measurement

Delete all paragraphs in 8-22.4 and substitute the following:

Bid items of Work completed pursuant to the Contract Documents will be measured as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-22.5 Payment

Delete all paragraphs in 8-22.5 and substitute the following:

Payment for Bid items of Work completed pursuant to the Contract Documents will be as described in Division B - Bid Item Descriptions and Section 1-09 MEASUREMENT AND PAYMENT of the Standard Specifications.

8-32 TRANSIT SHELTER BENCH

(*****)

The contractor will secure, assemble, and install four (4) ParkTastic 4-foot Rolled Bench without back surface mount expanded metal under the transit shelters to be installed on the transit platform, per ParkTastic Standard Drawing 766be125. Bench to be powder coated red.

8-33 BIKE RACK

(*****)

The contractor will secure and install six (6) stainless steel bike racks by HUNTCO, type Staple-Flange surface mount, finish to be stainless steel per contract plans and standard HUNTCO plan.

8-34 BIG BELLY SOLAR GARBAGE COMPACTOR**(*****)**

The contractor will secure and install two (2) new Bigbelly Smart Max solar garbage compactors with a 150-gallon capacity per the contract plans.

8-35 KIOSK FOUNDATION & INSTALLATION**(*****)****8-35.1 Description**

The contractor will construct a cement concrete foundation for two (2) transit kiosk display units. Pour conduit runs into the foundation and mount TransitVue kiosks per the plan set and requirements of this specification. The kiosk is to be powered, connected to communication lines and fully functional. Kiosk display units will be supplied by the Owner.

8-35.2 Materials

Reinforcing Steel 9-07

Aggregate 9-03

Cement 9-301

Cement Concrete is to be class 4000

END OF DIVISION 8

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DIVISION 9 – MATERIALS**9-03 AGGREGATES****9-03.6 Vacant**

Delete 9-03.6 and substitute the following:

9-03.6 Aggregates for Asphalt Treated Base (ATB)**9-03.6(1) General Requirements**

Aggregates for asphalt treated base shall be manufactured from ledge rock, talus, or gravel, in accordance with the provisions of Section 3-01 that meet the following test requirements:

Los Angeles Wear, 500 Rev.	30% max.
Degradation Factor	15 min.

9-03.6(2) Grading

Aggregates for asphalt treated base shall meet the following requirements for grading:

Sieve Size	Percent Passing
2"	100
1/2"	56-100
No. 4	32-72
No. 10	22-57
No. 40	8-32
No. 200	2.0-9.0

All percentages are by weight.

9-03.6(3) Test Requirements

When the aggregates are combined within the limits set forth in Section 9-03.6(2) and mixed in the laboratory with the designated grade of asphalt, the mixture shall be capable of meeting the following test values:

% of Theoretical Maximum Specific Gravity (GMM) (approximate)	93@
AASHTO T324, WSDOT TM T718 or ASTM D3625	100 gyrations
(Acceptable anti-strip evaluation tests)	Pass

The sand equivalent value of the mineral aggregate for asphalt treated base (ATB) shall not be less than 35.

Supplement Section 9-03 by adding the following:

9-03.22 Sand Backfill for Pipe Zone

(*****)

For pipe zone bedding and backfill of ductile iron and steel pipe only, provide a clean sand mixture free from organic matter and conforming to the following gradation:

<u>U.S. Standard Sieve Size</u>	<u>Percent Passing By Weight</u>
1/2"	100
#4	65-100
#50	5-30
#200	0-7

All percentages are by weight.

9-03.24 Bedding Sand for Interlocking Pavers
(*****)

Conform to the grading requirements of ASTM C-33 with modifications shown in Table 1.

Table 1

<u>U.S. Standard Sieve Size</u>	<u>Percent Passing By Weight</u>
3/8"	100
#4	95-100
#8	85-100
#16	50-85
#30	25-60
#50	10-30
#100	2-10
#200	0-1

All percentages are by weight.

9-03.25 Joint Sand for Interlocking Pavers
(*****)

Conform to the grading requirements of ASTM C-144 as shown in Table 1. Provide joint sand free of shale, stone dust, screening or lightweight aggregates.

Table 1

<u>U.S. Standard Sieve Size</u>	<u>Natural Sand Percent Passing By Weight</u>	<u>Manufactured Sand Percent Passing By Weight</u>
#4	100	100
#8	95-100	95-100
#16	70-100	70-100
#30	40-75	40-100
#50	10-35	20-40
#100	2-15	10-25
#200	0-1	0-10

All percentages are by weight.

9-04 JOINTS AND CRACK SEALING MATERIALS

Supplement Section 9-04 by adding the following:

9-04.12 Watertight Pipe to Manhole Connection Boot
(*****)

Provide Kor N Seal®, A•Lok, or equal watertight pipe to manhole connection boot.

9-04.13 Flexible Coupling
(***)**

Provide Fernco or equal flexible coupling for gravity side sewer connections.

Provide model DFW (non-shear) as manufactured by NDS Inc., Strong Back RC series as manufactured by Fernco, or equal for pressure sewer connections.

9-05 DRAINAGE STRUCTURES, CULVERTS, AND CONDUITS**9-05.4(2) Mitered Ends**

Delete all paragraphs in 9-05.4(2) and substitute the following:

Unless otherwise indicated in the plans or Special Provisions the ends of steel culvert pipe or pipe arch shall be beveled. If beveled ends are specified, the ends of culvert pipe over 30 inches in diameter shall be mitered to conform to the slope of the embankment in which the culvert is to be placed whether the culvert is constructed normal to or at an angle with the centerline of the roadway.

Beveled steel pipe end sections 12 inches through 30 inches in diameter shall be of the same material and thickness and have the same protective coating as the pipe to which they are attached. Beveled pipe ends of these dimensions shall be constructed in conformance with the City Standard Plan 435.

9-05.12 Polyvinyl Chloride (PVC) Pipe**9-05.12(1) Solid Wall PVC Culvert Pipe, Solid Wall PVC Storm Sewer Pipe, and Solid Wall PVC Sanitary Sewer Pipe**

Revise the third paragraph in 9-05.12(1) to read as follows:

For pipe sizes 18 to 30-inch diameter, provide solid wall PVC pipe meeting ASTM F 679, using minimum pipe stiffness of PS46, unless otherwise noted on the Plans.

Revise the fifth paragraph in 9-05.12(1) to read as follows:

Provide Trench Tough™ SDR 35 gasketed injection molded fittings for solid wall PVC pipe as manufactured by MULTI FITTINGS, or equal.

9-05.13 Ductile Iron Sewer Pipe

Delete all paragraphs in 9-05.13 and substitute the following:

Provide centrifugally cast ductile iron sewer pipe meeting the requirements of AWWA C151. Provide cement-mortar lining meeting the requirements of AWWA C104 and coated with a seal coat per AWWA C104. Provide ductile iron pipe Special Thickness Class 52.

Provide rubber gasket push-on type, or mechanical type non-restrained joints meeting the requirements of AWWA C111.

9-05.15 Metal Castings**9-05.15(1) Manhole Ring and Cover**

Delete all paragraphs in 9-05.15(1) and substitute the following:

For hinged frames and covers, provide heavy duty ductile iron frames and covers as manufactured by PAMREX, 24-inch, Model CDPA60EH, East Jordan Iron Works Ergo 00104042L01, or equal, with badging for sanitary or storm sewer as the case may be.

For non-hinged frames and covers, provide watertight, heavy duty cast iron frames and ductile iron covers as manufactured by Olympic Foundry, Inc., East Jordan Iron Works, Inc., or equal with badging for sanitary or storm sewer as the case may be.

Supplement 9-05.15 by adding the following:

9-05.15(4) Metal Frame and Cover for Sewer Cleanouts
(***)**

Provide East Jordan Ironworks heavy duty gray iron frame number 3661ZPT and cover number 3660CPT or equal.

9-05.23 High Density Polyethylene (HDPE) Pipe

Revise 9-05.23 to read as follows:

Provide polyethylene pipe and fittings manufactured from resins meeting the requirements of ASTM D3350 with a cell classification 345464C for black or 345464E for color and stripes and a Plastic Pipe Institute (PPI) designation of PE 3608. Provide materials listed in the name of the pipe and fitting manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. Provide manufacturer certification that the materials used to manufacture pipe and fittings meet these requirements. The fitting material may be gray or black.

Additives that can be conclusively proven not to be detrimental to the pipe may also be used, provided the pipe produced meets the requirements of ASTM D2837. Provide pipe containing no recycled compound except that generated in the manufacturer's own plant from resin of the same specifications from the same raw material supplier.

Provide pipe with the following information continuously marked on the pipe or spaced at intervals not exceeding 5-feet.

1. Name or trademark of the pipe manufacturer.
2. Nominal pipe size.
3. Standard Dimensional Ratio (SDR).
4. PE 3608 Manufacturing Standard Reference – ASTM F 714.
5. A production code from which the date and place of manufacture can be determined.
6. Nominal pressure.
7. Raw material.

Provide polyethylene pipe homogeneous throughout and free of visible cracks, holes, foreign inclusions, or their injurious defects. Nicks, scrapes, or gouges on the pipe deeper than 5-percent of the nominal wall thickness will be cause for rejecting the pipe. Provide pipe uniform in color, opacity, density, and other physical properties. Express the pipe diameter as nominal outside diameter.

Replace at the Contractor's expense pipe that has been damaged or does not meet these specifications. Internal and external surfaces of the pipe shall be smooth, clean and free of grooving and other defects. Pipe shall not be accepted if ovality exceeds 1 percent of the external diameter of the pipe. Provide manufacturer's certificates for all materials stating conformance to this specification.

For storm sewer pipe and sanitary sewer pipe bursting, provide HDPE pipe having a minimum SDR as identified on the Plans and having iron pipe size dimensions (IPS).

For water main, provide HDPE meeting requirements of 9-30.1(6).

Provide HDPE butt-fused joints and Class 125 bolt pattern flange joints fittings, including but not limited to, tees, bends, and flange adapters of the same material as the pipe manufacturer.

9-05.24 *Polypropylene Sewer Pipe*

Supplement 9-05.24 by adding the following:

Approved product is Sanitite HP as manufactured by ADS/Hancor or equal.

Supplement Section 9-05 by adding the following:

9-05.32 *Insertion Tee*

(*****)

Provide INSERTA TEE® SDR 35 gasketed bell end gravity application as manufactured by Inserta Fittings Co, or equal.

9-05.60 *Casing Spacers*

(*****)

Provide bolted side flange stainless steel split-case design casing spacers having minimum of two runners at the bottom and two runners at the top. Provide runners made of high strength polymer plastic. Spacers shall be a minimum of 12" wide. Acceptable manufacturers are Calpico Inc., PSI, Advanced Products and Systems Inc., or equal.

9-05.62 *Synthetic Rubber Sleeve Seal*

(*****)

Provide either pull-on conical model or a split wrap-around model with stainless steel band clamps. Acceptable manufacturers are Calpico Inc., PSI, Advanced Products and Systems Inc., or equal.

9-05.64 *Polypropylene Manhole and Hand Hold Steps*

(*****)

Provide polypropylene manhole and hand hold steps as manufactured by Lane International Corporation, or equal.

9-05.66 *Polypropylene Manhole Ladder*

(*****)

Provide polypropylene manhole ladder as manufactured by Lane International Corporation, or equal.

9-06 STRUCTURAL STEEL AND RELATED MATERIALS

9.06-1 *Structural Carbon Steel*

Supplement 9-06.1 by adding the following:

Steel casing pipe for bored or jacked crossings shall be in accordance with AWWA C200 and have minimum yield strength of 35,000 psi.

9-12 MASONARY UNITS

Supplement 9-12 by adding the following:

**9-12.3 Concrete Interlocking Pavers
(*****)**

Provide replacement interlocking pavers for existing damaged ones from same supplier as the original installation.

9-14 EROSION CONTROL AND ROADSIDE PLANTING

Delete section 9-14.2 in its entirety and substitute the following:

9-14.2 Soils

1. Provide following soils and soil mixes specified on Drawings or by the Engineer, according to project needs, and subject to the General Testing and Submittal Specifications of Section 9-14.1(1) of these Special Provisions, Topsoil Type A – Imported. Provide a general purpose mix of sandy loam and compost as needed to comply with the minimum organic matter content requirements.
2. General Turf Area Soil. Provide an imported soil mix for passive-recreation turf areas.

9-14.2(1) General Testing and Submittal Requirements

Submit to the Engineer at least 10 working days prior to any soil placement specified in this Section the following as specified in Section 1-05.3 – SUBMITTALS. Provide test results from samples collected and tested within 90 days of submittal.

1. Aggregate and Loam Analysis. Provide grain size analysis results of the Mineral Aggregate or sandy loam portion of each soil mix and performed by an accredited laboratory per ASTM C 136.
2. Compost Analysis. Provide quality analysis results for the compost portion of each soil mix performed per STA standards as specified in Section 9-14.4(8).
3. Mix Analysis. As a minimum, provide test results from an accredited soil laboratory for the following content values:
 - a. Total Nitrogen and Soluble Nitrogen (NO₃ + NH₃)
 - b. Phosphorous
 - c. Potassium
 - d. pH
 - e. Organic Matter percent (Loss on Ignition method)
 - f. Cation Exchange Capacity
 - g. Calcium
 - h. Sulfur
 - i. Magnesium
 - j. Sodium
 - k. Iron
 - l. Boron

- m. Weed Seed (for general turf area mixes)
- 4. Provide fertilizer and amendment and soil application depth recommendations from accredited soils laboratory, soil scientist or agronomist for the specified plant type.
- 5. Mix samples. Provide two 1-quart samples of each soil mix.
- 6. Manufacturer. Provide manufacturer's certificate of compliance as specified in Section 1-06.3 – MANUFACTURER'S CERTIFICATE OF COMPLIANCE from the soil mix Supplier and compost Supplier if different from soil mix Supplier. Include names and address on certificate.
- 7. Laboratory information. Include the following:
 - a. Name of laboratory including contact person,
 - b. Address,
 - c. Phone number of contact,
 - d. Email address of contact,
 - e. Laboratory and personnel qualifications including current certification date by STA, ASTM, ASSHTO, or approved equal.
- 8. Acceptance of Soils Prior to Placement. Placement of any soils or soil mixes specified in this Section will NOT be allowed until Engineer has reviewed and confirmed the following:
 - a. Soil mix delivery tickets. Provide delivery tickets showing full delivered soil amount matches product type, volume and Manufacturer named in the submittals.
 - b. Visual inspection. Engineer will compare delivered product to product submitted to verify it matches the submitted sample.

Engineer may inspect any loads of soil on delivery and stop placement if it is determined the delivered soil doesn't appear to match the submittals and require sampling and testing of delivered soil before authorizing soil placement at sole cost to Contractor.

9-14.4 Fertilizer

Supplement this section by adding the following:

Provide 12-25-10 starter fertilizer.

9-14.5 Mulch and Amendments

9-14.5(8) Compost

Supplement 9-14.1(8) by adding the following:

Procure compost manufactured by facilities that have an active solid waste handling permit from the local jurisdictional Health Department as per WAC 173-350-220 or WAC 173-308.

9-14.4(8)B Compost Acceptance

Supplement 9-14.4(8)A by adding the following:

Provide one gallon sample size.

9-14.8 *Root Barrier*

New Section:

Provide Mirafi 160N Geotextile fabric for the root barrier as noted in the COE standard details or approved equal. Any substituted material provided for review and approval must meet the same properties as the noted material for strength, opening size, permittivity, and flow rate, per ASTM D4632, ASTM D4533, ASTM D6241, ASTM D4751, and ASTM D4491,

9-23 CONCRETE CURING MATERIALS AND ADMIXTURES**9-23.2 *Liquid Membrane-Forming Concrete Curing Compounds***

Supplement 9-23.2 by adding the following:

Provide transparent curing compound, Sealtight 1100, as manufactured by W.R. Meadows, Benicia-CA, or City approved equal.

9-23.6 *Chemical Admixtures for Concrete*

Supplement 9-23.6 by adding the following:

**9-23.6(10) Integral Coloring Agent
(*****)**

Provide integral coloring agent “Silver Smoke” as manufactured by Davis Colors, “Dover Grey” as manufactured by Solomon Colors, or City approved equal.

9-29 ILLUMINATION, SIGNAL, ELECTRICAL**9-29.2 *Junction Boxes, Cable Vaults, and Pull Boxes*****9-29.2(1) Standard Duty and Heavy-Duty Junction Boxes****9-29.2(1)A Standard Duty Junction Boxes**

Supplement 9-29.2(1)A by adding the following:

Treat both the slip-resistant lid and slip-resistant frame with Mebac#1 as manufactured by IKG industries, or SlipNOT Grade 3-coarse as manufactured by W.S. Molnar Co. The slip-resistant treatment may be omitted on that portion of the frame where the exposed portion of the frame is 1/2 inch wide or less. Identify the slip-resistant lid with permanent marking on the underside indicating the type of surface treatment (“M1” for Mebac#1; or “S3” for SlipNOT Grade 3-coarse) and the year manufactured. Form the permanent marking using a line consisting of a 1/8 inch thick stainless steel welded bead.

9-29.3 *Fiber Optic Cable, Electrical Conductors, and Cable***9-29.3(2) Electrical Conductors and Cable**

Revise 9-29.3(2)F to read as follows:

9-29.3(2)F Detector Loop Wire

Provide 14 AWG stranded copper conductors conforming to IMSA Specification 61-7 with cross-linked polyethylene (XLPE) insulation encased in a polyethylene outer jacket (PE tube).

Supplement 9-29.3(2) by adding the following:

9-29.3(2)J Video Detection Cable

Coaxial cable or combination (composite/Siamese) cable for video detection shall be RG59/U with a manufacturer's rating of 600 Volts (Non UL - manufacturer's voltage rating of the insulation is acceptable). Combination cable shall be in accordance with the video detection system manufacturer's recommendations for the length of cable required.

9-29.18 Vehicle Detector

Supplement 9-29.18 by adding the following:

All components needed to provide a complete video detection system shall be supplied and installed per manufacturer's recommendation.

The video detection equipment shall include, but not be limited to, Cameras, Camera Housings, Camera Lens, Camera Mounting Hardware, Video Image Processors, Input File Adapters, lens Adjustment Modules, Keypad and Monitor.

The video detection system shall be capable of supplying video detection to the signal controller phases as indicated in the plans and Appendix H of these Special Provisions.

The video detection system shall be the following:

1. Traficon	VIP3.2
Traficon	NV
Bissegemsestraat	45
B-8501	Heule
Belgium, Europe	

9-30 WATER DISTRIBUTION MATERIALS

9-30.1 Pipe

9-30.1(1) Ductile Iron Pipe

Revise 9-30.1 to read as follows:

1. Provide ductile iron pipe Special Class 52 meeting the requirements of AWWA C151 with a cement mortar interior lining and a 1-mil thick exterior seal coat meeting the requirements of AWWA C104.
2. Provide rubber gasket type, push on type, or mechanical type non-restrained joints meeting the requirements of AWWA C111.
3. Provide flanged joints meeting the requirements of AWWA C115.
4. Restrained joints shall be as specified in Section 9-30.2(6).

9-30.1(6) Polyethylene (PE) Pressure Pipe (4-inches and over)

Revise 9-30.1(6) to read as follows:

9-30.1(2) Polyethylene Encasement

9-30.1(2)A For Non-Earthquake Resistant Pipe

Provide natural or black color polyethylene encasement in tube-form high-density cross-laminated polyethylene film or linear low-density polyethylene film meeting the requirements of ANSI/AWWA C105.

Revise 9-30.1(3) Vacant to read as follows:

9-30.1(3) Earthquake Resistant Ductile Iron Pipe System

1. Meet all requirements of 9-30.1(1).
2. Meet all applicable requirements of AWWA C150 (design), AWWA C151 (manufacture), AWWA C104 (lining), C111 (joints), AWWA C153 (fittings), AWWA C105 (polyethylene encasement), and AWWAC600 (installation).
3. Size the ductile iron pipe in inches.
4. Meet defined classifications detailed below as shown in ISO 16134 Earthquake Resistant Ductile Iron Pipe and Subsidence-Resistant Design. Verify the seismic design by an independent seismic lab such as Cornell University or an Owner-approved alternative.
 - a. All ductile iron pipe and fittings joints shall meet or exceed 3dKN pull out strength or category A.
 - b. Designated Earthquake System piping shall meet or exceed a minimum deflection of 7.5 degrees or category M2 for sizes 6" – 12".
 - c. Designated ductile iron Earthquake System piping will have a minimum strain relief of plus or minus 1% or category S1.
5. Provide designated earthquake system piping meeting the minimum requirements of A-M2-S1 in accordance with ISO 16134 for diameters up to and including 12 inches.
6. Provide expansion spigot in the assembly having a minimum of two assembly stripes, one indicating fully contracted position and one indicating the midpoint of extension.
7. Coat the exterior of the pipe the network of ductile iron pipe connected to the Earthquake Joint System coated with a minimum mass of 200 g/m² of pipe surface area layer of arc-sprayed zinc.
 - a. Provide the coating system conforming in every respect to ISO 8179-1, "Ductile Iron Pipes – External Zinc-Based Coating – Part 1: Metallic Zinc with Finishing Layer," second edition 2004-06-01, with a top coat of approved materials.
8. Provide "American Field Flex-Ring® Joint Pipe", or City approved equal.

9-30.2 Fittings

9-30.2(1) Ductile Iron Pipe

Supplement 9-30.2(1) by adding the following:

For Earthquake Resistant Ductile Iron Pipe provide push-on, boltless fittings meeting the requirements of AWWA C110 or C153. Provide "American Flex-Ring® Fittings", or City approved equal.

Delete 9-30.2(2) Vacant and substitute the following:

9-30.2(2) Earthquake Joint System Ductile Iron Pipe
(*****)

Provide pre-assembled, machined ductile iron casting designed to allow for minimum of 2.4 inches of expansion and contraction in either direction, providing a minimum of 4.8

inches total movement along with up to eight degrees deflection. Provide “American Earthquake Joint System”, or City approved equal.

9-30.2(2)B For Earthquake Resistant Pipe

Provide natural or black color polyethylene encasement in tube-form three layer co-extruded linear low-density polyethylene fused into a single minimum thickness of eight mils, and meeting the requirements of ANSI/AWWA C105. Infuse the inside polyethylene surface that will be in contact with the ductile iron pipe with a blend of anti-microbial compounds to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

9-30.2(6) Restrained Joints

Supplement 9-30.2(6) by adding the following:

For non-earthquake resistant ductile iron pipe provide “MegaLug® Series 1100” mechanical restrained joints as manufactured by EBAA Iron, or City approved equal.

For earthquake resistant ductile iron pipe provide “American Ductile Iron Flex-Ring® Joint Pipes and Flex-Ring fittings with Field Flex-Ring”, or City approved equal.

9-30.2(7) Bolted, Sleeve-Type Couplings for Plain End Pipe

Supplement 9-30.2(7) by adding the following:

For up to 12-inch diameter pipe, provide “Romac ALPHA-13.30 Coupling”, or City approved equal.

9-30.3 Valves

Revise 9-30.3 to read as follows:

Provide valves with hand wheels or operating nuts as designated. In general, valves buried on the distribution system shall be nonrising stem type, open counterclockwise, and be equipped with two O rings in the stuffing box with a two inch operating nut. Valves within vaults shall be rising stem type, open counterclockwise, and be equipped with two O rings stuffing box with a hand wheel for operation.

9-30.3(1) Gate Valves (3-inches to 16-inches)

Delete 9-30.3(1) and substitute the following:

9-30.3(1) Gate Valves (2-inches to 12-inches)

Provide Waterous Series 2500, or City approved equal, resilient wedge gate valves meeting the requirements of AWWA C509 or AWWA C515.

Provide an affidavit of compliance stating the valve furnished fully complies with AWWA C509 or AWWA C515.

9-30.3(3) Butterfly Valves

Revise the first sentence of the second paragraph of 9-30.3(3) to read as follows:

Valve operators shall be of the travelling nut, self-locking type, sealed, gasketed and permanently lubricated for underground service.

9-30.3(4) Valve Boxes

Supplement 9-30.3(4) by adding the following:

Provide East Jordan 8555 Series, two piece slip type box with 6800 two and one-half inch skirt drop lid or City approved equal.

Plastic valve boxes with a cast iron lid having dimensions conforming to a number 940 valve box, as manufactured by Handley Industries, or City approved equal, are acceptable for valve boxes located in grass, non-paved or paved non-vehicular traffic areas.

9-30.3(5) Valve Marker Posts

Delete first and second paragraphs of 9-30.3(5) and substitute the following:

Post shall be 4-inch diameter, 42-inch tall, fluorescent orange, low density polypropylene portable traffic delineator post with two reflectorized strips.

9-30.3(6) Valve Stem Extension

Revise the first paragraph of 9-30.3(6) to read as follows:

Provide valve stem extension in accordance with COE Standard Drawing No. 504.

9-30.3(7) Combination Air Release/Air Vacuum Valves

Supplement this section by adding the following.

Provide combination air release/air vacuum valve in accordance with COE Standard Drawing 512.

9-30.3(8) Tapping Sleeve and Valve Assembly

Revise the last sentence of 9-30.3(8) to read as follows:

Provide all stainless steel tapping sleeves, Romac SST, Romac SSTIII, or City approved equal.

9-30.5 Hydrants

Delete first paragraph of 9-30.5 and substitute the following:

Provide fire hydrants with ANSI 125 flanged connection conforming to AWWA C502. Provide Mueller "Super Centurion No. 250", American Flow Control "Waterous Pacer No. WB67", or City approved equal.

9-30.5(2) Hydrant Dimensions

Delete last sentence of first paragraph of 9-30.5(2) and substitute the following:

Provide hydrants having two 2-1/2 inch hose nozzles and one 4-1/2 inch pumper nozzle. The 4-1/2 inch pumper nozzle shall be National Thread and fitted with a 5-inch STORZ fitting.

Delete last sentence of second paragraph of 9-30.5(2) and substitute the following:

Paint hydrants with two coats of high gloss Caterpillar yellow, Luxite 6100-516, Rost-Oleum 7448, or City approved equal. Paint the port caps with two coats of high gloss black enamel paint.

9-30.5(4) Hydrant Restraints

Revise the first paragraph of 9-30.5(4) to read as follows:

Provide either mechanical joint restraint system in accordance with 9-30.5(6) of these Special Provisions, or field lock gaskets for hydrant restraint.

9-30.6 Water Service Connections (2-inches and Smaller)

9-30.6(1) Saddles

Revise 9-30.6(1) to read as follows:

Provide Romac, Ford, Mueller, or City approved equal single strap ductile iron, bronze, brass, or stainless steel service saddle with C.C. (AWWA tapered) thread for 3/4-inch and 1-inch services.

Provide Romac, Ford, Mueller, or City approved equal double strap ductile iron, bronze, brass, or stainless steel service saddle with I.P. thread for 2-inch services.

All materials shall meet the requirements of AWWA C800-05.

9-30.6(2) Corporation Stops

Revise 9-30.6(2) to read as follows:

Provide Ford FB600 Series, or City approved equal, corporation stops for 3/4-inch and 1-inch services.

All materials shall meet the requirements of AWWA C800-05.

9-30.6(3) Service Pipes

Delete 9-30.6(3) C PEX-a Tubing in its entirety.

9-30.6(4) Service Fittings

Revise third paragraph to read as follows:

Provide either compression fittings, or stab type fittings using internal grip and O ring seal, for polyethylene pipe.

Delete the last paragraph in its entirety.

Supplement 9-30.6(4) with the following:

Provide corporation bends with swivel nut on inlet.

9-30.6(5) Meter Setters

Delete the second, third and fourth paragraphs of 9-30.6(5) and substitute the following:

Provide A.Y. McDonald 62-212WWDD33-15, or City approved equal, meter setter for 3/4-inch and 1-inch metered service. Provide Ford 70 Series copper setter VBH77-12B-11-77 with horizontal inlet and outlet, or City approved equal, meter setter for 2-inch metered service.

9-30.6(6) Bronze Nipples and Fittings

Delete 9-30.6(6) and substitute the following:

9-30.6(6) Brass Nipples and Fittings

Provide brass threaded fittings made with ASA class 125 lb Red Brass meeting the requirements of ANSI/AWWA C800-05 and also meeting requirements of ANSI/NSF-61.

Provide Schedule 40 Red Brass Nipples meeting requirements of ASTM B43.

9-30.6(7) Meter Boxes

Delete the first and second paragraphs of 9-30.6(7) and substitute the following:

Provide Raven Products RMB 11-18-12 meter box body, mouseholes cut, with ductile iron flush solid water meter H-20 rated cover, or City approved equal, for 3/4-inch services.

Provide Raven Products RMB 15-27-12 meter box body, mouseholes cut, with ductile iron flush solid water meter H-20 rated cover, or City approved equal, for 1-inch services.

Provide Raven Products RMB 17-30-12 meter box body, mouseholes cut, with ductile iron flush solid water meter H-20 rated cover, or City approved equal, for 2-inch services.

Supplement 9-30.6 by adding the following:

9-30.6(8) Curb Stops

(*****)

Provide Ford B11-333W-NL 3/4-inch or Ford B11-444-NL 1-inch curb stop, or City approved equal as noted in the Plans.

All materials shall meet the requirements of AWWA C800.

Add the following section to Division 9:

9-40 SUBMERSIBLE IRRIGATION WELL**9-40.1 Submersible Pump****9-40.1(1) Bowl Assembly and Shaft**

Provide stainless steel intermediate bowls, shafts and discharge adapter free from sand holes, blow holes or other faults and accurately machined and fitted to close tolerances.

9-40.1(2) Impellers

Provide stainless steel impellers free from defects and accurately cast, machined, balanced and filed for optimum performance and minimum vibration. Provide standard product of the pump manufacturer. Impellers shall not contain special workmanship to temporarily increase efficiency.

9-40.1(3) Inlet Motor Adapter

Provide stainless steel inlet motor adapter with extra long bearing. Provide inlet area with net open area of at least four times the impeller eye and protect inlet area with 304 stainless steel screen.

9-40.1(4) Wear Rings

Provide wear rings having minimum practical clearance to the impeller's mating cylinder surface to provide adequate sealing independent of vertical positioning of the impellers.

9-40.1(5) Motor Coupling

Provide stainless steel motor coupling conforming to NEMA specifications and capable of transmitting the total bowl assembly torque and thrust in either direction of rotation.

9-40.2 Submersible Electric Motor

Provide electric motor capable of continuous operation under water at the specified conditions noted in 8-40.1(1) meeting the following conditions:

Service factor	1.15
Voltage	480
Phase	Three
Cycle	60

Incorporate suitable thrust bearing in lower end of the motor adequate to receive the entire hydraulic thrust load of the pump unit plus the weight of the rotating parts regardless of the direction of rotation.

Protect motor leads against the pump end with a 304 stainless steel cable guard held in place with stainless steel banding. Properly protect the motor lead exit from the top of the cable guard to prevent damaging or cutting the lead by the cable guard material.

9-40.3 Pump Motor Controls**9-40.3(1) Motor Control Unit**

Provide heavy duty three-phase panel in UL approved heavy-duty NEMA 3R enclosure with following features:

- 1) Class R fusible disconnect
- 2) Service entrance rated
- 3) Lightning arrestor
- 4) H-O-A switch
- 5) Manual push to start switch
- 6) Pilot device and alarm terminal block
- 7) Provide room for PLC furnished by City

9-40.3(2) Wiring

Provide pump wiring sized to limit voltage drop to no more than five percent. Provide three separate conductors plus a ground within a single continuous water and oil resistant jacket assembly suitable for continuous immersion.

9-40.4 Pump Well Column Pipe

Provide grade A steel pipe in 20 feet lengths with ends machined with eight threads per inch and 3/4-inch taper.

Provide threaded sleeve type steel couplings to connect pipes.

9-40.5 Measuring Conduit Pipe

Provide threaded PVC Schedule 80 pipe.

9-40.6 Wellhead Vault

Provide precast concrete vault with dual locking steel covers designed to H-20 loading as manufactured by Utility Vault Co., or equal.

END OF DIVISION 9

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City of Everett
Everett Mall Bus Platform
WO NO. MALLSTN/24462

Appendix A
Prevailing Wages, Benefits Key Code,
and L&I Policy Statement

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State of Washington
Department of Labor & Industries
Prevailing Wage Section - Telephone 360-902-5335
PO Box 44540, Olympia, WA 98504-4540

Washington State Prevailing Wage

The PREVAILING WAGES listed here include both the hourly wage rate and the hourly rate of fringe benefits. On public works projects, worker's wage and benefit rates must add to not less than this total. A brief description of overtime calculation requirements are provided on the Benefit Code Key.

Journey Level Prevailing Wage Rates for the Effective Date: 2/18/2025

Snohomish County

Trade^	Job Classification	Wage	Holiday	Overtime	Note
<u>Asbestos Abatement Workers</u>	Journey Level	\$63.87	5D	1H	
<u>Boilermakers</u>	Journey Level	\$77.89	5N	1C	
<u>Brick Mason</u>	Journey Level	\$71.82	7E	1N	
<u>Brick Mason</u>	Pointer-Caulker-Cleaner	\$71.82	7E	1N	
<u>Building Service Employees</u>	Janitor	\$16.66		1	
<u>Building Service Employees</u>	Shampooer	\$16.66		1	
<u>Building Service Employees</u>	Waxer	\$16.66		1	

<u>Building Service Employees</u>	Window Cleaner	\$16.66		1	
<u>Cabinet Makers (In Shop)</u>	Journey Level	\$27.33	5C	2M	
<u>Carpenters</u>	Acoustical Worker	\$78.96	15J	11U	
<u>Carpenters</u>	Bridge Dock and Wharf Carpenter	\$80.50	15J	11U	9L
<u>Carpenters</u>	Floor Layer & Floor Finisher	\$78.96	15J	11U	
<u>Carpenters</u>	General Carpenter	\$78.96	15J	11U	
<u>Carpenters</u>	Scaffold Erector	\$78.96	15J	11U	
<u>Cement Masons</u>	Application of all Composition Mastic	\$77.30	15J	4U	
<u>Cement Masons</u>	Application of all Epoxy Material	\$76.78	15J	4U	
<u>Cement Masons</u>	Application of all Plastic Material	\$77.30	15J	4U	
<u>Cement Masons</u>	Application of Sealing Compound	\$76.78	15J	4U	
<u>Cement Masons</u>	Application of Underlayment	\$77.30	15J	4U	
<u>Cement Masons</u>	Building General	\$76.78	15J	4U	
<u>Cement Masons</u>	Composition or Kalman Floors	\$77.30	15J	4U	

<u>Cement Masons</u>	Concrete Paving	\$76.78	15J	4U
<u>Cement Masons</u>	Curb & Gutter Machine	\$77.30	15J	4U
<u>Cement Masons</u>	Curb & Gutter, Sidewalks	\$76.78	15J	4U
<u>Cement Masons</u>	Curing Concrete	\$76.78	15J	4U
<u>Cement Masons</u>	Finish Colored Concrete	\$77.30	15J	4U
<u>Cement Masons</u>	Floor Grinding	\$77.30	15J	4U
<u>Cement Masons</u>	Floor Grinding/Polisher	\$76.78	15J	4U
<u>Cement Masons</u>	Green Concrete Saw, self-powered	\$77.30	15J	4U
<u>Cement Masons</u>	Grouting of all Plates	\$76.78	15J	4U
<u>Cement Masons</u>	Grouting of all Tilt-up Panels	\$76.78	15J	4U
<u>Cement Masons</u>	Guniting Nozzleman	\$77.30	15J	4U
<u>Cement Masons</u>	Hand Powered Grinder	\$77.30	15J	4U
<u>Cement Masons</u>	Journey Level	\$76.78	15J	4U
<u>Cement Masons</u>	Patching Concrete	\$76.78	15J	4U
<u>Cement Masons</u>	Pneumatic Power Tools	\$77.30	15J	4U
<u>Cement Masons</u>	Power Chipping & Brushing	\$77.30	15J	4U

<u>Cement Masons</u>	Sand Blasting Architectural Finish	\$77.30	15J	4U	
<u>Cement Masons</u>	Screed & Rodding Machine	\$77.30	15J	4U	
<u>Cement Masons</u>	Spackling or Skim Coat Concrete	\$76.78	15J	4U	
<u>Cement Masons</u>	Troweling Machine Operator	\$77.30	15J	4U	
<u>Cement Masons</u>	Troweling Machine Operator on Colored Slabs	\$77.30	15J	4U	
<u>Cement Masons</u>	Tunnel Workers	\$77.30	15J	4U	
<u>Divers & Tenders</u>	Bell/Vehicle/Submersible Operator (not under pressure)	\$156.25	15J	11T	9I
<u>Divers & Tenders</u>	Dive Supervisor	\$157.75	15J	11T	9I
<u>Divers & Tenders</u>	Diver	\$156.25	15J	11T	9I
<u>Divers & Tenders</u>	Diver Tender	\$86.86	15J	11T	9I
<u>Divers & Tenders</u>	Hyperbaric Worker - Compressed Air Worker 0-30.00 PSI	\$109.76	15J	11U	
<u>Divers & Tenders</u>	Hyperbaric Worker - Compressed Air Worker 31.01-44.00 PSI	\$118.99	15J	11U	

	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 44.01 - 54.00 PSI	\$128.22	15J	11U	
	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 54.01 - 60.00 PSI	\$137.45	15J	11U	
	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 60.01 - 64.00 PSI	\$146.67	15J	11U	
	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 64.01 - 68.00 PSI	\$155.90	15J	11U	
	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 68.01 - 70.00 PSI	\$165.13	15J	11U	
	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 70.01 - 72.00 PSI	\$174.36	15J	11U	
	Hyperbaric Worker -				
<u>Divers & Tenders</u>	Compressed Air Worker 72.01 - 74.00 PSI	\$183.59	15J	11U	
<u>Divers & Tenders</u>	Lead Diver (Dive Master)	\$101.32	15J	11T	9I
<u>Divers & Tenders</u>	Manifold Operator (Life Support Technician)	\$86.86	15J	11T	9I
<u>Divers & Tenders</u>	Remote Operated Vehicle Operator/Technician	\$86.86	15J	11T	9I

<u>Divers & Tenders</u>	Remote Operated Vehicle Operator/Technician	\$86.86	15J	11T	9I
<u>Divers & Tenders</u>	Remote Operated Vehicle Tender	\$80.55	15J	11T	9I
<u>Divers & Tenders</u>	Stand-by Diver	\$96.32	15J	11T	9I
Dredge Workers	Assistant Engineer	\$83.92	5D	3F	
Dredge Workers	Assistant Mate (Deckhand)	\$83.28	5D	3F	
Dredge Workers	Boatmen	\$83.92	5D	3F	
Dredge Workers	Engineer Welder	\$85.53	5D	3F	
Dredge Workers	Leverman, Hydraulic	\$87.24	5D	3F	
Dredge Workers	Mates	\$83.92	5D	3F	
Dredge Workers	Oiler	\$83.28	5D	3F	
<u>Drywall Applicator</u>	Journey Level	\$78.76	150	11S	
<u>Drywall Tapers</u>	Journey Level	\$78.76	150	11S	
<u>Electrical Fixture Maintenance Workers</u>	Journey Level	\$16.66		1	
<u>Electricians - Inside</u>	Cable Splicer	\$95.85	7H	1E	
<u>Electricians - Inside</u>	Construction Stock Person	\$46.03	7H	1D	

<u>Electricians - Inside</u>	Journey Level	\$89.75	7H	1E	
<u>Electricians - Motor Shop</u>	Craftsman	\$16.66		1	
<u>Electricians - Motor Shop</u>	Journey Level	\$16.66		1	
<u>Electricians - Powerline Construction</u>	Cable Splicer	\$97.76	5A	4D	
<u>Electricians - Powerline Construction</u>	Certified Line Welder	\$89.71	5A	4D	
<u>Electricians - Powerline Construction</u>	Groundperson	\$56.79	5A	4D	
<u>Electricians - Powerline Construction</u>	Heavy Line Equipment Operator	\$89.71	5A	4D	
<u>Electricians - Powerline Construction</u>	Journey Level Lineperson	\$89.71	5A	4D	
<u>Electricians - Powerline Construction</u>	Line Equipment Operator	\$77.13	5A	4D	
<u>Electricians - Powerline Construction</u>	Meter Installer	\$56.79	5A	4D	8W
<u>Electricians - Powerline Construction</u>	Pole Sprayer	\$89.71	5A	4D	
<u>Electricians - Powerline Construction</u>	Powderperson	\$66.84	5A	4D	
<u>Electronic Technicians</u>	Electronic Technicians Journey Level	\$58.51	5B	1B	

<u>Elevator Constructors</u>	Mechanic	\$111.26	7D	4A	
<u>Elevator Constructors</u>	Mechanic In Charge	\$120.27	7D	4A	
Fabricated Precast Concrete Products	Journey Level	\$16.66		1	
Fabricated Precast Concrete Products	Journey Level - In-Factory Work Only	\$16.66		1	
<u>Fence Erectors</u>	Fence Erector	\$54.65	15J	11P	8Y
<u>Fence Erectors</u>	Fence Laborer	\$54.65	15J	11P	8Y
<u>Flaggers</u>	Journey Level	\$54.65	15J	11P	8Y
<u>Glaziers</u>	Journey Level	\$82.16	7L	1Y	
<u>Heat & Frost Insulators And Asbestos Workers</u>	Journey Level	\$91.81	15H	11C	
<u>Heating Equipment Mechanics</u>	Journey Level	\$99.92	7F	1E	
<u>Hod Carriers & Mason Tenders</u>	Journey Level	\$67.38	15J	11P	8Y
<u>Industrial Power Vacuum Cleaner</u>	Journey Level	\$16.66		1	
<u>Inland Boatmen</u>	Boat Operator	\$61.41	5B	1K	
<u>Inland Boatmen</u>	Cook	\$56.48	5B	1K	
<u>Inland Boatmen</u>	Deckhand	\$57.48	5B	1K	

<u>Inland Boatmen</u>	Deckhand Engineer	\$58.81	5B	1K
<u>Inland Boatmen</u>	Launch Operator	\$58.89	5B	1K
<u>Inland Boatmen</u>	Mate	\$57.31	5B	1K
<u>Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control</u>	Cleaner Operator	\$51.27	15M	110
<u>Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control</u>	Foamer Operator	\$51.27	15M	110
<u>Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control</u>	Grout Truck Operator	\$51.27	15M	110
<u>Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control</u>	Head Operator	\$49.20	15M	110
<u>Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control</u>	Technician	\$42.99	15M	110
<u>Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control</u>	TV Truck Operator	\$46.10	15M	110
<u>Insulation Applicators</u>	Journey Level	\$78.96	15J	11U
<u>Ironworkers</u>	Journeyman	\$90.82	15K	11N

<u>Laborers</u>	Air, Gas Or Electric Vibrating Screed	\$63.87	15J	11P	8Y
<u>Laborers</u>	Airtrac Drill Operator	\$65.75	15J	11P	8Y
<u>Laborers</u>	Ballast Regular Machine	\$63.87	15J	11P	8Y
<u>Laborers</u>	Batch Weighman	\$54.65	15J	11P	8Y
<u>Laborers</u>	Brick Pavers	\$63.87	15J	11P	8Y
<u>Laborers</u>	Brush Cutter	\$63.87	15J	11P	8Y
<u>Laborers</u>	Brush Hog Feeder	\$63.87	15J	11P	8Y
<u>Laborers</u>	Burner	\$63.87	15J	11P	8Y
<u>Laborers</u>	Caisson Worker	\$65.75	15J	11P	8Y
<u>Laborers</u>	Carpenter Tender	\$63.87	15J	11P	8Y
<u>Laborers</u>	Cement Dumper-paving	\$64.98	15J	11P	8Y
<u>Laborers</u>	Cement Finisher Tender	\$63.87	15J	11P	8Y
<u>Laborers</u>	Change House Or Dry Shack	\$63.87	15J	11P	8Y
<u>Laborers</u>	Chipping Gun (30 Lbs. And Over)	\$64.98	15J	11P	8Y
<u>Laborers</u>	Chipping Gun (Under 30 Lbs.)	\$63.87	15J	11P	8Y
<u>Laborers</u>	Choker Setter	\$63.87	15J	11P	8Y

<u>Laborers</u>	Chuck Tender	\$63.87	15J	11P	8Y
<u>Laborers</u>	Clary Power Spreader	\$64.98	15J	11P	8Y
<u>Laborers</u>	Clean-up Laborer	\$63.87	15J	11P	8Y
<u>Laborers</u>	Concrete Dumper/Chute Operator	\$64.98	15J	11P	8Y
<u>Laborers</u>	Concrete Form Stripper	\$63.87	15J	11P	8Y
<u>Laborers</u>	Concrete Placement Crew	\$64.98	15J	11P	8Y
<u>Laborers</u>	Concrete Saw Operator/Core Driller	\$64.98	15J	11P	8Y
<u>Laborers</u>	Crusher Feeder	\$54.65	15J	11P	8Y
<u>Laborers</u>	Curing Laborer	\$63.87	15J	11P	8Y
<u>Laborers</u>	Demolition: Wrecking & Moving (Incl. Charred Material)	\$63.87	15J	11P	8Y
<u>Laborers</u>	Ditch Digger	\$63.87	15J	11P	8Y
<u>Laborers</u>	Diver	\$65.75	15J	11P	8Y
<u>Laborers</u>	Drill Operator (Hydraulic, Diamond)	\$64.98	15J	11P	8Y
<u>Laborers</u>	Dry Stack Walls	\$63.87	15J	11P	8Y
<u>Laborers</u>	Dump Person	\$63.87	15J	11P	8Y

<u>Laborers</u>	Epoxy Technician	\$63.87	15J	11P	8Y
<u>Laborers</u>	Erosion Control Worker	\$63.87	15J	11P	8Y
<u>Laborers</u>	Faller & Bucker Chain Saw	\$64.98	15J	11P	8Y
<u>Laborers</u>	Fine Graders	\$63.87	15J	11P	8Y
<u>Laborers</u>	Firewatch	\$54.65	15J	11P	8Y
<u>Laborers</u>	Form Setter	\$64.98	15J	11P	8Y
<u>Laborers</u>	Gabian Basket Builders	\$63.87	15J	11P	8Y
<u>Laborers</u>	General Laborer	\$63.87	15J	11P	8Y
<u>Laborers</u>	Grade Checker & Transit Person	\$67.38	15J	11P	8Y
<u>Laborers</u>	Grinders	\$63.87	15J	11P	8Y
<u>Laborers</u>	Grout Machine Tender	\$63.87	15J	11P	8Y
<u>Laborers</u>	Groutmen (Pressure) Including Post Tension Beams	\$64.98	15J	11P	8Y
<u>Laborers</u>	Guardrail Erector	\$63.87	15J	11P	8Y
<u>Laborers</u>	Hazardous Waste Worker (Level A)	\$65.75	15J	11P	8Y
<u>Laborers</u>	Hazardous Waste Worker (Level B)	\$64.98	15J	11P	8Y

<u>Laborers</u>	Hazardous Waste Worker (Level C)	\$63.87	15J	11P	8Y
<u>Laborers</u>	High Scaler	\$65.75	15J	11P	8Y
<u>Laborers</u>	Jackhammer	\$64.98	15J	11P	8Y
<u>Laborers</u>	Laserbeam Operator	\$64.98	15J	11P	8Y
<u>Laborers</u>	Maintenance Person	\$63.87	15J	11P	8Y
<u>Laborers</u>	Manhole Builder-Mudman	\$64.98	15J	11P	8Y
<u>Laborers</u>	Material Yard Person	\$63.87	15J	11P	8Y
<u>Laborers</u>	Mold Abatement Worker	\$63.87	15J	11P	8Y
<u>Laborers</u>	Motorman-Dinky Locomotive	\$67.48	15J	11P	8Y
<u>Laborers</u>	nozzleman (concrete pump, green cutter when using combination of high pressure air & water on concrete & rock, sandblast, gunite, shotcrete, water blaster, vacuum blaster)	\$67.38	15J	11P	8Y
<u>Laborers</u>	Pavement Breaker	\$64.98	15J	11P	8Y
<u>Laborers</u>	Pilot Car	\$54.65	15J	11P	8Y
<u>Laborers</u>	Pipe Layer (Lead)	\$67.38	15J	11P	8Y

<u>Laborers</u>	Pipe Layer/Tailor	\$64.98	15J	11P	8Y
<u>Laborers</u>	Pipe Pot Tender	\$64.98	15J	11P	8Y
<u>Laborers</u>	Pipe Reliner	\$64.98	15J	11P	8Y
<u>Laborers</u>	Pipe Wrapper	\$64.98	15J	11P	8Y
<u>Laborers</u>	Pot Tender	\$63.87	15J	11P	8Y
<u>Laborers</u>	Powderman	\$65.75	15J	11P	8Y
<u>Laborers</u>	Powderman's Helper	\$63.87	15J	11P	8Y
<u>Laborers</u>	Power Jacks	\$64.98	15J	11P	8Y
<u>Laborers</u>	Railroad Spike Puller - Power	\$64.98	15J	11P	8Y
<u>Laborers</u>	Raker - Asphalt	\$67.38	15J	11P	8Y
<u>Laborers</u>	Re-timberman	\$65.75	15J	11P	8Y
<u>Laborers</u>	Remote Equipment Operator	\$64.98	15J	11P	8Y
<u>Laborers</u>	Rigger/Signal Person	\$64.98	15J	11P	8Y
<u>Laborers</u>	Rip Rap Person	\$63.87	15J	11P	8Y
<u>Laborers</u>	Rivet Buster	\$64.98	15J	11P	8Y
<u>Laborers</u>	Rodder	\$64.98	15J	11P	8Y

<u>Laborers</u>	Scaffold Erector	\$63.87	15J	11P	8Y
<u>Laborers</u>	Scale Person	\$63.87	15J	11P	8Y
<u>Laborers</u>	Sloper (Over 20")	\$64.98	15J	11P	8Y
<u>Laborers</u>	Sloper Sprayer	\$63.87	15J	11P	8Y
<u>Laborers</u>	Spreader (Concrete)	\$64.98	15J	11P	8Y
<u>Laborers</u>	Stake Hopper	\$63.87	15J	11P	8Y
<u>Laborers</u>	Stock Piler	\$63.87	15J	11P	8Y
<u>Laborers</u>	Swinging Stage/Boatswain Chair	\$54.65	15J	11P	8Y
<u>Laborers</u>	Tamper & Similar Electric, Air & Gas Operated Tools	\$64.98	15J	11P	8Y
<u>Laborers</u>	Tamper (Multiple & Self- propelled)	\$64.98	15J	11P	8Y
<u>Laborers</u>	Timber Person - Sewer (Lagger, Shorer & Cribber)	\$64.98	15J	11P	8Y
<u>Laborers</u>	Toolroom Person (at Jobsite)	\$63.87	15J	11P	8Y
<u>Laborers</u>	Topper	\$63.87	15J	11P	8Y
<u>Laborers</u>	Track Laborer	\$63.87	15J	11P	8Y
<u>Laborers</u>	Track Liner (Power)	\$64.98	15J	11P	8Y

<u>Laborers</u>	Traffic Control Laborer	\$58.20	15J	11P	9C
<u>Laborers</u>	Traffic Control Supervisor	\$61.47	15J	11P	9C
<u>Laborers</u>	Truck Spotter	\$63.87	15J	11P	8Y
<u>Laborers</u>	Tugger Operator	\$64.98	15J	11P	8Y
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 0-30 psi	\$200.40	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 30.01-44.00 psi	\$205.43	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 44.01-54.00 psi	\$209.11	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 54.01-60.00 psi	\$214.81	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 60.01-64.00 psi	\$216.93	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 64.01-68.00 psi	\$222.03	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 68.01-70.00 psi	\$223.93	15J	11P	9B

<u>Laborers</u>	Tunnel Work-Compressed Air Worker 70.01-72.00 psi	\$225.93	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Compressed Air Worker 72.01-74.00 psi	\$227.93	15J	11P	9B
<u>Laborers</u>	Tunnel Work-Guage and Lock Tender	\$67.48	15J	11P	8Y
<u>Laborers</u>	Tunnel Work-Miner	\$67.48	15J	11P	8Y
<u>Laborers</u>	Vibrator	\$64.98	15J	11P	8Y
<u>Laborers</u>	Vinyl Seamer	\$63.87	15J	11P	8Y
<u>Laborers</u>	Watchman	\$49.97	15J	11P	8Y
<u>Laborers</u>	Welder	\$64.98	15J	11P	8Y
<u>Laborers</u>	Well Point Laborer	\$64.98	15J	11P	8Y
<u>Laborers</u>	Window Washer/Cleaner	\$49.97	15J	11P	8Y
<u>Laborers - Underground Sewer & Water</u>	General Laborer & Topman	\$63.87	15J	11P	8Y
<u>Laborers - Underground Sewer & Water</u>	Pipe Layer	\$64.98	15J	11P	8Y
<u>Landscape Construction</u>	Landscape Construction/Landscaping Or Planting Laborers	\$49.97	15J	11P	8Y

<u>Landscape Construction</u>	Landscape Operator	\$86.05	15J	11G	8X
<u>Landscape Maintenance</u>	Groundskeeper	\$16.66		1	
<u>Lathers</u>	Journey Level	\$78.76	150	11S	
<u>Marble Setters</u>	Journey Level	\$71.82	7E	1N	
<u>Metal Fabrication (In Shop)</u>	Journey Level	\$37.56	0	11D	
<u>Millwright</u>	Journey Level	\$80.28	15J	4C	
Modular Buildings	Journey Level	\$16.66		1	
<u>Painters</u>	Journey Level	\$54.71	6Z	11J	
<u>Pile Driver</u>	Crew Tender	\$86.81	15J	11U	9L
<u>Pile Driver</u>	Journey Level	\$80.50	15J	11U	9L
<u>Plasterers</u>	Journey Level	\$73.54	7Q	1R	
<u>Plasterers</u>	Nozzleman	\$77.54	7Q	1R	
<u>Playground & Park Equipment Installers</u>	Journey Level	\$16.66		1	
<u>Plumbers & Pipefitters</u>	Journey Level	\$90.87	5A	1G	
<u>Power Equipment Operators</u>	Asphalt Plant Operators	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Assistant Engineer	\$82.29	15J	11G	8X

<u>Power Equipment Operators</u>	Barrier Machine (zipper)	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Batch Plant Operator: concrete	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Boat Operator	\$87.82	7A	11H	8X
<u>Power Equipment Operators</u>	Bobcat	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Brokk - Remote Demolition Equipment	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Brooms	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Bump Cutter	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Cableways	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Chipper	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Compressor	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Concrete Finish Machine - Laser Screed	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure	\$86.05	15J	11G	8X

<u>Power Equipment Operators</u>	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Conveyors	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Cranes Friction: 200 tons and over	\$90.46	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes, A-frame: 10 tons and under	\$82.59	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes: 100 tons through 199 tons, or 150' of boom (including jib with attachments)	\$88.67	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes: 20 tons through 44 tons with attachments	\$87.03	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes: 200 tons- 299 tons, or 250' of boom including jib with attachments	\$89.60	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes: 300 tons and over or 300' of boom including jib with attachments	\$90.46	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes: 45 tons through 99 tons, under 150' of	\$87.82	7A	11H	8X

	boom(including jib with attachments)				
<u>Power Equipment Operators</u>	Cranes: Friction cranes through 199 tons	\$89.60	7A	11H	8X
<u>Power Equipment Operators</u>	Cranes: through 19 tons with attachments, a-frame over 10 tons	\$86.36	7A	11H	8X
<u>Power Equipment Operators</u>	Crusher	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Deck Engineer/Deck Winches (power)	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Derricks, On Building Work	\$87.82	7A	11H	8X
<u>Power Equipment Operators</u>	Dozers D-9 & Under	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Drill Oilers: Auger Type, Truck Or Crane Mount	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Drilling Machine	\$88.36	15J	11G	8X
<u>Power Equipment Operators</u>	Elevator and man-lift: permanent and shaft type	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Finishing Machine, Bidwell And Gamaco & Similar Equipment	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Forklift: 3000 lbs and over with attachments	\$86.05	15J	11G	8X

<u>Power Equipment Operators</u>	Forklifts: under 3000 lbs. with attachments	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Gradechecker/Stakeman	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Guardrail Punch	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Horizontal/Directional Drill Locator	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Horizontal/Directional Drill Operator	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Hydralifts/Boom Trucks Over 10 Tons	\$86.36	7A	11H	8X
<u>Power Equipment Operators</u>	Hydralifts/boom trucks: 10 tons and under	\$82.59	7A	11H	8X

<u>Power Equipment Operators</u>	Leverman	\$89.27	15J	11G	8X
<u>Power Equipment Operators</u>	Loader, Overhead, 6 Yards. But Not Including 8 Yards	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Loaders, Overhead Under 6 Yards	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Loaders, Plant Feed	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Loaders: Elevating Type Belt	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Locomotives, All	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Material Transfer Device	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Mechanics: All (Leadmen - \$0.50 per hour over mechanic)	\$88.36	15J	11G	8X
<u>Power Equipment Operators</u>	Motor Patrol Graders	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Oil Distributors, Blower Distribution & Mulch Seeding Operator	\$82.29	15J	11G	8X

<u>Power Equipment Operators</u>	Outside Hoists (Elevators and Manlifts), Air Tuggers, Strato	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Overhead, bridge type Crane: 20 tons through 44 tons	\$87.03	7A	11H	8X
<u>Power Equipment Operators</u>	Overhead, bridge type: 100 tons and over	\$88.67	7A	11H	8X
<u>Power Equipment Operators</u>	Overhead, bridge type: 45 tons through 99 tons	\$87.82	7A	11H	8X
<u>Power Equipment Operators</u>	Pavement Breaker	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Pile Driver (other Than Crane Mount)	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Plant Oiler - Asphalt, Crusher	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Posthole Digger, Mechanical	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Power Plant	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Pumps - Water	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Quad 9, Hd 41, D10 And Over	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Quick Tower: no cab, under 100 feet in height	\$86.71	15J	11G	8X

base to boom

<u>Power Equipment Operators</u>	Remote Control Operator On Rubber Tired Earth Moving Equipment	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Rigger and Bellman	\$82.59	7A	11H	8X
<u>Power Equipment Operators</u>	Rigger/Signal Person, Bellman(Certified)	\$86.36	7A	11H	8X
<u>Power Equipment Operators</u>	Rollagon	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Roller, Other Than Plant Mix	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Roller, Plant Mix Or Multi- lift Materials	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Roto-mill, Roto-grinder	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Saws - Concrete	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Scraper, Self Propelled Under 45 Yards	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Scrapers - Concrete & Carry All	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Scrapers, Self-propelled: 45 Yards And Over	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Service Engineers: Equipment	\$86.05	15J	11G	8X

<u>Power Equipment Operators</u>	Shotcrete/Gunite Equipment	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Shovel, Excavator, Backhoe, Tractors Under 15 Metric Tons	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	\$88.36	15J	11G	8X
<u>Power Equipment Operators</u>	Shovel, Excavator, Backhoes: Over 90 Metric Tons	\$89.27	15J	11G	8X
<u>Power Equipment Operators</u>	Slipform Pavers	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Spreader, Topsider & Screedman	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Subgrader Trimmer	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Tower Bucket Elevators	\$86.05	15J	11G	8X

<u>Power Equipment Operators</u>	Tower Crane: over 175' through 250' in height, base to boom	\$89.60	7A	11H	8X
<u>Power Equipment Operators</u>	Tower crane: up to 175' in height base to boom	\$88.67	7A	11H	8X
<u>Power Equipment Operators</u>	Tower Cranes: over 250' in height from base to boom	\$90.46	7A	11H	8X
<u>Power Equipment Operators</u>	Transporters, All Track Or Truck Type	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Trenching Machines	\$86.05	15J	11G	8X
<u>Power Equipment Operators</u>	Truck Crane Oiler/Driver: 100 tons and over	\$87.03	7A	11H	8X
<u>Power Equipment Operators</u>	Truck crane oiler/driver: under 100 tons	\$86.36	7A	11H	8X
<u>Power Equipment Operators</u>	Truck Mount Portable Conveyor	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Vac Truck (Vactor Guzzler, Hydro Excavator)	\$86.71	15J	11G	8X
<u>Power Equipment Operators</u>	Welder	\$87.49	15J	11G	8X
<u>Power Equipment Operators</u>	Wheel Tractors, Farmall Type	\$82.29	15J	11G	8X
<u>Power Equipment Operators</u>	Yo Yo Pay Dozer	\$86.71	15J	11G	8X

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Asphalt Plant Operators	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Assistant Engineer	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Barrier Machine (zipper)	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Batch Plant Operator, Concrete	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Boat Operator	\$87.82	7A	11H	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Bobcat	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Brokk - Remote Demolition Equipment	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Brooms	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Bump Cutter	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Cableways	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Chipper	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Compressor	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Concrete Finish Machine - Laser Screed	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure	\$86.05	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Concrete Pump: Truck Mount With Boom	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Concrete Pump: Truck Mount With Boom	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Conveyors	\$86.05	15J	11G	8X
<u>Sewer & Water</u>					

<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes Friction: 200 tons and over	\$90.46	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes, A-frame: 10 tons and under	\$82.59	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes: 100 tons through 199 tons, or 150' of boom (including jib with attachments)	\$88.67	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes: 20 tons through 44 tons with attachments	\$87.03	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes: 200 tons- 299 tons, or 250' of boom including jib with attachments	\$89.60	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes: 300 tons and over or 300' of boom including jib with attachments	\$90.46	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes: 45 tons through 99 tons, under 150' of boom(including jib with attachments)	\$87.82	7A	11H	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Cranes: Friction cranes through 199 tons	\$89.60	7A	11H	8X

<u>Power Equipment</u>	Cranes: through 19 tons				
<u>Operators- Underground</u>	with attachments, a-frame	\$86.36	7A	11H	8X
<u>Sewer & Water</u>	over 10 tons				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Crusher	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Deck Engineer/Deck	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	Winches (power)				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Derricks, On Building	\$87.82	7A	11H	8X
<u>Sewer & Water</u>	Work				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Dozers D-9 & Under	\$86.05	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Drill Oilers: Auger Type,	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	Truck Or Crane Mount				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Drilling Machine	\$88.36	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Elevator and man-lift:	\$82.29	15J	11G	8X
<u>Sewer & Water</u>	permanent and shaft type				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Finishing Machine, Bidwell	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	And Gamaco & Similar Equipment				

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Forklift: 3000 lbs and over	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	with attachments				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Forklifts: under 3000 lbs.	\$82.29	15J	11G	8X
<u>Sewer & Water</u>	with attachments				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Grade Engineer: Using	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	Blue Prints, Cut Sheets, Etc				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Gradechecker/Stakeman	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Guardrail Punch	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Hard Tail End Dump				
<u>Sewer & Water</u>	Articulating Off- Road Equipment 45 Yards. & Over	\$87.49	15J	11G	8X
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Hard Tail End Dump				
<u>Sewer & Water</u>	Articulating Off-road Equipment Under 45 Yards	\$86.71	15J	11G	8X
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Horizontal/Directional Drill	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	Locator				

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Horizontal/Directional Drill	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	Operator				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Hydralifts/boom trucks: 10	\$82.59	7A	11H	8X
<u>Sewer & Water</u>	tons and under				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Hydralifts/boom trucks:	\$86.36	7A	11H	8X
<u>Sewer & Water</u>	over 10 tons				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Leverman	\$89.27	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Loader, Overhead, 6 Yards.	\$87.49	15J	11G	8X
<u>Sewer & Water</u>	But Not Including 8 Yards				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Loaders, Overhead Under	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	6 Yards				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Loaders, Plant Feed	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Loaders: Elevating Type	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	Belt				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Locomotives, All	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Material Transfer Device	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Mechanics: All (Leadmen -				
<u>Operators- Underground</u>	\$0.50 per hour over	\$88.36	15J	11G	8X
<u>Sewer & Water</u>	mechanic)				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Motor Patrol Graders	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Mucking Machine, Mole,				
<u>Operators- Underground</u>	Tunnel Drill, Boring, Road	\$87.49	15J	11G	8X
<u>Sewer & Water</u>	Header And/or Shield				
<u>Power Equipment</u>	Oil Distributors, Blower				
<u>Operators- Underground</u>	Distribution & Mulch	\$82.29	15J	11G	8X
<u>Sewer & Water</u>	Seeding Operator				
<u>Power Equipment</u>	Outside Hoists (Elevators				
<u>Operators- Underground</u>	and Manlifts), Air Tuggers,	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	Strato				
<u>Power Equipment</u>	Overhead, bridge type				
<u>Operators- Underground</u>	Crane: 20 tons through 44	\$87.03	7A	11H	8X
<u>Sewer & Water</u>	tons				
<u>Power Equipment</u>	Overhead, bridge type:				
<u>Operators- Underground</u>	100 tons and over	\$88.67	7A	11H	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Overhead, bridge type: 45				
<u>Operators- Underground</u>	tons through 99 tons	\$87.82	7A	11H	8X
<u>Sewer & Water</u>					

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Pavement Breaker	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Pile Driver (other Than	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	Crane Mount)				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Plant Oiler - Asphalt,	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	Crusher				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Posthole Digger,	\$82.29	15J	11G	8X
<u>Sewer & Water</u>	Mechanical				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Power Plant	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Pumps - Water	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Quad 9, Hd 41, D10 And	\$87.49	15J	11G	8X
<u>Sewer & Water</u>	Over				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Quick Tower: no cab,	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	under 100 feet in height base to boom				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Remote Control Operator	\$87.49	15J	11G	8X
<u>Sewer & Water</u>	On Rubber Tired Earth Moving Equipment				

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Rigger and Bellman	\$82.59	7A	11H	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Rigger/Signal Person,	\$86.36	7A	11H	8X
<u>Sewer & Water</u>	Bellman(Certified)				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Rollagon	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Roller, Other Than Plant	\$82.29	15J	11G	8X
<u>Sewer & Water</u>	Mix				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Roller, Plant Mix Or Multi-	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	lift Materials				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Roto-mill, Roto-grinder	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Saws - Concrete	\$86.05	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Scraper, Self Propelled	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	Under 45 Yards				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Scrapers - Concrete &	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	Carry All				

<u>Power Equipment</u>	Scrapers, Self-propelled:				
<u>Operators- Underground</u>	45 Yards And Over	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Shotcrete/Gunite				
<u>Operators- Underground</u>	Equipment	\$82.29	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Shovel, Excavator,				
<u>Operators- Underground</u>	Backhoe, Tractors Under	\$86.05	15J	11G	8X
<u>Sewer & Water</u>	15 Metric Tons				
<u>Power Equipment</u>	Shovel, Excavator,				
<u>Operators- Underground</u>	Backhoe: Over 30 Metric	\$87.49	15J	11G	8X
<u>Sewer & Water</u>	Tons To 50 Metric Tons				
<u>Power Equipment</u>	Shovel, Excavator,				
<u>Operators- Underground</u>	Backhoes, Tractors: 15 To	\$86.71	15J	11G	8X
<u>Sewer & Water</u>	30 Metric Tons				
<u>Power Equipment</u>	Shovel, Excavator,				
<u>Operators- Underground</u>	Backhoes: Over 50 Metric	\$88.36	15J	11G	8X
<u>Sewer & Water</u>	Tons To 90 Metric Tons				
<u>Power Equipment</u>	Shovel, Excavator,				
<u>Operators- Underground</u>	Backhoes: Over 90 Metric	\$89.27	15J	11G	8X
<u>Sewer & Water</u>	Tons				
<u>Power Equipment</u>	Slipform Pavers				
<u>Operators- Underground</u>		\$87.49	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Spreader, Topsider &				
<u>Operators- Underground</u>	Screedman	\$87.49	15J	11G	8X
<u>Sewer & Water</u>					

<u>Power Equipment</u>					
<u>Operators- Underground</u>	Subgrader Trimmer	\$86.71	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Tower Bucket Elevators	\$86.05	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>	Tower Crane: over 175'				
<u>Operators- Underground</u>	through 250' in height,	\$89.60	7A	11H	8X
<u>Sewer & Water</u>	base to boom				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Tower crane: up to 175' in	\$88.67	7A	11H	8X
<u>Sewer & Water</u>	height base to boom				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Tower Cranes: over 250' in	\$90.46	7A	11H	8X
<u>Sewer & Water</u>	height from base to boom				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Transporters, All Track Or	\$87.49	15J	11G	8X
<u>Sewer & Water</u>	Truck Type				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Trenching Machines	\$86.05	15J	11G	8X
<u>Sewer & Water</u>					
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Truck Crane Oiler/Driver:	\$87.03	7A	11H	8X
<u>Sewer & Water</u>	100 tons and over				
<u>Power Equipment</u>					
<u>Operators- Underground</u>	Truck crane oiler/driver:	\$86.36	7A	11H	8X
<u>Sewer & Water</u>	under 100 tons				

<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Truck Mount Portable Conveyor	\$86.71	15J	11G	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Vac Truck (Vactor Guzzler, Hydro Excavator)	\$86.71	15J	11G	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Welder	\$87.49	15J	11G	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Wheel Tractors, Farmall Type	\$82.29	15J	11G	8X
<u>Power Equipment</u> <u>Operators- Underground</u> <u>Sewer & Water</u>	Yo Yo Pay Dozer	\$86.71	15J	11G	8X
<u>Power Line Clearance Tree</u> <u>Trimmers</u>	Journey Level In Charge	\$61.73	5A	4A	
<u>Power Line Clearance Tree</u> <u>Trimmers</u>	Spray Person	\$58.44	5A	4A	
<u>Power Line Clearance Tree</u> <u>Trimmers</u>	Tree Equipment Operator	\$61.73	5A	4A	
<u>Power Line Clearance Tree</u> <u>Trimmers</u>	Tree Trimmer	\$55.14	5A	4A	
<u>Power Line Clearance Tree</u> <u>Trimmers</u>	Tree Trimmer Groundperson	\$41.68	5A	4A	

<u>Refrigeration & Air Conditioning Mechanics</u>	Journey Level	\$90.96	5A	1G
Residential Brick Mason	Journey Level	\$22.73		1
Residential Carpenters	Journey Level	\$78.96	15J	4C
Residential Cement Masons	Journey Level	\$76.78	15J	4U
Residential Drywall Applicators	Journey Level	\$51.52	15J	4C
Residential Drywall Tapers	Journey Level	\$77.66	5P	1E
Residential Electricians	Journey Level	\$48.80		1
Residential Glaziers	Journey Level	\$27.66		1
Residential Insulation Applicators	Journey Level	\$27.61		1
Residential Laborers	Journey Level	\$28.78		1
Residential Marble Setters	Journey Level	\$39.71		1
Residential Painters	Journey Level	\$30.44		1
Residential Plumbers & Pipefitters	Journey Level	\$51.38		1
Residential Refrigeration & Air Conditioning Mechanics	Journey Level	\$99.92	7F	1E
Residential Sheet Metal Workers	Journey Level	\$99.92	7F	1E

Residential Soft Floor Layers	Journey Level	\$59.52	5A	3J
Residential Sprinkler Fitters (Fire Protection)	Journey Level	\$61.85		1
Residential Stone Masons	Journey Level	\$39.71		1
Residential Terrazzo Workers	Journey Level	\$16.66		1
Residential Terrazzo/Tile Finishers	Journey Level	\$27.90		1
Residential Tile Setters	Journey Level	\$21.38		1
<u>Roofers</u>	Journey Level	\$64.45	5A	3H
<u>Roofers</u>	Using Irritable Bituminous Materials	\$67.39	5A	3H
<u>Sheet Metal Workers</u>	Journey Level (Field or Shop)	\$99.92	7F	1E
Shipbuilding & Ship Repair	New Construction Boilermaker	\$58.93	7X	4J
Shipbuilding & Ship Repair	New Construction Carpenter	\$51.85	7X	4J
Shipbuilding & Ship Repair	New Construction Crane Operator	\$43.00	7V	1
Shipbuilding & Ship Repair	New Construction Electrician	\$58.98	7X	4J

Shipbuilding & Ship Repair	New Construction Heat & Frost Insulator	\$91.81	15H	11C
Shipbuilding & Ship Repair	New Construction Laborer	\$58.60	7X	4J
Shipbuilding & Ship Repair	New Construction Machinist	\$58.79	7X	4J
Shipbuilding & Ship Repair	New Construction Operating Engineer	\$43.00	7V	1
Shipbuilding & Ship Repair	New Construction Painter	\$58.72	7X	4J
Shipbuilding & Ship Repair	New Construction Pipefitter	\$59.07	7X	4J
Shipbuilding & Ship Repair	New Construction Rigger	\$58.93	7X	4J
Shipbuilding & Ship Repair	New Construction Sheet Metal	\$58.68	7X	4J
Shipbuilding & Ship Repair	New Construction Shipwright	\$51.85	7X	4J
Shipbuilding & Ship Repair	New Construction Warehouse/Teamster	\$43.00	7V	1
Shipbuilding & Ship Repair	New Construction Welder / Burner	\$58.93	7X	4J
Shipbuilding & Ship Repair	Ship Repair Boilermaker	\$58.93	7X	4J
Shipbuilding & Ship Repair	Ship Repair Carpenter	\$51.85	7X	4J
Shipbuilding & Ship Repair	Ship Repair Crane Operator	\$45.06	7Y	4K

Shipbuilding & Ship Repair	Ship Repair Electrician	\$58.98	7X	4J
Shipbuilding & Ship Repair	Ship Repair Heat & Frost Insulator	\$91.81	15H	11C
Shipbuilding & Ship Repair	Ship Repair Laborer	\$58.60	7X	4J
Shipbuilding & Ship Repair	Ship Repair Machinist	\$58.79	7X	4J
Shipbuilding & Ship Repair	Ship Repair Operating Engineer	\$45.06	7Y	4K
Shipbuilding & Ship Repair	Ship Repair Painter	\$58.72	7X	4J
Shipbuilding & Ship Repair	Ship Repair Pipefitter	\$59.07	7X	4J
Shipbuilding & Ship Repair	Ship Repair Rigger	\$58.93	7X	4J
Shipbuilding & Ship Repair	Ship Repair Sheet Metal	\$58.68	7X	4J
Shipbuilding & Ship Repair	Ship Repair Shipwright	\$51.85	7X	4J
Shipbuilding & Ship Repair	Ship Repair Warehouse / Teamster	\$45.06	7Y	4K
<u>Sign Makers & Installers</u> (Electrical).	Sign Installer	\$26.56		1
<u>Sign Makers & Installers</u> (Electrical).	Sign Maker	\$20.50		1
<u>Sign Makers & Installers</u> (Non-Electrical).	Sign Installer	\$22.56		1
<u>Sign Makers & Installers</u> (Non-Electrical).	Sign Maker	\$20.50		1

<u>Soft Floor Layers</u>	Journey Level	\$63.29	15J	4C	
<u>Solar Controls For Windows</u>	Journey Level	\$16.66		1	
<u>Sprinkler Fitters (Fire Protection)</u>	Journey Level	\$96.99	5C	1X	
<u>Stage Rigging Mechanics (Non Structural)</u>	Journey Level	\$16.66		1	
<u>Stone Masons</u>	Journey Level	\$71.82	7E	1N	
<u>Street And Parking Lot Sweeper Workers</u>	Journey Level	\$16.66		1	
<u>Surveyors</u>	Assistant Construction Site Surveyor	\$86.36	7A	11H	8X
<u>Surveyors</u>	Chainman	\$82.59	7A	11H	8X
<u>Surveyors</u>	Construction Site Surveyor	\$87.82	7A	11H	8X
<u>Surveyors</u>	Drone Operator (when used in conjunction with survey work only)	\$82.59	7A	11H	8X
<u>Surveyors</u>	Ground Penetrating Radar Operator	\$82.59	7A	11H	8X
<u>Telecommunication Technicians</u>	Telecom Technician Journey Level	\$58.51	5B	1B	
<u>Telephone Line Construction - Outside</u>	Cable Splicer	\$41.35	5A	2B	

<u>Telephone Line</u> <u>Construction - Outside</u>	Hole Digger/Ground Person	\$27.31	5A	2B	
<u>Telephone Line</u> <u>Construction - Outside</u>	Telephone Equipment Operator (Light)	\$34.53	5A	2B	
<u>Telephone Line</u> <u>Construction - Outside</u>	Telephone Lineperson	\$39.07	5A	2B	
<u>Terrazzo Workers</u>	Journey Level	\$67.51	7E	1N	
<u>Tile Setters</u>	Journey Level	\$65.51	7E	1N	
<u>Tile, Marble & Terrazzo</u> <u>Finishers</u>	Finisher	\$56.34	7E	1N	
<u>Traffic Control Stripers</u>	Journey Level	\$92.44	15L	1K	
<u>Truck Drivers</u>	Asphalt Mix Over 16 Yards	\$79.40	15J	11M	8L
<u>Truck Drivers</u>	Asphalt Mix To 16 Yards	\$78.56	15J	11M	8L
<u>Truck Drivers</u>	Dump Truck	\$78.56	15J	11M	8L
<u>Truck Drivers</u>	Dump Truck & Trailer	\$79.40	15J	11M	8L
<u>Truck Drivers</u>	Other Trucks	\$79.40	15J	11M	8L
<u>Truck Drivers - Ready Mix</u>	Transit Mix	\$79.40	15J	11M	8L
<u>Well Drillers & Irrigation</u> <u>Pump Installers</u>	Irrigation Pump Installer	\$17.05		1	
<u>Well Drillers & Irrigation</u> <u>Pump Installers</u>	Oiler	\$16.66		1	

<u>Well Drillers & Irrigation</u>			
<u>Pump Installers</u>	Well Driller	\$19.01	1

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes

Overtime calculations are based on the hourly rate actually paid to the worker. On public works projects, the hourly rate must be not less than the prevailing rate of wage minus the hourly rate of the cost of fringe benefits actually provided for the worker.

1. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
 - B. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - C. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - D. The first two (2) hours before or after a five-eight (8) hour workweek day or a four-ten (10) hour workweek day and the first eight (8) hours worked the next day after either workweek shall be paid at one and one-half times the hourly rate of wage. All additional hours worked and all worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.
 - G. The first ten (10) hours worked on Saturdays and the first ten (10) hours worked on a fifth calendar weekday in a four-ten hour schedule, shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - H. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions or equipment breakdown) shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - I. All hours worked on Sundays and holidays shall also be paid at double the hourly rate of wage.
 - J. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage.
 - K. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
 - M. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

1. N. All hours worked on Saturdays (except makeup days) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
- O. The first ten (10) hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays, holidays and after twelve (12) hours, Monday through Friday and after ten (10) hours on Saturday shall be paid at double the hourly rate of wage.
- P. All hours worked on Saturdays (except makeup days if circumstances warrant) and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
- Q. The first two (2) hours after eight (8) regular hours Monday through Friday and up to ten (10) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays (except Christmas day) shall be paid at double the hourly rate of wage. All hours worked on Christmas day shall be paid at two and one-half times the hourly rate of wage.
- R. All hours worked on Sundays and holidays shall be paid at two times the hourly rate of wage.
- U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays (except Labor Day) shall be paid at two times the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.
- V. All hours worked on Sundays and holidays (except Thanksgiving Day and Christmas day) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Thanksgiving Day and Christmas day shall be paid at double the hourly rate of wage.
- W. All hours worked on Saturdays and Sundays (except make-up days due to conditions beyond the control of the employer)) shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
- X. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over twelve (12) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage. When holiday falls on Saturday or Sunday, the day before Saturday, Friday, and the day after Sunday, Monday, shall be considered the holiday and all work performed shall be paid at double the hourly rate of wage.
- Y. All hours worked outside the hours of 5:00 am and 5:00 pm (or such other hours as may be agreed upon by any employer and the employee) and all hours worked in excess of eight (8) hours per day (10 hours per day for a 4 x 10 workweek) and on Saturdays and holidays (except labor day) shall be paid at one and one-half times the hourly rate of wage. (except for employees who are absent from work without prior approval on a scheduled workday during the workweek shall be paid at the straight-time rate until they have worked 8 hours in a day (10 in a 4 x 10 workweek) or 40 hours during that workweek.) All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and Labor Day shall be paid at double the hourly rate of wage.
- Z. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid the straight time rate of pay in addition to holiday pay.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

2. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
 - B. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.
 - F. The first eight (8) hours worked on holidays shall be paid at the straight hourly rate of wage in addition to the holiday pay. All hours worked in excess of eight (8) hours on holidays shall be paid at double the hourly rate of wage.
 - M. This code appears to be missing. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage.
 - R. All hours worked on Sundays and holidays and all hours worked over sixty (60) in one week shall be paid at double the hourly rate of wage.
 - U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked over 12 hours in a day or on Sundays and holidays shall be paid at double the hourly rate of wage.

3. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
 - F. All hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.
 - H. All work performed on Sundays between March 16th and October 14th and all Holidays shall be compensated for at two (2) times the regular rate of pay. Work performed on Sundays between October 15th and March 15th shall be compensated at one and one half (1-1/2) times the regular rate of pay.
 - J. All hours worked between the hours of 10:00 pm and 5:00 am, Monday through Friday, and all hours worked on Saturdays shall be paid at a one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
 - K. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more. When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the eight (8) hours rest period.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued**4. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.**

- A. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage
- C. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay. On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay, except that if the job is down on Monday through Friday due to weather conditions or other conditions outside the control of the employer, the first ten (10) hours on Saturday may be worked at the straight time rate of pay. All hours worked over twelve (12) hours in a day and all hours worked on Sunday and Holidays shall be paid at two (2) times the straight time rate of pay.
- D. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturday, Sundays and holidays shall be paid at double the hourly rate of pay. Rates include all members of the assigned crew.

EXCEPTION:

On all multipole structures and steel transmission lines, switching stations, regulating, capacitor stations, generating plants, industrial plants, associated installations and substations, except those substations whose primary function is to feed a distribution system, will be paid overtime under the following rates:

The first two (2) hours after eight (8) regular hours Monday through Friday of overtime on a regular workday, shall be paid at one and one-half times the hourly rate of wage. All hours in excess of ten (10) hours will be at two (2) times the hourly rate of wage. The first eight (8) hours worked on Saturday will be paid at one and one-half (1-1/2) times the hourly rate of wage. All hours worked in excess of eight (8) hours on Saturday, and all hours worked on Sundays and holidays will be at the double the hourly rate of wage.

All overtime eligible hours performed on the above described work that is energized, shall be paid at the double the hourly rate of wage.

- E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The Monday or Friday not utilized in the normal four-day, ten hour work week, and Saturday shall be paid at one and one half (1½) times the regular shift rate for the first eight (8) hours. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
- G. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
- I. The First eight (8) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of eight (8) per day on Saturdays shall be paid at double the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

4. J. The first eight (8) hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of eight (8) hours on a Saturday shall be paid at double the hourly rate of wage. All hours worked over twelve (12) in a day, and all hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.
- K. All hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage, so long as Saturday is the sixth consecutive day worked. All hours worked over twelve (12) in a day Monday through Saturday, and all hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.
- L. The first twelve (12) hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on a Saturday in excess of twelve (12) hours shall be paid at double the hourly rate of pay. All hours worked over twelve (12) in a day Monday through Friday, and all hours worked on Sundays shall be paid at double the hourly rate of wage. All hours worked on a holiday shall be paid at one and one-half times the hourly rate of wage, except that all hours worked on Labor Day shall be paid at double the hourly rate of pay.
- S. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, work performed in excess of (10) hours shall be paid at one and one half (1-1/2) times the hourly rate of pay. On Monday through Friday, work performed outside the normal work hours of 6:00 a.m. and 6:00 p.m. shall be paid at one and one-half (1-1/2) times the straight time rate, (except for special shifts or multiple shift operations).
- All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed on Sundays and holidays shall be paid at double the hourly rate of wage. When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.
- Multiple Shift Operations: When the first shift of a multiple shift (a two or three shift) operation is started at the basic straight time rate or at a specific overtime rate, all shifts of that day's operation shall be completed at that rate. Special Shifts: The Special Shift Premium is the basic hourly rate of pay plus \$2.00 an hour. When due to conditions beyond the control of the employer or when an owner (not acting as the contractor), a government agency or the contract specifications require more than four (4) hours of a special shift can only be performed outside the normal 6am to 6pm shift then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they shall be paid the special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday).
- U. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. (Except on makeup days if work is lost due to inclement weather, then the first eight (8) hours on Saturday may be paid the regular rate.) All hours worked over twelve (12) hours Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

4. X. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage. Work performed outside the normal shift of 6 am to 6pm shall be paid at one and one-half the straight time rate, (except for special shifts or three shift operations). All work performed on Sundays and holidays shall be paid at double the hourly rate of wage. Shifts may be established when considered necessary by the Employer.

The Employer may establish shifts consisting of eight (8) or ten (10) hours of work (subject to WAC 296-127-022), that shall constitute a normal forty (40) hour work week. The Employer can change from a 5-eight to a 4-ten hour schedule or back to the other. All hours of work on these shifts shall be paid for at the straight time hourly rate. Work performed in excess of eight hours (or ten hours per day (subject to WAC 296-127-022) shall be paid at one and one-half the straight time rate.

When due to conditions beyond the control of the Employer, or when contract specifications require that work can only be performed outside the regular day shift, then by mutual agreement a special shift may be worked at the straight time rate, eight (8) hours work for eight (8) hours pay. The starting time shall be arranged to fit such conditions of work.

When an employee returns to work without at a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

Overtime Codes Continued

11. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

B After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

C The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, and all hours on Sunday shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage. All non-overtime and non-holiday hours worked between 4:00 pm and 5:00 am, Monday through Friday, shall be paid at a premium rate of 15% over the hourly rate of wage.

D. All hours worked on Saturdays and holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

E. The first two (2) hours after eight (8) regular hours Monday through Friday, the first ten (10) hours on Saturday, and the first ten (10) hours worked on Holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, and Sundays shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

11. F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The Monday or Friday not utilized in the normal four-day, ten hour work week, and Saturday shall be paid at one-half times the hourly rate of wage for the first eight (8) hours. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

- G. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage.

All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of nine (9) hours or more. When an employee returns to work without at least nine (9) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the nine (9) hours rest period.

- H. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage.

All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of ten (10) hours or more. When an employee returns to work without at least ten (10) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the ten (10) hours rest period.

- J. All hours worked on holidays shall be paid at double the hourly rate of wage.

- K. On Monday through Friday hours worked outside 4:00 am and 5:00 pm, and the first two (2) hours after eight (8) hours worked shall be paid at one and one-half times the hourly rate. All hours worked over 10 hours per day Monday through Friday, and all hours worked on Saturdays, Sundays, and Holidays worked shall be paid at double the hourly rate of wage.

- L. An employee working outside 5:00 am and 5:00 pm shall receive an additional two dollar (\$2.00) per hour for all hours worked that shift. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

11. M. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay.
- Work performed outside the normal work hours of 5:00 a.m. and 6:00 p.m. shall be paid at one and one-half (1-1/2) times the straight time rate, (except for special shifts or multiple shift operations). When the first shift of a multiple shift (a two or three shift) operation is started at the basic straight time rate or at a specific overtime rate, all shifts of that day's operation shall be completed at that rate. When due to conditions beyond the control of the Employer or when contract specifications require that work can only be performed outside the regular day shift of 5:00 am to 6:00 pm, then a special shift may be worked at the straight time rate, plus the shift pay premium when applicable. The starting time of work will be arranged to fit such conditions of work. Such shift shall consist of eight (8) hours work for eight (8) hours pay or ten (10) hours work for ten (10) hours pay for four ten shifts.
- On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay. All work performed after 6:00 pm Saturday to 5:00 am Monday, all work performed over twelve (12) hours, and all work performed on holidays shall be paid at double the straight time rate of pay.
- Shift Pay Premium: In an addition to any overtime already required, all hours worked between the hours of 6:00 pm and 5:00 am shall receive an additional two dollars (\$2.00) per hour.
- N. All work performed over twelve hours in a shift and all work performed on Sundays and Holidays shall be paid at double the straight time rate.
- Any time worked over eight (8) hours on Saturday shall be paid double the straight time rate, except employees assigned to work six 10-hour shifts per week shall be paid double the straight time rate for any time worked on Saturday over 10 hours.
- O. All work performed on Saturdays, Sundays, and Holidays shall be paid at one and one half (1-1/2) times the straight time rate of pay.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Overtime Codes Continued

11. P. Work performed in excess of ten (10) hours of straight time per day when four ten (10) hour shifts are established and all work on Saturdays, except for make-up days shall be paid at time and one-half (1 ½) the straight time rate.
- Work performed outside the normal work hours of 5:00 a.m. and 6:00 p.m. shall be paid at one and one-half (1-1/2) times the straight time rate, (except for special shifts or multiple shift operations). When the first shift of multiple shift (a two or three shift) operation is started at the basic straight time rate or at a specific overtime rate, all shifts of that day's operation shall be completed at that rate. When due to conditions beyond the control of the Employer or when contract specifications require that work can only be performed outside the regular day shift of 5:00 a.m. to 6:00 p.m., then a special shift may be worked at the straight time rate, plus the shift pay premium when applicable. The starting time of work will be arranged to fit such conditions of work. Such shifts shall consist of eight (8) hours work for eight (8) hours pay or ten (10) hours work for ten (10) hours pay for four ten-hour shifts.
- In the event the job is down due to weather conditions, then Saturday may, be worked as a voluntary make-up day at the straight time rate. However, Saturday shall not be utilized as a make-up day when a holiday falls on Friday. All work performed on Sundays and holidays and work in excess of twelve (12) hours per day shall be paid at double (2x) the straight time rate of pay.
- After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.
- When an employee returns to work without a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.
- Q. All hours worked between the hours of 6:00 pm and 6:00 am, Monday through Saturday, shall be paid at a premium rate of 35% over the hourly rate of wage. Work performed on Sundays shall be paid at double time. All hours worked on holidays shall be paid at double the hourly rate of wage.
- R. On Monday through Saturday hours worked outside 6:00 am and 7:00 pm, and all hours after eight (8) hours worked shall be paid at one and one-half times the hourly rate. All hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.
- When a holiday falls on a Saturday, the Friday before shall be the observed holiday. When a holiday falls on a Sunday, the following Monday shall be the observed holiday.
- S. The first ten (10) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. In the event the job is down due to weather conditions, or other conditions beyond the control of the Employer, then Saturday may be worked at the straight time rate, for the first eight (8) hours, or the first ten (10) hours when a four day ten hour workweek has been established.
- All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
- When an employee returns to work without a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

11. T. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay.
- On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay, except that if the job is down on Monday through Friday due to weather conditions or other conditions outside the control of the employer, the first ten (10) hours on Saturday may be worked at the straight time rate of pay.
- All hours worked over twelve (12) hours in a day and all hours worked on Sunday and Holidays shall be paid at two (2) times the straight time rate of pay.
- U. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay.
- On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay, except that if the job is down on Monday through Friday due to weather conditions or other conditions outside the control of the employer, the first ten (10) hours on Saturday may be worked at the straight time rate of pay.
- All hours worked over twelve (12) hours in a day and all hours worked on Sunday and Holidays shall be paid at two (2) times the straight time rate of pay.
- If, due to conditions beyond the control of the Employer or when contract specifications require that work can only be performed outside the regular day shift, then a Special Shift may be worked, Monday through Friday, at the straight-time rate. The starting time of work for the Special Shift will be arranged to fit such conditions of work. Such Special Shift shall consist of eight (8) hours of work for eight (8) hours of pay or ten (10) hours of work for ten(10) hours of pay on a four-ten workday schedule.

Holiday Codes

5. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, and Christmas Day (7).
- B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, the day before Christmas, and Christmas Day (8).
- C. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).
- D. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8).
- H. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Day after Thanksgiving Day, And Christmas (6).

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Holiday Codes Continued

5. I. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).
- K. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9).
- L. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (8).
- N. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, The Friday After Thanksgiving Day, And Christmas Day (9).
- P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday And Saturday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9). If A Holiday Falls On Sunday, The Following Monday Shall Be Considered As A Holiday.
- Q. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).
- R. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day After Thanksgiving Day, One-Half Day Before Christmas Day, And Christmas Day. (7 1/2).
- S. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, And Christmas Day (7).
- Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).

Holiday Codes Continued

6. G. Paid Holidays: New Year's Day, Martin Luther King Jr. Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Christmas Eve Day (11).
- H. Paid Holidays: New Year's Day, New Year's Eve Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, Christmas Day, The Day After Christmas, And A Floating Holiday (10).
- T. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Last Working Day Before Christmas Day, And Christmas Day (9).
- Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). If a holiday falls on Saturday, the preceding Friday shall be considered as the holiday. If a holiday falls on Sunday, the following Monday shall be considered as the holiday.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Holiday Codes Continued

7. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any Holiday Which Falls On A Sunday Shall Be Observed As A Holiday On The Following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- C. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- D. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Unpaid Holidays: President's Day. Any paid holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any paid holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- E. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- F. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the last working day before Christmas day and Christmas day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

Holiday Codes Continued

7. G. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.
- H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Holiday Codes Continued

7. K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the Last Work Day before Christmas Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.
- P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.
- Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, the Day after Christmas, and A Floating Holiday (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.
- V. Holidays: New Year's Day, President's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the day before or after Christmas, and the day before or after New Year's Day. If any of the above listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.
- W. Holidays: New Year's Day, Day After New Year's, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Eve Day, Christmas Day, the day after Christmas, the day before New Year's Day, and a Floating Holiday.
- X. Holidays: New Year's Day, Day before or after New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day before or after Christmas day. If a holiday falls on a Saturday or on a Friday that is the normal day off, then the holiday will be taken on the last normal workday. If the holiday falls on a Monday that is the normal day off or on a Sunday, then the holiday will be taken on the next normal workday.
- Y. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. (8) If the holiday falls on a Sunday, then the day observed by the federal government shall be considered a holiday and compensated accordingly.
- Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, Christmas Eve, and Christmas Day (9). Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday. Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Holiday Codes Continued

15. G. New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, the last scheduled workday before Christmas, and Christmas Day (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.
- H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- J. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- L. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- M. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Eve Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.
- O. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, the day before Christmas day, and Christmas Day (10). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Note Codes

8. D. Workers working with supplied air on hazmat projects receive an additional \$1.00 per hour.
- L. Workers on hazmat projects receive additional hourly premiums as follows -Level A: \$0.75, Level B: \$0.50, And Level C: \$0.25.
- M. Workers on hazmat projects receive additional hourly premiums as follows: Levels A & B: \$1.00, Levels C & D: \$0.50.
- N. Workers on hazmat projects receive additional hourly premiums as follows -Level A: \$1.00, Level B: \$0.75, Level C: \$0.50, And Level D: \$0.25.
- S. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.
- T. Effective August 31, 2012 – A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.
- U. Workers on hazmat projects receive additional hourly premiums as follows – Class A Suit: \$2.00, Class B Suit: \$1.50, And Class C Suit: \$1.00. Workers performing underground work receive an additional \$0.40 per hour for any and all work performed underground, including operating, servicing and repairing of equipment. The premium for underground work shall be paid for the entire shift worked. Workers who work suspended by a rope or cable receive an additional \$0.50 per hour. The premium for work suspended shall be paid for the entire shift worked. Workers who do “pioneer” work (break open a cut, build road, etc.) more than one hundred fifty (150) feet above grade elevation receive an additional \$0.50 per hour.
8. V. In addition to the hourly wage and fringe benefits, the following depth and enclosure premiums shall be paid. The premiums are to be calculated for the maximum depth and distance into an enclosure that a diver reaches in a day. The premiums are to be paid one time for the day and are not used in calculating overtime pay.
- Depth premiums apply to depths of fifty feet or more. Over 50' to 100' - \$2.00 per foot for each foot over 50 feet. Over 101' to 150' - \$3.00 per foot for each foot over 101 feet. Over 151' to 220' - \$4.00 per foot for each foot over 220 feet. Over 221' - \$5.00 per foot for each foot over 221 feet.
- Enclosure premiums apply when divers enter enclosures (such as pipes or tunnels) where there is no vertical ascent and is measured by the distance travelled from the entrance. 25' to 300' - \$1.00 per foot from entrance. 300' to 600' - \$1.50 per foot beginning at 300'. Over 600' - \$2.00 per foot beginning at 600'.
- W. Meter Installers work on single phase 120/240V self-contained residential meters. The Lineman/Groundmen rates would apply to meters not fitting this description.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Note Codes Continued

- X. Workers on hazmat projects receive additional hourly premiums as follows - Class A Suit: \$2.00, Class B Suit: \$1.50, Class C Suit: \$1.00, and Class D Suit: \$0.50. Special Shift Premium: Basic hourly rate plus \$2.00 per hour.

When due to conditions beyond the control of the Employer or when an owner (not acting as the contractor), a government agency or the contract specifications requires that work can only be performed outside the normal 5 am to 6pm shift, then the special shift premium will be applied to the basic hourly rate. When an employee works on a special shift, they shall be paid a special shift premium for each hour worked unless they are in OT or Double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

- Y. Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay.

Swinging Stage/Boatswains Chair: Employees working on a swinging state or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents (\$0.75) per hour above the classification rate.

- Z. Workers working with supplied air on hazmat projects receive an additional \$1.00 per hour.

Special Shift Premium: Basic hourly rate plus \$2.00 per hour. When due to conditions beyond the control of the Employer or when an owner (not acting as a contractor), a government agency or the contract specifications require that more than (4) hours of a special shift can only be performed outside the normal 6 am to 6pm shift, then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they will be paid a special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

Note Codes Continued

9. A. Workers working with supplied air on hazmat projects receive an additional \$1.00 per hour.

Special Shift Premium: Basic hourly rate plus \$2.00 per hour. When due to conditions beyond the control of the Employer or when an owner (not acting as the contractor), a government agency or the contract specifications require that more than four (4) hours of a special shift can only be performed outside the normal 6 am to 6pm shift, then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they shall be paid a special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

Certified Crane Operator Premium: Crane operators requiring certifications shall be paid \$0.50 per hour above their classification rate.

Boom Pay Premium: All cranes including tower shall be paid as follows based on boom length:

(A) – 130' to 199' – \$0.50 per hour over their classification rate.

(B) – 200' to 299' – \$0.80 per hour over their classification rate.

(C) – 300' and over – \$1.00 per hour over their classification rate.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

Note Codes Continued

9. B. The highest pressure registered on the gauge for an accumulated time of more than fifteen (15) minutes during the shift shall be used in determining the scale paid.

Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay. Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents (\$0.75) per hour above the classification rate.

- C. Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay. Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents (\$0.75) per hour above the classification rate.

Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. These classifications are only effective on or after August 31, 2012.

- D. Industrial Painter wages are required for painting within industrial facilities such as treatment plants, pipelines, towers, dams, bridges, power generation facilities and manufacturing facilities such as chemical plants, etc., or anywhere abrasive blasting is necessary to prepare surfaces, or hazardous materials encapsulation is required.
- E. Heavy Construction includes construction, repair, alteration or additions to the production, fabrication or manufacturing portions of industrial or manufacturing plants, hydroelectric or nuclear power plants and atomic reactor construction. Workers on hazmat projects receive additional hourly premiums as follows -Level A: \$1.00, Level B: \$0.75, Level C: \$0.50, And Level D: \$0.25.
- F. Industrial Painter wages are required for painting within industrial facilities such as treatment plants, pipelines, towers, dams, power generation facilities and manufacturing facilities such as chemical plants, etc., or anywhere abrasive blasting is necessary to prepare surfaces, or hazardous materials encapsulation is required.
- H. One (1) person crew shall consist of a Party Chief. (Total Station or similar one (1) person survey system). Two (2) person survey party shall consist of a least a Party Chief and a Chain Person. Three (3) person survey party shall consist of at least a Party Chief, an Instrument Person, and a Chain Person.

Benefit Code Key – Effective 8/31/2024 thru 3/4/2025

9. I. In addition to the hourly wage and fringe benefits, the following depth and enclosure premiums shall be paid. The premiums are to be calculated for the maximum depth and distance into an enclosure that a diver reaches in a day. The premiums are to be paid one time for the day and are not used in calculating overtime pay.
- Depth premiums apply to depths of fifty feet or more. Over 50' to 100' - \$2.00 per foot for each foot over 50 feet. Over 101' to 150' - \$3.00 per foot for each foot over 101 feet. Over 151' to 220' - \$4.00 per foot for each foot over 220 feet. Over 221' - \$5.00 per foot for each foot over 221 feet.
- Enclosure premiums apply when divers enter enclosures (such as pipes or tunnels) where there is no vertical ascent and is measured by the distance travelled from the entrance. 25' to 300' - \$1.00 per foot from entrance. 300' to 600' - \$1.50 per foot beginning at 300'. Over 600' - \$2.00 per foot beginning at 600'.
- Employees may be required to perform any combination of work within the Diving team/crew, (with the exception of dive Supervisor) provided they are paid at the highest rate at which he/she has worked for the shift.
- L. Workers on hazmat projects receive additional hourly premiums as follows -Level A: \$0.75, Level B: \$0.50, And Level C: \$0.25.
- Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay.
- Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents (\$0.75) per hour above the classification rate.

Washington State Department of Labor and Industries
Policy Statement
(Regarding the Production of "Standard" or "Non-standard" Items)

Below is the department's (State L&I's) list of criteria to be used in determining whether a prefabricated item is "standard" or "non-standard". For items not appearing on WSDOT's predetermined list, these criteria shall be used by the Contractor (and the Contractor's subcontractors, agents to subcontractors, suppliers, manufacturers, and fabricators) to determine coverage under RCW 39.12. The production, in the State of Washington, of non-standard items is covered by RCW 39.12, and the production of standard items is not. The production of any item outside the State of Washington is not covered by RCW 39.12.

1. Is the item fabricated for a public works project? If not, it is not subject to RCW 39.12. If it is, go to question 2.
2. Is the item fabricated on the public works jobsite? If it is, the work is covered under RCW 39.12. If not, go to question 3.
3. Is the item fabricated in an assembly/fabrication plant set up for, and dedicated primarily to, the public works project? If it is, the work is covered by RCW 39.12. If not, go to question 4.
4. Does the item require any assembly, cutting, modification or other fabrication by the supplier? If not, the work is not covered by RCW 39.12. If yes, go to question 5.
5. Is the prefabricated item intended for the public works project typically an inventory item which could reasonably be sold on the general market? If not, the work is covered by RCW 39.12. If yes, go to question 6.
6. Does the specific prefabricated item, generally defined as standard, have any unusual characteristics such as shape, type of material, strength requirements, finish, etc? If yes, the work is covered under RCW 39.12.

Any firm with questions regarding the policy, WSDOT's Predetermined List, or for determinations of covered and non-covered workers shall be directed to State L&I at (360) 902-5330.

City of Everett
Everett Mall Bus Platform
WO NO. MALLSTN/24462

Appendix B
Puget Sound Clean Air Agency
Excerpts of Air Quality Rules

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ARTICLE 9: EMISSION STANDARDS

SECTION 9.03 EMISSION OF AIR CONTAMINANT: VISUAL STANDARD

Adopted 03/13/68 (12) Revised 07/08/70 (126), 04/11/73 (186), 06/09/88 (621) 05/11/89 (643), 09/08/94 (798), 04/09/98 (865), 03/11/99 (881), 03/25/04 (1024)

- (a) It shall be unlawful for any person to cause or allow the emission of any air contaminant for a period or periods aggregating more than 3 minutes in any 1 hour, which is:
 - (1) Darker in shade than that designated as No. 1 (20% density) on the Ringelmann Chart, as published by the United States Bureau of Mines;
or
 - (2) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in Section 9.03(a)(1).
- (b) The density or opacity of an air contaminant shall be measured at the point of its emission, except when the point of emission cannot be readily observed, it may be measured at an observable point of the plume nearest the point of emission.
- (c) This section shall not apply when the presence of uncombined water is the only reason for the failure of the emission to meet the requirements of this section.
- (d) This section shall not apply to solid fuel burning devices, permitted fire training facilities, permitted obscurant usage during military training operations, outdoor fires, motor vehicles when operated on public roads, aircraft, or equipment subject to Section 9.04 of this regulation.
- (e) This section shall not apply to equipment with an alternate opacity standard issued under Section 3.03 or Article 6 of this regulation that is based upon a correlation with the particulate concentration and that accurately indicates a violation of the applicable particulate emission standards in Section 9.09 of this regulation.

SECTION 9.04 OPACITY STANDARDS FOR EQUIPMENT WITH CONTINUOUS OPACITY MONITORING SYSTEMS

Adopted 04/09/98 (865)
Revised 03/25/04 (1024)

- (a) Applicability. This section shall apply to all equipment required to be equipped with a continuous emission monitoring system for opacity.
- (b) It shall be unlawful for any person to cause or allow the operation of any of the following equipment unless equipped with a continuous emission monitoring system for opacity:
 - (1) Cement kilns;
 - (2) Clinker coolers;
 - (3) Glass furnaces, rated at greater than 1 ton per hour, that burn fuel;
 - (4) Fuel burning equipment, rated at 100 million Btu per hour or greater, that burns wood, coal, or residual oil; and
 - (5) Refuse burning equipment rated at greater than 12 tons per day.
- (c) It shall be unlawful for any person to cause or allow the emission of any air contaminant from any equipment subject to this section during any hour that:

- (1) Averages greater than 5% opacity; or
 - (2) Contains any consecutive 6-minute period averaging greater than 20% opacity.
- (d) Section 9.04(c)(1) shall not apply to:
- (1) Glass furnaces that are tested annually for compliance with the applicable particulate emission standard in Section 9.09 of this regulation; or
 - (2) Equipment with an alternate opacity standard issued under Section 3.03 or Article 6 of this regulation that is based upon a correlation with the particulate concentration and that accurately indicates a violation of the applicable particulate emission standards in Section 9.09 of this regulation.
- (e) This section shall not apply to sources controlled by a venturi scrubber, provided that:
- (1) The source is tested annually for compliance with the applicable particulate emission standard in Section 9.09 of this regulation;
 - (2) The pressure drop across the scrubber is continuously monitored and recorded; and
 - (3) The scrubbing liquid flow rate and temperature are continuously monitored and recorded.
- (f) This section shall not apply to fuel burning equipment that burns residual oil less than 31 days per year, provided that the source implements an alternate opacity monitoring plan issued under Section 3.03 or Article 6 of this regulation.

SECTION 9.05 REFUSE BURNING Adopted 03/13/68 (12)

Revised 06/09/88 (621), 12/09/93 (769)

- (a) It shall be unlawful for any person to cause or allow the burning of combustible refuse except in a multiple chamber incinerator provided with control equipment.
- (b) It shall be unlawful for any person to cause or allow the operation of refuse burning equipment any time other than daylight hours.

SECTION 9.07 SULFUR DIOXIDE EMISSION STANDARD Adopted 03/13/68 (12)

Revised 07/08/70 (126), 02/21/74 (230), 02/13/86 (597), 06/09/88 (621), 04/14/94 (784)

It shall be unlawful for any person to cause or allow the emission of sulfur dioxide from any source in excess of 1,000 parts per million by volume on a dry basis, 1-hour average (corrected to 7% oxygen for fuel burning equipment and refuse burning equipment).

SECTION 9.08 FUEL OIL STANDARDS Adopted 06/13/85 (579)
Revised 02/13/86 (597), 04/14/94 (784), 03/25/04 (1024)

- (a) It shall be unlawful for any person to cause or allow the combustion of oil in fuel burning equipment or refuse burning equipment that exceeds any of the following limits unless that person has obtained an Order of Approval from the Agency in accordance with Article 6 of this regulation:

Ash	0.1% (maximum)
Sulfur	1.0% (maximum for used oil)
Sulfur	2.00% (maximum for fuel oil)
Lead	100 ppm (maximum)
Arsenic	5 ppm (maximum)
Cadmium	2 ppm (maximum)
Chromium.....	10 ppm (maximum)
Total Halogens.....	1,000 ppm (maximum)
Polychlorinated Biphenyls (PCBs)	2 ppm (maximum)
Flash Point	100°F (minimum)

- (b) It shall be unlawful for any person to sell or make available for sale any oil in excess of the limits of this section to any person who has not obtained an Order of Approval from the Agency in accordance with Article 6 of this regulation. Any person who sells or makes available for sale such oil shall submit a report to the Agency within 15 days of the end of the month that includes the name and address of the recipient, the amount of oil delivered, and the concentration of contaminants therein.
- (c) The provisions of this section shall not apply to:
- (1) Ocean-going vessels;
 - (2) Used oil burned in space heaters that have a maximum heat output of not greater than 0.5 million Btu per hour; and
 - (3) Persons in the business of collecting used oil from residences when under commission authorization by a city, county, or the utilities and transportation

SECTION 9.09 PARTICULATE MATTER EMISSION STANDARDS

Adopted 03/13/68 (12) Revised 07/08/70 (126), 11/10/71 (135), 10/10/73 (214), 02/13/86 (597), 06/09/88 (621), 05/11/89 (643), 02/10/94 (777), 04/09/98 (865)

It shall be unlawful for any person to cause or allow the emission of particulate matter in excess of the following concentrations:

Refuse Burning Equipment:

1. Rated at 12 tons per day or less without heat recovery and without hydrochloric acid control equipment 0.10 gr/dscf @ 7% O₂
2. Rated at 12 tons per day or less without heat recovery and with hydrochloric acid control equipment 0.05 gr/dscf @ 7% O₂
3. Rated at 12 tons per day or less with heat recovery 0.02 gr/dscf @ 7% O₂
4. Rated at greater than 12 tons per day0.01 gr/dscf @ 7% O₂

Fuel Burning Equipment:

1. Burning wood0.20 gr/dscf @ 7% O₂
2. Burning wood and installed after March 13, 1968 or located within the urbanized area 0.10 gr/dscf @ 7% O₂
3. Burning wood, rated at 100 million Btu per hour or greater, and located within the urbanized area 0.04 gr/dscf @ 7% O₂
4. Burning wood and installed after March 1, 1986 0.02 gr/dscf @ 7% O₂
5. Burning fuel other than wood0.05 gr/dscf @ 7% O₂
6. Burning coal or other solid fossil fuel and installed after March 1, 1986 0.01 gr/dscf @ 7% O₂

Equipment Used in a Manufacturing Process:0.05 gr/dscf

SECTION 9.10 EMISSION OF HYDROCHLORIC ACID Adopted 06/09/88 (621)

- (a) It shall be unlawful for any person to cause or allow the emission of hydrochloric acid from any equipment in excess of 100 ppm on a dry basis, 1-hour average corrected to 7% oxygen for combustion sources.
- (b) It shall be unlawful for any person to cause or allow the emission of hydrochloric acid from any refuse burning equipment rated at greater than 12 tons per day in excess of 30 ppm on a dry basis, 1-hour average corrected to 7% oxygen.

SECTION 9.11 EMISSION OF AIR CONTAMINANT: DETRIMENT TO PERSON OR PROPERTY

Adopted 03/13/68 (12) Revised 06/09/83 (536), 03/11/99 (882)

- (a) It shall be unlawful for any person to cause or allow the emission of any air contaminant in sufficient quantities and of such characteristics and duration as is, or is likely to be, injurious to human health, plant or animal life, or property, or which unreasonably interferes with enjoyment of life and property.
- (b) With respect to odor, the Agency may take enforcement action under this section if the Control Officer or a duly authorized representative has documented all of the following:
 - (1) The detection by the Control Officer or a duly authorized representative of an odor at a level 2 or greater, according to the following odor scale:
 - level 0 – no odor detected;
 - level 1 – odor barely detected;
 - level 2 – odor is distinct and definite, any unpleasant characteristics recognizable;
 - level 3 – odor is objectionable enough or strong enough to cause attempts at avoidance; and
 - level 4 – odor is so strong that a person does not want to remain present;
 - (2) An affidavit from a person making a complaint that demonstrates that they have experienced air contaminant emissions in sufficient quantities and of such characteristics and duration so as to unreasonably interfere with their enjoyment of life and property; and
 - (3) The source of the odor.
- (c) Nothing in this Regulation shall be construed to impair any cause of action or legal remedy of any person, or the public for injury or damages arising from the emission of any air contaminant in such place, manner or concentration as to constitute air pollution or a common law nuisance.

SECTION 9.13 EMISSION OF AIR CONTAMINANT: CONCEALMENT AND MASKING RESTRICTED

Adopted 03/13/68 (12) Revised 06/09/88 (621)

- (a) It shall be unlawful for any person to cause or allow the installation or use of any device or use of any means which, without resulting in a reduction in the total amount of air contaminant emitted, conceals an emission of air contaminant which would otherwise violate this article.
- (b) It shall be unlawful for any person to cause or allow the installation or use of any device or use of any means designed to mask the emission of an air contaminant which causes detriment to health, safety or welfare of any person.

SECTION 9.15 FUGITIVE DUST CONTROL MEASURES

Adopted 03/13/68 (12) Revised 06/09/83 (536), 06/09/88 (621), 08/10/89 (644), 03/11/99 (882)

- (a) It shall be unlawful for any person to cause or allow visible emissions of fugitive dust unless reasonable precautions are employed to minimize the emissions. Reasonable precautions include, but are not limited to, the following:
 - (1) The use of control equipment, enclosures, and wet (or chemical) suppression techniques, as practical, and curtailment during high winds;
 - (2) Surfacing roadways and parking areas with asphalt, concrete, or gravel;
 - (3) Treating temporary, low-traffic areas (e.g., construction sites) with water or chemical stabilizers, reducing vehicle speeds, constructing pavement or rip rap exit aprons, and cleaning vehicle undercarriages before they exit to prevent the track-out of mud or dirt onto paved public roadways;
or
 - (4) Covering or wetting truck loads or allowing adequate freeboard to prevent the escape of dust-bearing materials.
- (b) Compliance with the provisions of this section shall not relieve any person from the responsibility to comply with Section 9.11 of this regulation.

SECTION 9.16 SPRAY-COATING OPERATIONS Adopted 06/13/91 (700)

Revised 07/08/99 (886), 07/12/01 (944)

- (a) Applicability. This section applies to spray-coating operations at facilities subject to Article 5 (Registration) or Article 7 (Operating Permits) of this regulation, where a coating that protects or beautifies a surface is applied with spray-coating equipment.
- (b) Exemptions. The following activities are exempt from the provisions of Sections 9.16(c) and (d) of this regulation. Persons claiming any of the following spray-coating exemptions shall have the burden of demonstrating compliance with the claimed exemption.
 - (1) Application of architectural or maintenance coatings to stationary structures (e.g., bridges, water towers, buildings, stationary machinery, or similar structures);
 - (2) Aerospace coating operations subject to 40 CFR Part 63, Subpart GG. This includes all activities and materials listed in 40 CFR 63.741(f);
 - (3) Use of high-volume, low-pressure (HVLP) spray guns when:
 - (A) spray-coating operations do not involve motor vehicles or motor vehicle components;
 - (B) the gun cup capacity is 8 fluid ounces or less;
 - (C) the spray gun is used to spray-coat less than 9 square feet per day per facility;
 - (D) coatings are purchased in containers of 1 quart or less; and
 - (E) spray-coating is allowed by fire department, fire marshal, or other government agency requirements.
 - (4) Use of air-brush spray equipment with 0.5 to 2.0 CFM airflow and a maximum cup capacity of 2 fluid ounces;
 - (5) Use of hand-held aerosol spray cans with a capacity of 1 quart or less; or
 - (6) Indoor application of automotive undercoating materials using organic solvents

having a flash point in excess of 100°F.

- (c) General Requirements for Indoor Spray-Coating Operations. It shall be unlawful for any person subject to the provisions of this section to cause or allow spray-coating inside a structure, or spray-coating of any motor vehicles or motor vehicle components, unless the spray-coating is conducted inside an enclosed spray area. The enclosed spray area shall employ either properly seated paint arresters, or water-wash curtains with a continuous water curtain to control the overspray. All emissions from the spray-coating operation shall be vented to the atmosphere through an unobstructed vertical exhaust vent.
- (d) General Requirements for Outdoor Spray-Coating Operations. It shall be unlawful for any person subject to the provisions of this section to cause or allow spray-coating outside an enclosed structure unless reasonable precautions are employed to minimize the overspray. Reasonable precautions include, but are not limited to the use of:
 - (1) Enclosures and curtailment during high winds; and
 - (2) High-volume low-pressure (HVLP), low-volume low-pressure (LVLP), electrostatic, or air-assisted airless spray equipment. Airless spray equipment may be used where low viscosity and high solid coatings preclude the use of higher-transfer efficiency spray equipment.
- (e) Compliance with Other Regulations. Compliance with this regulation does not exempt any person from compliance with Regulation I, Section 9.11 and all other applicable regulations including those of other agencies.

SECTION 9.20 MAINTENANCE OF EQUIPMENT Adopted 12/09/82 (531)

Revised 06/09/88 (621)

- (a) It shall be unlawful for any person to cause or allow the operation of any features, machines or devices constituting parts of or called for by plans, specifications, or other information submitted pursuant to Article 6 of Regulation I unless such features, machines or devices are maintained in good working order.
- (b) It shall be unlawful for any person to cause or allow the operation of any equipment as defined in Section 1.07 or control equipment not subject to Section 9.20(a) unless the equipment or control equipment is maintained in good working order.

City of Everett
Everett Mall Bus Platform
WO NO. MALLSTN/24462

Appendix C
Sample Change Order Forms;
Agreed and Unilateral

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Change Order No. _____

Change Order Effective Date: _____

CITY OF EVERETT Change Order

Project Title

Department

Work Order No.

Contractor:

Contract Award Date:

City Staff Contact:

Change Order No.

*Change Order
Effective Date*

CONTRACT SUM

	Original Contract Sum	Total of Previous Change Orders	This Change Order	Contract Sum After this Change Order
Amount	\$	\$	\$	\$
+ WSST	\$	\$	\$	\$
Total	\$	\$	\$	\$

CONTRACT TIME

Original Contract Time	Working Days <input type="checkbox"/> / Calendar Days <input type="checkbox"/>
Date of Notice to Proceed	
Cumulative adjustment to time by <i>prior</i> Change Orders	
Adjustment to time by <i>this</i> Change Order	
New Contract Time (<i>including</i> this Change Order)	

Change Order No. _____

Change Order Effective Date: _____

Contractor and City agree as follows:

- 1. The scope of Work shall be changed to the extent described in Exhibit A.**
- 2. The amount of this Change Order for the changes described in Exhibit A, represents complete compensation for the changes described in Exhibit A, including all direct and indirect costs and impacts. The Contract Sum shall be adjusted as described in this Change Order.**
- 3. Everett Municipal Code 3.80.050 sets forth the threshold amounts below which the Mayor or his designee is authorized to direct Contractor to perform additional work. In calculating such threshold amounts, Washington State sales tax, as applicable to the Work, has been considered.**
- 4. The Contract Time of the Contract shall be adjusted to the extent described in this Change Order.**
- 5. Contractor waives and releases any and all claims arising out of, or related to, this Change Order, the work described in Exhibit A, and all work and actual or constructive changes that occurred or began prior to the date of this Change Order, including, but not limited to, claims for equitable adjustment of time and compensation, delay, impact, overhead, or inefficiencies. This provision does not apply to requests for equitable adjustment of time or price for which the Contractor timely and properly provided notice of a differing site condition, protest, dispute, claim or Contract Claim as required by the Contract Documents. If the Contract Documents establish a time period for notice of a differing site condition, protest, dispute, claim, or Contract Claim that ends after the date of this Change Order, but relates to work performed prior to the date of this Change Order, then this provision does not apply if the Contractor timely and properly submits such notice**
- 6. This Change Order only changes the contract between Contractor and City to the extent explicitly provided herein.**
- 7. Signature(s) on this Change Order may be by pdf, email, fax or other electronic means, in which case such signature(s) will have the same effect as an original ink signature. This Change Order may be signed in counterparts, each of which shall be deemed an original, and all of which, taken together, shall be deemed one and the same document.**

Change Order No. _____

Change Order Effective Date: _____

CITY			
 _____ Mayor Date: _____		Attest: _____ City Clerk Date: _____	
Standard Document Approved as to Form Office of the City Attorney (5.13.22)			
Recommended By:			
Construction Manager (if applicable)	Project Manager (if applicable)	Engineering Manager (if applicable)	Department Director
 _____ Date: _____	 _____ Date: _____	 _____ Date: _____	 _____ Date: _____
CONTRACTOR			
 By _____ Officer			
Date: _____			

Change Order No. _____

Change Order Effective Date: _____

Exhibit A—Description of Changed Work



Change Order No. _____

Change Order Effective Date: _____

CITY OF EVERETT Unilateral Change Order

Project Title

Department

Work Order No.

Contractor:

Contract Award Date:

City Staff Contact:

Change Order No.

*Change Order
Effective Date*

CONTRACT SUM

	Original Contract Sum	Total of Previous Change Orders	This Change Order	Contract Sum After this Change Order
Amount	\$	\$	\$	\$
+ WSST	\$	\$	\$	\$
Total	\$	\$	\$	\$

CONTRACT TIME

Original Contract Time	Working Days <input type="checkbox"/> / Calendar Days <input type="checkbox"/>
Date of Notice to Proceed	
Cumulative adjustment to time by <i>prior</i> Change Orders	
Adjustment to time by <i>this</i> Change Order	
New Contract Time (<i>including</i> this Change Order)	

Change Order No. _____

Change Order Effective Date: _____

As allowed by the contract, the City directs the Contractor as follows:

- 1. The Scope of Work shall be changed to the extent described in Exhibit A.**
- 2. The Contract Sum shall be adjusted as described in this Change Order.**
- 3. The duration of the Contract, and contractually scheduled completion date, shall be adjusted to the extent described in this Change Order.**
- 4. Unless the Contractor timely and properly follows the procedures in the Contract Documents for seeking further equitable adjustment of time and compensation, including, but not limited to, delays, impacts, inefficiencies, overhead, and direct and indirect costs, and except as otherwise expressly provided herein, the Contractor will be barred from (a) asserting any claim for further adjustment of time and compensation arising out of, or relating to, the charges described in this Change Order or work described in Exhibit A and (b) asserting an equitable adjustment of time or price arising earlier than the date of this Change Order. This provision does not apply to requests for equitable adjustment of time or price for which the Contractor timely and properly provided notice of a differing site condition, protest, dispute, claim or Contract Claim as required by the Contract Documents. If the Contract Documents establish a time period for notice of a differing site condition, protest, dispute, claim, or Contract Claim that ends after the date of this Change Order, but relates to work performed prior to the date of this Change Order, then this provision does not apply if the Contractor timely and properly submits such notice.**
- 5. This Change Order only changes the contract between Contractor and City to the extent explicitly provided herein.**

Change Order No. _____

Change Order Effective Date: _____

CITY			
 _____ Mayor Date: _____		Attest: _____ City Clerk Date: _____	
Standard Document Approved as to Form Office of the City Attorney (5.13.22)			
Recommended By:			
Construction Manager (if applicable) _____ Date: _____	Project Manager (if applicable) _____ Date: _____	Engineering Manager (if applicable) _____ Date: _____	Department Director _____ Date: _____

Change Order No. _____

Change Order Effective Date: _____

Exhibit A—Description of Changed Work

City of Everett
Everett Mall Bus Platform
WO NO. MALLSTN/24462

Appendix D
Architectural CSI Restroom Building
Technical Specifications

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City of Everett

Everett Mall Bus Platform

Permit/Bid Set

TCF Project No. 2024-013

October 23, 2024

Section #	Section Name	Author
DIVISION 01 - GENERAL REQUIREMENTS		
	by Client	Client
DIVISION 03 - CONCRETE		
033000	Cast-In-Place Concrete	ABI
033543	Polished Concrete Finishing	ABI
DIVISION 04 - MASONRY		
042000	Unit Masonry	ABI
DIVISION 05 - METALS		
	NOT USED	
DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES		
061000	Rough Carpentry	ABI
061800	Glue-Laminated Construction	ABI
062000	Finish Carpentry	ABI
DIVISION 07 - THERMAL AND MOISTURE PROTECTION		
070805	Air Barrier System Requirements	ABI
070810	Commissioning of Air Barrier System	ABI
071900	Water Repellents	ABI
072100	Thermal Insulation	ABI
072500	Weather Barriers	ABI
074113	Formed Metal Roof Panels	ABI
074646	Fiber Cement Siding	ABI
076200	Sheet Metal Flashing and Trim	ABI
079200	Joint Sealants	ABI
DIVISION 08 - OPENINGS		
081113	Hollow Metal Doors and Frames	ABI
081416	Flush Wood Doors and Frames	ABI
084313	Aluminum Framed Entrances and Storefronts	ABI
087100	Door Hardware	HARDWARE
088000	Glazing	ABI
089100	Louvers	ABI
DIVISION 09 - FINISHES		
092116	Gypsum Board Assemblies	ABI
095100	Acoustical Ceilings	ABI
096500	Resilient Flooring	ABI
099000	Painting and Coating	ABI

DIVISION 10 - SPECIALTIES

101400	Signage	ABI
102800	Toilet Accessories	ABI

DIVISION 11 - EQUIPMENT

113012	Appliances	ABI
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DIVISION 12 - FURNISHINGS

123505	Manufactured Casework	ABI
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DIVISION 20 - FACILITY SERVICES

200000	General Mechanical Requirements	BCE
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DIVISION 21 - FIRE SUPPRESSION

NOT USED

DIVISION 22 - PLUMBING

220300	Excavation & Backfill for Mechanical Underground Utilities	BCE
220513	Common Motor Requirements for Plumbing Equipment	BCE
220517	Sleeves and Sleeve Seals for Plumbing Piping	BCE
220523	General-Duty Valves for Plumbing Piping	BCE
220548	Vibration and Seismic Controls for Plumbing Piping and Equipment	BCE
220553	Identification for Plumbing Piping and Equipment	BCE
220719	Plumbing Piping Insulation	BCE
221005	Plumbing Piping	BCE
221006	Plumbing Piping Specialties	BCE
223000	Plumbing Equipment	BCE
224000	Plumbing Fixtures	BCE

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING

230513	Motors and Variable Drives	BCE
230529	Hangers and Supports for HVAC Piping and Equipment	BCE
230548	Vibration and Seismic Control	BCE
230553	Mechanical Identification for HVAC Piping and Equipment	BCE
230593	Air System Testing and Balancing	BCE
230713	Equipment/Ductwork Insulation	BCE
230719	HVAC Piping Insulations	BCE
230900	Energy Management and Controls (DDC)	BCE
232100	Sleeves and Seals for HVAC Piping and Equipment	BCE
233113	Steel Ductwork	BCE
233300	HVAC Specialties	BCE
233423	Exhaust Fans	BCE
233700	Air Terminals	BCE
237200	Air-to-Air Heat Exchangers	BCE

DIVISION 26 - ELECTRICAL

260000	Electrical General Conditions	BCE
260010	Excavation and Backfill for Elec UG Util	BCE
260519	Wires and Cables	BCE
260526	Grounding	BCE
260532	Outlet and Pull Boxes	BCE
260533	Raceway	BCE
260534	Metal Clad Cable (Type MC) and Fittings	BCE
260539	Floor Outlet Devices-Flush	BCE
260573	Electrical System Studies	BCE
260923	Network Digital Lighting Control System	BCE
262416	Panelboards	BCE
262419	Motor Controllers	BCE
262726	Switches and Receptacles	BCE
262813	Fuses	BCE
262816	Disconnects and Fused Switches	BCE
263100	Photovoltaic Grid Interface System	BCE
264300	Surge Protective Device (SPD)	BCE
265000	Lighting	BCE

DIVISION 27 - COMMUNICATIONS

270000	Low Voltage Systems General Requirements	BCE
270528	Pathways for Communications Systems	BCE
272000	Data and Voice Infrastructure	BCE

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Form-facing materials.
- B. Steel reinforcement.
- C. Reinforcement accessories.
- D. Concrete materials.
- E. Vapor barriers.
- F. Dampproofing.
- G. Floor and slab treatments.
- H. Curing materials.
- I. Related materials.
- J. Repair materials.
- K. Concrete mixtures, general.
- L. Concrete mixtures for building elements.
- M. Fabricating reinforcement.
- N. Concrete mixing.

1.2 RELATED REQUIREMENTS

- A. 033513 - Concrete Floor Finishes: For floor finishes, additional concrete treatment/finishing, and liquid floor treatments.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-barrier installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

- E. Samples: For waterstops and vapor barrier.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Floor and slab treatments.
 - 6. Adhesives.
 - 7. Vapor barriers.
 - 8. Semirigid joint filler.
 - 9. Joint-filler strips.
 - 10. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.
- G. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
1. Maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301 (ACI 301M).
 2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
 3. Overlaid Finish birch plywood.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch 3/4 by 3/4 inch, minimum.
- C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type I gray.
 - 2. Fly Ash: ASTM C618, Class F
 - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
 - 4. Silica Fume: ASTM C1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C260/C260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: ASTM C94/C94M.

2.6 VAPOR BARRIER

- A. Basis of Design:

1. Moistop Ultra 15 by Fortifiber Corp.
 2. Stego Wrap by Stego Industries LLC.
 3. Perminator by W.R. Meadows Sealtight.
- B. Thickness: 15 mil minimum.
- C. ASTM E1745, Class A, sheet vapor retarder.
- D. Moisture Vapor Permeance: 0.01 perms when tested to ASTM E154/E154M, after mandatory conditioning tests per sections 8,11,12, and 13.
- E. Puncture Resistance: 140 lbf when tested in accordance with ASTM E154/E154M.
- F. Tensile Strength: 45 foot-pounds per inch, tested to ASTM E154/E154M, Section 9, Method ASTM D882.

2.7 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Emulsified-Asphalt Damproofing: Cold-applied, water-based emulsified-asphalt dampproofing reinforced with short, non-asbestos fibers.
1. Basis of Design: BASF; MasterSeal 615.
 2. Other Manufacturers: Subject to compliance with requirements, provided products by one of the following:
 - a. Henry Company; 789.
 - b. Karnak; 220.
 - c. Or approved substitute during the bid process per Division 00 Specification Section “instructions to Bidders” and Division 01 Specification Section “Substitution Procedures”.

2.8 FLOOR AND SLAB TREATMENTS

- A. In accordance with Section 033513 - Concrete Floor Finishes.

2.9 CURING MATERIALS

- A. Evaporation Barrier: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. See Structural General Notes for applications.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

- C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Curing Compounds: None allowed.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D2240.

2.11 REPAIR MATERIALS

- A. Repair Underlayment: Refer to Section 035400 - Cast Underlayment.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109/C109M.

2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.

2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Slag Cement: 25 percent.
 4. Combined Fly Ash or Pozzolan and Slag Cement: 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 25 percent
 7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 25 percent
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete: See Structural General Notes for requirements
- B. Foundation Walls: Normal-weight concrete: See Structural General Notes for requirements.
- C. Slabs-on-Grade: Normal-weight concrete: See Structural General Notes for requirements.

2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.

1. When air temperature is between 85 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.

PART 3 EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-BARRIER INSTALLATION

- A. Sheet Vapor Barriers: Place, protect, and repair sheet vapor barrier according to ASTM E1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.5 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING INSTALLATION

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
 - 1. Apply dampproofing to provide continuous plane of mitigation.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smoother surface and uninterrupted coverage.
 - 3. Apply dampproofing to exterior side of all building perimeter footings, foundation walls, and where indicated on Drawings.
- B. Provide dampproofing where indicated on the Drawings, and where required by this paragraph, unless and indicating on the Drawing specifically indicates a different material. Apply dampproofing to footings and below-grade exterior face of concrete foundation walls, where waterproofing is not installed.

3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Provide joint layout on slabs as indicated on Structural and Architectural Plans, and Structural General Notes.
 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 - Joint Sealants, are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

- A. Refer to Section 033513 - Concrete Floor Finishes for exposed floor finishes.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General:
 1. Refer to Section 033513 - Concrete Floor Finishes for exposed floor finishes.
 2. Comply with ACI 302.1R recommendations for screeding, restrecting, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 1. Apply scratch finish to surfaces indicated, to receive concrete floor toppings, and to receive mortar setting beds for bonded cementitious floor finishes.

- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated, to receive trowel finish, and to be covered with fluid-applied or sheet waterproofing, built up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces indicated, exposed to view, or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, according to ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - 3. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 4000 psi at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
- B. Evaporation Barrier: Apply evaporation barrier to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12-inch, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections (See Structural General Notes for additional requirements):

1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of use of required design mixture.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 3. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C231/C231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 degrees F and below or 80 degrees F and above, and one test for each composite sample.
 6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 7. Compression Test Specimens: ASTM C31/C31M.

- a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E1155 (ASTM E1155M) within 24 hours of finishing.

END OF SECTION

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Polished concrete finish on new cast-in-place concrete work.

1.2 RELATED REQUIREMENTS

- A. 033000 - Cast-in-Place Concrete.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with Section 013100 - Project Management and Coordination.
 - 1. Review preparation and installation procedures, and coordinating and scheduling required with related work.

1.4 SUBMITTALS

- A. Qualification Data: For installer.
- B. Samples: Submit two, 12 inch square samples, illustrating aggregate size, color and the extremes of color range.

1.5 QUALITY ASSURANCE

- A. Installer's Qualifications:
 - 1. Certified Polished Concrete installer.
 - 2. Certified PCI or CSDA installer.
- B. Perform Work in accordance with ACI 301 and ACI 303R.
 - 1. Maintain one copy of each document on project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
 - 1. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
 - 2. Keep materials from freezing.

- C. Handling: Protect materials during handling and application to prevent contamination or damage.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Polished concrete finishing for cast in place concrete.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Wet Dynamic Coefficient of Friction (DCOF): Not less than 0.42 as tested in accordance with ANSI/NFSI B101.3 Wet DCOF of Common Hard-Surface Floor Materials.
- B. Finished floor surface to have a minimum hardness rating of 6.5 Mohs (Hardness Pencil Test) in accordance with ASTM D3363.

2.3 MANUFACTURERS

- A. Specification is based on RetroPlate Concrete Polishing System by CureCrete Distribution Inc., as provided by Diamond-S Polished Concrete Inc.

2.4 CONCRETE DENSIFIER / SEALER

- A. Basis of Design: Subject to compliance with requirements, provide RetroPlate Concrete Polishing System by CureCrete Distribution Inc., as provided by Diamond-S Polished Concrete Inc. or one of the following.
- B. Prosoco Consolidex LS.
- C. Lythic Densifier / Lythic SPD Protector.
- D. Substitutions: Refer to City of Everett Special Provisions.

2.5 CONCRETE MIX

- A. Concrete mix design is specified in Section 033000 - Cast-in-Place Concrete.

2.6 EQUIPMENT TO BE USED FOR INSTALLATION

- A. Floor Grinder: Type: Multi-orbital, planetary-action, opposing-rotational, diamond-headed floor grinder.
- B. Vacuum System: Ruwac / Ermator (or equivalent) model as determined by installer to perform required dust extraction during grinding and polishing of concrete floor. Diamond Tooling for Initial Grinding, and Preparing Floor for Polishing:
 - 1. 60-grit metal-bonded diamonds (or equivalent).

C. Diamond Tooling for Polishing Concrete:

1. 800-grit resin-bonded diamonds (or equivalent).

2.7 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine floor to receive polished concrete floor finish.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Verify the Following for Concrete Floors:
1. Floor Finish:
 - a. Slabs and flatwork shall be placed and finished monolithically.
 - b. Strike off and screed slabs to true, plane surfaces at required elevations.
 - c. Thoroughly compact concrete with vibrators, floats, and tampers to force coarse aggregate below the surface.
 - d. Power trowel with no hand finishing.
 - e. Surface should not be burned or burnished due to excessive troweling.
 - f. Imprints are not acceptable.
 2. Floor and Joints:
 - a. Free of debris and excessive dirt, dust, clay, and mud.
 - b. Dry.
 3. Floor Surface Profile:
 - a. Floor Flatness Number (FF): 55.
 4. Concrete Curing: Minimum 8 days water cured or dissipating curing compound applied.
 5. Concrete Adjacent to Floor Penetrations: Troweled flat and level with surrounding concrete.

6. Concrete Adjacent to Drains, clean-outs, etc: Finish level to the top of the structure.

3.2 PREPARATION

- A. Protection: Protect surrounding areas and adjacent surfaces from the following:
 1. Minimal accumulation of dust from grinding and polishing.
 2. Contact with overspray of concrete densifier.
- B. Surface Preparation: Prepare surfaces in accordance with installer's instructions.
- C. Clean Surfaces: Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, and other surface contaminants which could adversely affect installation of polished concrete floor system.

3.3 INSTALLATION

- A. Install polished concrete floor system in accordance with installer's instructions at locations indicated on the Drawings.
- B. Polished Concrete Floor System:
 1. Preparation Step:
 - a. For exposure of standard aggregate: Open-up concrete to accept concrete densifier by grinding with 60-grit metal-bonded diamonds.
 2. Apply concrete densifier to deeply saturate floor.
 3. Remove residue of concrete densifier dried on floor surface by grinding with 80-grit metal-bonded diamonds.
 4. Floor Closure Polishing:
 - a. Remove 80-grit metal-bonded diamond scratches by grinding with 100-grit hybrid diamonds.
 - b. Remove 100-grit resin-bonded diamond scratches by grinding with 200-grit hybrid diamonds.
 - c. Remove 200-grit resin-bonded diamond scratches by grinding with 400-grit resin-bonded diamonds.
 - d. Remove 400-grit resin-bonded diamond scratches by grinding with 800-grit resin-bonded diamonds.
 - e. Apply protective sealer.

- f. High speed burnish protective sealer with diamond impregnated pad.

3.4 TESTING

- A. Test each concrete surface in accordance with ANSI/NFSI B101.3 to confirm compliance with performance criteria.

3.5 FIELD QUALITY CONTROL

- A. Inspect completed polished concrete floor system with Owner, Contractor, Architect, and Installer.
- B. Review procedures with Architect to correct unacceptable areas of completed polished concrete floor system.

3.6 PROTECTION

- A. Protect completed polished concrete floor system from damage until Substantial Completion.
 - 1. Do not allow vehicle and pedestrian traffic on unprotected floor.
 - 2. Do not allow construction materials, equipment, and tools on unprotected floor.
- B. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed polished concrete floor system.
- C. Repair damaged areas of completed polished concrete floor system to satisfaction of Architect.

3.7 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

END OF SECTION

SECTION 042000 - UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete Masonry Units (CMU).
- B. Installation Materials.

1.2 RELATED REQUIREMENTS

- A. 072100 - Thermal Insulation: For insulation components of masonry systems.
- B. 072500 - Weather Barriers: For components of masonry systems.
- C. 076200 - Sheet Metal Flashing and Trim: For sheet metal components of masonry systems.
- D. 079200 - Joint Sealants.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with Section 013100 - Project Management and Coordination.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.4 SUBMITTALS

- A. Qualification Data: For manufacturer, fabricator, and installer.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
 - 1. Include material properties and test reports substantiating compliance with project requirements.
 - 2. Size Variation Data: For block.
 - 3. Efflorescence Rating: In accordance with ASTM C67: For exposed brick.
 - 4. Durability: In accordance with ASTM C67; 50 cycles of freezing and thawing.
 - 5. Strength: provide data and calculations establishing average net-area compressive strength for masonry units used in structural assemblies.
 - 6. Steel reinforcing bars.

7. Joint reinforcement.
8. Anchors, ties, and metal accessories.
9. Cementitious Materials include:
 - a. Brand, type, and name of manufacturer.
 - b. Description of mix design and proportions of ingredients.
- C. Shop Drawings: Indicate required flashings, control joints, and expansion joints, sealing at openings, projections, and penetrations.
 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
 4. Detail Drawings: Submit elevation or overall drawings at 1/2 equal to 1 foot scale and detail drawings of a minimum 1-1/2 inch equal to 1 foot scale showing:
 - a. Bar splice locations.
 - b. Wall elevations exposed to view indicating the location of all cut masonry products.
 - c. Location and diagrams of all bent bars.
 - d. Wall dimensions, bar clearances, and all openings greater than one masonry unit in area.
 - e. Control joints.
- D. Samples: Full units to illustrate range of color and texture.
 1. Facing Block.
 2. Mortar.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods for cementitious materials and accessories.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Data: For user operation and maintenance of system including:

1. Methods for maintaining system's materials and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.
 1. Certified member in good standing with the Washington State Conference of Mason Contractors (WSCMC) or Mason Contractors Association of Oregon (MCAO).

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle material to avoid chipping, breakage, and contact with soil or contaminating materials.
- B. Do not ship facing units to site until Architect approves sample panel.
- C. Store masonry units in accordance with ASTM C90.
- D. Store moisture sensitive materials in dry, weathertight enclosures.

1.7 WARRANTY

- A. Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.

1.8 ENVIRONMENTAL CONDITIONS

- A. General: Conform to ASTM D1790 for hot and cold weather masonry construction.
- B. Hot Weather:
 1. Take the following precautions if masonry is erected when:
 - a. The ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent.
 - b. The ambient air temperature exceeds 90 degrees F and the wind velocity is more than 8 mph.
 2. Shade masonry materials from direct sunlight; spread mortar beds no more than 4 feet ahead of masonry; set masonry units within one minute of spreading mortar; and after erection, protect masonry from direct exposure to wind and sun for 48 hours.

C. Cold Weather:

1. Take the following precautions if masonry is erected when:
 - a. Ambient temperature or mean daily air temperature falls below 40 degrees F.
 - b. Temperature of masonry units is below 40 degrees F.
2. Provide supplemental heat to achieve required ambient temperature of air and materials.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Exterior assemblies of concrete masonry units including concrete masonry units and installation materials.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Follow details and specifications for size, layout, and grouting of structural unit masonry walls. Coordinate net-area compressive strength requirements with Architect.
 1. Determine net-area compressive strength as follows:
 - a. Unit Strength Method: Compressive strength of units and mortar per Tables 1 and 2 in ASTM D1790 / ASTM C1405 / TMS 402/602.
 - b. Prism Method: Test masonry prisms in accordance with ASTM C1314.

2.3 GENERAL

- A. Obtain masonry units from a single manufacturer for each type of unit used.
- B. Obtain cementitious materials from a single manufacturer for each type used.

2.4 CONCRETE MASONRY UNITS (CMU)

- A. Complying with ASTM C652.
- B. Compressive strength for each type of unit required per ASTM C140/C140M.
- C. Aggregates: Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units that comply with the following requirements when tested for stain-producing iron compounds in accordance with ASCE 6.
 1. By visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

- D. Slag: Comply with ASTM C989/C989M per project requirements.
- E. Cement: Low alkali content.
- F. Unit Sizes: As indicated. Standard units are nominally 4, 6, 8, 10, and 12 inches thick by 8 inches tall x 16 inches long.

2.5 CEMENTITIOUS MATERIALS

- A. Portland Cement: Complying with ASTM C150/C150M.
- B. Masonry Cement: Complying with ASTM C91/C91M.
- C. Sand: Complying with ASTM C144.
- D. Water: Clean, potable, and free from substances which could adversely affect the mortar.
- E. Fly Ash: Complying with ASTM C641, Class F.
 - 1. Cement-lime mortar: 40 percent maximum with type IP cement.
- F. Mortar Coloring: Colorant specifically made for use in masonry mortar.
 - 1. Added to the mortar used for exposed masonry surfaces to produce a uniform color.
 - 2. Quantity of pigment required to match approved samples.
- G. Cold Weather Accelerating Admixture: Complying with ASTM C494/C494M non-corrosive, containing less than 0.2 percent chlorides.
- H. Masonry Mortar: Complying with ASTM C270.
 - 1. Mortar Types: Conform to the proportion specification of ASTM C270.
 - a. Type M cement-lime mortar: 1 part cement, 1/4 part lime, and 3-3/4 parts aggregate.
 - 1) Average compressive strength at 28 days: Not be less than 2500 psi.
 - b. Type S cement-lime mortar: 1 part cement, 1/2 part lime, and 4-1/2 parts aggregate.
 - c. Type N cement-lime mortar: 1 part cement, 1 part lime, and 6 parts aggregate.
 - 2. Air-Content: When structural reinforcement is incorporated.
 - a. Cement-lime mortar: 12 percent maximum.
 - b. Masonry cement mortar: 18 percent maximum.

3. Admixture: Liquid, integral water-repellent, bond-enhancing admixture for masonry mortar.
 - a. Basis of Design: DRY-BLOCK Mortar Admixture by GCP Applied Technologies.

I. Grout:

1. General: Comply with ASTM C476, with minimum compressive strength of 2000 psi when tested in accordance with ASTM C1019.
 - a. Slump: 8 to 10 inches as measured by ASTM C143/C143M.
 - b. Grout Mix: Provide factory-blended hydraulic cement-based products containing the following minimum components:
 - 1) Portland cement or blended cement: ASTM C150/C150M Types I, IA, II, IIA, III or IIIA.
 - 2) Portland Cement or Blended Cement: ASTM C593 Types IS, IS(MS), IS-A, IS-A(MS), IP, or IP-A.
 - 3) Portland cement or Blended Cement: ASTM C595/C595M Types GU, HE, MS, or HS.
 - 4) Fly Ash: ASTM C618.
 - 5) Aggregate: ASTM C404.
 - 6) Water: Clean and free from deleterious acids, alkalies, and organic matter.
 - c. Coarse Grout: Adjust aggregate proportions as necessary to provide an evenly graded mix which will be easily pumped, with coarse aggregate content no greater than maximum specified in the proportion specifications of ASTM C476.
 - d. Grout Barriers for vertical cores: Made of fine mesh wire, fiberglass, or expanded metal.

J. Packaged Mortar Material:

1. Complying with ASTM C1142, Types RN, RS, and RM.
2. Exceeds performance of the field-mixed mortar design.

K. Packaged Dry Material for Grout for Masonry:

1. Complying with ASTM C476 with the addition of water only.
2. Exceeds performance of the field-mixed grout design.

2.6 ACCESSORIES

A. Metal Flashing:

1. Provide metal flashing, where flashing is exposed or partly exposed and where indicated, comply with Section 076200 – Sheet Metal Flashing and Trim and as follows:
 - a. Stainless Steel Thru-Wall Flashing (SS TWF): Stainless Steel, ASTM A240/A 240M, Type 304, No. 2D (Dull, cold rolled) finish, 0.016 inch (28 gauge) thick.
 - 1) Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
 - 2) Solder metal items at corners.

B. Ties and Anchors:

1. Provide wire or sheet metal ties and anchors that are made from materials that comply with one of the following:
 - a. Stainless-Steel Wire: AISI Type 304 or Type 316
 - b. Hot-Dip Galvanized, Carbon Steel Wire: ASTM A153/A153M, Class B-2
 - c. Epoxy Coated: ASTM C1157/C1157M Class C Epoxy, greater than 20 mils thick.
2. Wire Ties:
 - a. General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8 inch cover on outside face.
 - b. Wire: Fabricate from 3/16 inch minimum diameter wire.
 - c. Tie Section: Provide rectangular-shaped wire ties with closed ends not less than 4 inches wide, or provided triangular-shaped wire ties with outer ends bent to extend 2 inches parallel to face of veneer.
3. Adjustable Anchors:
 - a. Provide ties that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - b. Structural Performance Characteristics: Capable of withstanding specified building design loads in both tension and compression without deforming or developing play in excess of 1/16 inch.

- c. Type: Provide double eye-and-pintle type wire ties, or provide triangular wire ties with slotted sheet metal connector.
 - d. Adjustability: Ties adjustment: be limited to 1-1/4 inches.
- 4. Seismic Masonry-Veneer Ties:
 - a. Provide ties with a connector section designed to engage a continuous horizontal wire embedded in the veneer mortar joint.
- 5. Fasteners:
 - a. Provide mechanical fasteners to secure masonry ties to backup wall substrate.
 - b. Material: Provide fasteners of the same corrosion resistant material as masonry ties and anchors.
- C. Joint Reinforcement:
 - 1. Factory fabricated from steel wire conforming to ASTM A1064/A1064M, welded construction.
 - a. Tack welding will not be acceptable in reinforcement used for wall ties.
 - 1) Wire with a zinc coating conforming to ASTM A153/A153M, Class B-2.
 - 2) Wires with a minimum gauge per project requirements.
 - 3) Reinforcement: Ladder type design, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units.
 - 4) Joint reinforcement: Place a minimum of 5/8 inch cover from either face. The distance between cross wires will not exceed 16 inches. Furnish Joint reinforcement for straight runs in flat sections not less than 10 feet long.
 - 5) Joint reinforcement provide with factory formed corners and intersections.
- D. Bar Positioners:
 - 1. Use to prevent displacement of reinforcing bars during the course of construction.
 - 2. Provide factory fabricated from 9 gauge steel wire or equivalent, and coated with a hot-dip galvanized finish.
 - 3. Allow no more than one wire to cross the cell.
 - 4. Telescoping bar positioners: Manufactured from AISI 1065 spring steel and coated in accordance with ASTM B633.

E. Preformed Control Joints:

1. Rubber or PVC material. Provide with corner and tee accessories, fused joints Control Joint.

F. Expansion Joint Materials:

1. Backer rod and sealant adequate to accommodate joint compression equal to 50 percent of the width of the joint with backer rod of compressible type suitable to prevent three-sided adhesion. See Section 079200 - Joint Sealants.
2. Expansion Joint Material compression up to 50 percent; manufactured of closed cell neoprene conforming to ASTM D1056, RE41:
 - a. Adhesive on one side and 1/4 inch thick at Horizontal Joints.
 - b. No adhesive and 3/8 inches thick at Vertical Joints.

G. Sheet Metal Flashing:

1. See 076200 - Sheet Metal Flashing and Trim.

H. Weep Hole Ventilators:

1. Prefabricated plastic, blocking sized to form the proper size opening in head joints.
2. Provide aluminum and plastic inserts with grill or screen-type openings designed to allow the passage of moisture from cavities and to prevent the entrance of insects.
3. Ventilators: Size to match modular construction with a standard 3/8 inch mortar joint.

I. Cleaning Solution:

1. Non-acidic, not harmful to masonry work or adjacent materials.
2. Basis of Design: Sure Klean 600 Detergent by PROSOCO or a comparable product by one of the following:
 - a. Evonik Corporation.
 - b. Substitutions: See Section 016000 - Product Requirements.

J. Block Sealer and Anti Graffiti Coatings:

1. See Section 071900 - Water Repellents.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Clean substrate free of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 1/8 inch.
- B. Sandblast if necessary to remove laitance from pores and to expose the aggregate.
- C. Ensure that exterior sheathing and weather-resistive air barriers are installed and transitioned per the project documents prior to erecting masonry units.
- D. Do not compromise or otherwise harm the continuity of a continuous air and weather resistive barrier system specified in Section 072500 - Weather Barriers.
- E. Provide continuous semi-rigid or rigid insulation complying with Section 072100. Formwork fit tightly around penetrations and masonry anchors.
- F. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION - GENERAL

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Lay masonry units in the bond pattern per project requirements. Adjust each unit to its final position while mortar is still soft and plastic.
- C. Remove clean and re-lay units that have been disturbed after the mortar has stiffened, with fresh mortar. Keep free from mortar and other debris air spaces, cavities, chases, expansion joints, and spaces to be grouted.
- D. Select units used at the exposed masonry surface from those having the least amount of chipped edge or other imperfections detracting from the appearance of the finished work.
- E. Keep units being laid and surfaces to receive units free of water film and frost. Mortar for veneer wythes: Bevel and slope toward the center of the wythe from the cavity side.
- F. Shove units into place so that the vertical joints are tight.
- G. Completely fill vertical joints of brick and the vertical face shells of concrete masonry units with mortar, except where indicated at control, expansion, and isolation joints

- H. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted.
- I. Unfinished Work:
1. Step back unfinished work for joining with new work. Toothing may be resorted to only when specifically approved. Remove loose mortar and thoroughly clean the exposed joints before laying new work.
- J. Cutting and Fitting: Use full units of the proper size wherever possible. Use power masonry saws and skilled masonry mechanics for cutting and fitting, including that required to accommodate the work of others.
1. Concrete masonry units may be cut wet or dry.
 2. Dry wet cut units, before being placed in the work. Dry to the same surface-dry appearance as uncut units being laid.
 3. Cut edges clean, true, and sharp.
 4. Openings in the masonry: Make carefully so that wall plates, cover plates, or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints.
 5. Provide reinforced masonry lintels above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.
- K. Jointing: Tool joints when the mortar is thumbprint hard. Tool horizontal joints last. Brush joints to remove all loose and excess mortar. Mortar joints finishes:
1. Flush Joints:
 - a. Flush cut: Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas.
 - b. Make by cutting off the mortar flush with the face of the wall.
 - c. Use at joints in unparged masonry walls below grade.
 - d. Use for architectural units, such as fluted units. Completely fill both the head and bed joints.
 2. Tooled Joints (slightly concave):
 - a. Use at joints in exposed exterior and interior masonry surfaces.
 - b. Tool with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit.

- c. Perform so that the mortar is compressed and the joint surface is sealed.
 - d. Use a jointer of sufficient length to obtain a straight and true mortar joint.
- 3. Door and Window Frame Joints:
 - a. On the exposed interior side of exterior frames, rake to a depth of 3/8 inch, joints between frames and abutting masonry walls.
 - b. On the exterior side of the exterior frames, rake to a depth of 3/8 inch, joints between frames and abutting masonry walls.
- 4. Joints Between Dissimilar Materials:
 - a. Seal joints between masonry and dissimilar materials with backer rod and sealant, unless otherwise directed by EOR.
- 5. Joint Widths:
 - a. Brick joint widths are the difference between the actual and nominal dimensions of the brick in either height or length.
 - b. Brick expansion joint widths: As indicated.

L. Embedded Items:

- 1. Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar.
- 2. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses.
- 3. Fully embed anchors, ties and joint reinforcement in mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout.

M. Joint reinforcement:

- 1. Install joint reinforcement at 16 inches on center or as indicated. Lap reinforcement not less than 6 inches.
- 2. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement to provide not less than 5/8 inch cover to either face of the unit.

N. Expansion joints:

- 1. Provide joints subject to movement (seismic, thermal, shrinkage, etc.) as indicated.

2. Provide continuous vertical joints where designed for movement, including through bond beams.
3. In single wythe exterior masonry walls, provide open control joints with backer rod and sealant. Install sealant per Section 079200 - Joint Sealants.
4. Rake exposed interior control joints to a depth of 1/4 inch.
5. Cut concealed control joints flush.

O. Shelf Angles:

1. Provide hot-dipped galvanized shapes in conformance with ASTM A123/A123M.
2. Provide sections not longer than 10 feet with 1/4 inch gap between sections.
3. Miter and weld shelf angles at building corners with each angle not shorter than 4 feet, unless limited by wall configuration.
4. Adjust shelf angles as required to keep masonry level and at the proper elevation per drawings.

P. Lintels:

1. Masonry Lintels:

- a. Construct masonry lintels with lintel units filled solid with grout in all courses and reinforced with minimum two Number 4 bars in the bottom course unless otherwise indicated on the drawings.
- b. Extend lintel reinforcement beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater.
- c. Support reinforcing bars in place prior to grouting and locate 1/2 inch above the bottom inside surface of the lintel unit.

2. Precast Concrete and Steel Lintels:

- a. Construct precast concrete and steel lintels as shown on the drawings.
- b. Set lintels in a full bed of mortar with faces plumb and true.
- c. Steel and precast lintels: Provide a minimum bearing length indicated on the drawings.

3.4 ANCHORING MASONRY VENEERS

- A. General: Strictly conform to intervals and methods indicated.

1. Anchorage to Concrete: Use manufacturer's pre-engineered concrete fastener.
 2. Anchorage to Structural Steel: Use manufacturer's pre-engineered, self-tapping fastener. Ensure fastener penetrates through cross-section of steel member a minimum of 3/8 inch.
 3. Anchorage to Wood: Use anchor manufacturer's pre-engineered, self-drilling fastener. Ensure fastener engages into framing members / solid blocking square and at depth indicated.
- B. Spacing: Space anchors as indicated, but not more than:
1. Non-seismic:
 - a. 18 inches on center vertically and 32 inches on center horizontally, with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of all wall openings, and at intervals not exceeding 36 inches around the perimeter.
 2. Seismic:
 - a. 18 inches on center vertically and 24 inches on center horizontally, with not less than 1 anchor for each 2.0 sq. ft. of wall area. Install additional anchors within 12 inches of all wall openings, and at intervals not exceeding 24 inches around the perimeter.
- C. Position: Position ties to extend at least halfway through veneer but with at least 5/8 inch cover on outside face.

3.5 FIELD QUALITY CONTROL

- A. Testing:
1. Mortar Test: For each mix type required.
 - a. Compressive strength: ASTM C109/C109M.
 - b. Water retention: ASTM A899.
 - c. Air content: ASTM C91/C91M.
 2. Grout Test: Compressive strength for each mix required per ASTM C1019.
- B. Tolerances:
1. Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Square corners unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, lay masonry within the following tolerances.
 2. Variation from Plumb in the lines and surfaces of columns, walls, and arrises:

- a. In adjacent masonry units: 1/8 inch.
 - b. In 10 feet: 1/4 inch.
 - c. In 20 feet: 3/8 inch.
 - d. In 40 feet or more: 1/2 inch.
3. Variations from Plumb for external corners, expansion joints, and other conspicuous lines:
 - a. In 20 feet: 1/4 inch.
 - b. In 40 feet or more: 1/2 inch.
4. Variations from level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
 - a. In 20 feet: 1/4 inch.
 - b. In 40 feet or more: 1/2 inch.
5. Variation from level for bed joints and top surfaces of bearing walls:
 - a. In 10 feet: 1/4 inch.
 - b. In 40 feet or more: 1/2 inch.
6. Variations from horizontal lines:
 - a. In 10 feet: 1/4 inch.
 - b. In 20 feet: 3/8 inch.
 - c. In 40 feet or more: 1/2 inch.
7. Variations in cross sectional dimensions of columns and in thickness of walls:
 - a. Minus: 1/4 inch.
 - b. Plus: 1/2 inch.

3.6 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.
- B. Remove excess mortar and grout from surface units.

3.7 PROTECTION

- A. Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Communications and electrical room mounting boards.
- B. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS

- A. Structural Notes: For additional requirements.

1.3 SUBMITTALS

- A. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Provide miscellaneous rough carpentry items including fire retardant treated wood materials, preservative treated wood materials, roof-mounted curbs, miscellaneous wood nailers, furring, and grounds.

2.2 MATERIALS

- A. Lumber, General:
 - 1. Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee's (ALSC) Board of Review. Provide dressed lumber, S4S, with each piece factory marked with grade stamp of inspection agency.

B. Miscellaneous Lumber:

1. Provide No. 3 or Standard grade lumber of any species for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, and similar members.

2.3 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

B. Fasteners and Anchors:

1. Metal and Finish: Stainless steel for exterior, high humidity or preservative-treated wood locations, unfinished steel elsewhere.

C. Sill Flashing:

1. Sill Flashing: As specified in Section 076200 - Sheet Metal Flashing and Trim.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION - GENERAL

3.4 FRAMING INSTALLATION

- A. Refer to Structural drawings.

3.5 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific non-structural framing and blocking:
 - 1. Handrails.
 - 2. Grab bars.
 - 3. Towel and bath accessories.
 - 4. Wall paneling and trim.
 - 5. Joints of rigid wall coverings that occur between studs.

3.6 INSTALLATION OF CONSTRUCTION PANELS

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges provide solid edge blocking where joints occur between roof framing members.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
 - 1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches 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.
 - 4. Size: 48 by 96 inches, installed horizontally at ceiling height.

5. Size and Location: As indicated on drawings.
6. Paint all mounting boards. Leave one copy of fire treatment stamp visible (unpainted) for building inspector.

3.7 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.8 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.
- C. Dispose of all waste material in accordance with project's Waste Management Plan.

3.9 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

END OF SECTION

SECTION 061800 - GLUED-LAMINATED CONSTRUCTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Framing using structural glued-laminated timber.

1.2 RELATED REQUIREMENTS

- A. 061000 - Rough Carpentry: For dimension lumber items associated with structural glued-laminated timber.

1.3 DEFINITIONS

- A. Structural Glued-Laminated (Glulam) Timber: An engineered, stress-rated timber product assembled from selected and prepared wood laminations bonded together with adhesives and with the grain of the laminations approximately parallel longitudinally.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data on lumber, adhesives, fabrication, and protection.
 - 2. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 3. For connectors. Include installation instructions.
- B. Shop Drawings:
 - 1. Show layout of structural glued-laminated timber system and full dimensions of each member.
 - 2. Indicate species and laminating combination.
 - 3. Include large-scale details of connections.
- C. Samples: Full width and depth, 24 inches long, showing the range of variation to be expected in appearance of structural glued-laminated timber including variations due to specified treatment.
 - 1. Apply specified factory finish to three sides of half length of each Sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

- B. Material Certificates: For preservative-treated wood products, from manufacturer. Indicate type of preservative used and net amount of preservative retained.
- C. Research/Evaluation Reports: For structural glued-laminated timber and timber connectors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An AITC- or APA-EWS-licensed firm certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with provisions in AITC 111.
- B. Individually wrap members using plastic-coated paper covering with water-resistant seams.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Structural Performance: Structural glued-laminated timber and connectors shall withstand the effects of structural loads shown on Drawings without exceeding allowable design working stresses listed in AITC 117 or determined according to ASTM D3737 and acceptable to authorities having jurisdiction.

2.2 STRUCTURAL GLUED-LAMINATED TIMBER

- A. General: Provide structural glued-laminated timber that complies with the requirements listed in the General Structural Notes.
 - 1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that are not exposed in the completed Work.
 - 2. Provide structural glued-laminated timber made from single species.
 - 3. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
 - 4. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.
- B. Species and Grades for Structural Glued-Laminated Timber: See General Structural Notes.
- C. Species and Grades for Beams: See General Structural Notes.

D. Appearance Grade: Architectural, complying with AITC 110.

1. For Architectural appearance grades, fill voids as required by AITC 110.

2.3 PRESERVATIVE TREATMENT

A. Preservative Treatment: Where preservative-treated structural glued-laminated timber is indicated, comply with AWP A U1, Use Category 3B.

1. Use preservative solution without substances that might interfere with application of indicated finishes.
2. Do not incise structural glued-laminated timber or wood used to produce structural glued-laminated timber.

B. Preservative:

1. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.
2. Pentachlorophenol in light petroleum solvent.
3. Copper naphthenate in a light petroleum solvent.
4. Ammoniacal zinc copper arsenate (ACZA) in a water solution.
5. Chromated copper arsenate (CCA) in a water solution.
6. Ammoniacal copper quat Type A (ACQ-C) in a water solution.
7. Propiconazole tebuconazole imidacloprid (PTI) in a water emulsion.

C. After dressing members, apply a copper naphthenate field-treatment preservative to comply with AWP A M4 to surfaces cut to a depth of more than 1/16 inch.

2.4 TIMBER CONNECTORS

- A. See Structural Drawings and General Notes.
- B. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.
- C. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A123/A123M or ASTM A153/A153M.

2.5 MISCELLANEOUS MATERIALS

- A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

- B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.6 FABRICATION

- A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.
 - 1. Dress exposed surfaces as needed to remove planing and surfacing marks.
- B. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span unless otherwise noted on Structural Drawings.
- C. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with AWP A M4.
 - 1. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
 - 2. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
- D. End-Cut Sealing: Immediately after end cutting each member to final length and after preservative treatment, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.
- E. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit except for preservative-treated wood where treatment included a water repellent.

2.7 FACTORY FINISHING

- A. Wiped Stain Finish: Manufacturer's standard, dry-appearance, penetrating acrylic stain and sealer; oven dried and resistant to mildew and fungus.
 - 1. Color: As selected by Architect from manufacturer's full range.
- B. Clear Finish: Manufacturer's standard, two-coat, clear varnish finish; resistant to mildew and fungus.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates in areas to receive structural glued-laminated timber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
 - 1. Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with indicated finish.
- B. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.
- C. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing and finishing.
 - 1. Predrill for fasteners using timber connectors as templates.
 - 2. Finish exposed surfaces to remove planning or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
 - 3. Coat cross cuts with end sealer.
 - 4. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPAC M4.
 - a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
 - b. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
- D. Install timber connectors as indicated.
 - 1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
 - 2. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.

3.3 ADJUSTING

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

3.4 PROTECTION

- A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.
 - 1. Coordinate wrapping removal with finishing work. Retain wrapping where it can serve as a painting shield.
 - 2. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION

SECTION 062000 - FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finish carpentry materials.
- B. Wood roof deck soffit.
- C. Hardware.

1.2 RELATED REQUIREMENTS

- A. 061000 - Rough Carpentry: for additional carpentry items.
- B. 09 90 00 - Painting and Coating: for field finish of finish carpentry items.

1.3 SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Data:
 - 1. Provide instructions for attachment hardware and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS) Architectural Woodwork Standards.
- D. Sample: Submit three samples of each type of wood exposed to view, 11 inches by width of board (or 8 inches max) inch in size illustrating wood grain and specified finish.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - 2. Single Source Responsibility: Provide and install this work from single fabricator.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the Quality Certification Program for installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Wood frames, dimensional lumber and plywood, wall base, and other wood trim, moldings, bases, casings, and miscellaneous trim for doors, glazed lights, windowsills, loose shelving. Carpentry items shop fabricated and finished in accordance with AWI/AWMAC/WI (AWS) Architectural Woodwork Standards.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Finish Carpentry Items:
 - 1. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) Architectural Woodwork Standards for Custom Grade.
 - a. Typical: Custom Quality.

2.3 MATERIALS

- A. Interior Woodwork Items:
 - 1. Wood Base Trim, Interior Window Sills, Moldings, Casings, and Miscellaneous Trim.
 - a. Species and Finish: White Oak.
 - b. Profiles: As indicated in drawings.
 - c. Finish: Painted in accordance with Section 09 90 00 - Painting and Coating.
- B. Lumber Materials:
 - 1. Softwood Lumber: fir species, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
- C. Sheet Materials:
 - 1. Softwood Plywood Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B; glue type as recommended for application.
 - 2. Softwood Plywood Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B; glue type as recommended for application.

D. Shop Finishing:

1. Sand work smooth and set exposed nails and screws.
2. Apply wood filler in exposed nail and screw indentations.
3. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
4. Finish work in accordance with AWI/AWMAC/WI (AWS) Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
 - a. Transparent:
 - 1) Stain: As selected by Architect.
 - b. Opaque:
 - 1) Color: As selected by Architect.
5. Back prime woodwork items to be field finished, prior to installation.

E. WOOD ROOF DECKING SOFFIT

1. Decking: Tongue and Groove Roof Decking.
 - a. Features:
 - 1) Species: Pine.
 - 2) Thickness: 2 or 3 inch depending on span.
 - 3) Coverage: 6 inches.
 - 4) Attachment: Toenailed through the tongue and face nailed in accordance with American Wood Council recommendations.
 - 5) Length: Maximum length to minimize butt joints.
 - 6) Typical Vertical Joint: 5/8 inch.
 - 7) Typical Horizontal Joint: 5/8 inch.
 - 8) Finish: Stain to match Architect's sample in accordance with Section 09 90 00 - Painting and Coating.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Soffit Vent: Sized as required to ventilate soffit area. Color: Black.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the requirements of the quality standard specified before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with quality standard specified.

3.3 INSTALLATION

- A. General: Install all materials in accordance with quality standard specified based on conditions present.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut to fit adjoining work. Refinish and seal cuts as recommended by quality standard.
 - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32 inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Install stairs with no more than 3/16 inch variation between adjacent treads and risers and with no more than 3/8 inch variation between largest and smallest treads and risers within each flight.
- C. Install with trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

3.4 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

- A. Protect installed work as required by the quality standard to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 070805 - AIR BARRIER SYSTEM REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes administrative and procedural requirements for accomplishing an airtight building enclosure that controls infiltration or exfiltration of air.
 - 1. The airtight components of the building enclosure and the joints, junctures and transitions between materials, products, and assemblies forming the air-tightness of the building enclosure are called "the air barrier system." Services include coordination between the trades, the proper scheduling and sequencing of the work, preconstruction meetings, and related actions, including reports performed by Contractor and by governing authorities. They do not include contract enforcement activities performed by Architect.
 - 2. The Contractor shall ensure that the intent of constructing the building enclosure with a continuous air barrier system to control air leakage into, or out of the conditioned space is achieved. The air barrier system shall have the following characteristics:
 - a. It must be continuous, with all joints sealed.
 - b. It must be structurally supported to withstand positive and negative air pressures applied to the building enclosure.
 - c. Connection shall be made between:
 - 1) Foundation and walls.
 - 2) Walls and windows or doors.
 - 3) Different wall systems.
 - 4) Wall and roof.
 - 5) Walls to utility, pipe and duct penetrations.
 - 3. Air Barrier Penetrations: All penetrations of the air barrier and paths of air infiltration / exfiltration shall be sealed.
- B. Requirements of this section relate to the coordination between subcontractors required to provide an airtight building enclosure, customized fabrication and installation procedures, not production of standard products.
 - 1. Continuity of the air barrier materials and products with joints to provide assemblies.
 - 2. Continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.
 - 3. Specific quality-control requirements for individual construction activities are specified in the sections of the specifications. Requirements in those sections may also cover

production of standard products. It is the Contractor's responsibility to ensure that each subcontractor is adequately and satisfactorily performing the quality assurance documentation, tests and procedures required by each section.

4. Requirements for Contractor to provide an airtight building enclosure is not limited by quality-control services required by Architect, Owner, or authorities having jurisdiction and are not limited by provisions of this section.

C. Related Requirements:

1. Section 013100 "Project Management and Coordination" for pre-installation meeting requirements.
2. Section 014000 "Quality Requirements" for coordination with other quality requirements.
3. Section 061600 "Sheathing" for coordination with substrate.
4. Section 072100 "Thermal Insulation" for coordination with exterior envelope insulation.
5. Section 072500 "Weather Barriers" for coordination the weather-resistant-barrier / air barrier products and installation.
6. Section 079200 "Joint Sealants" for coordination of sealants at exterior envelope openings.
7. Section 081113 "Hollow Metal Doors and Frames," Section 084113 "Aluminum-Framed Storefronts," and Section 089119 "Fixed Louvers" for coordination with exterior envelope openings.

1.3 RESPONSIBILITIES

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide coordination of the trades, and the sequence of construction to ensure continuity of the air barrier system joints, junctures and transitions between materials and assemblies of materials and products, from substructure to walls to roof. Provide quality assurance procedures as specified herein.

1. Organize preconstruction meetings between the trades involved in the whole building's air barrier system to discuss where each trade begins and ends and the responsibility and sequence of installation of all the air-tight joints, junctures, and transitions between materials, products and assemblies of products specified in the different sections, to be installed by the different trades.

1.4 PERFORMANCE REQUIREMENTS

A. Compliance:

1. Materials: Materials used for the air barrier system in the opaque envelope shall have an air permeance not to exceed 0.004 cfm/ft² under a pressure differential of 0.3 in. water (1.57psf) when tested in accordance with ASTM E 2178.
2. New Construction: The air leakage of the new construction shall not exceed 0.17 cfm/ft² under a pressure differential of 0.3 in. water (1.57psf) when tested according to ASTM E 779.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 014100

SECTION 070810 – COMMISSIONING OF AIR BARRIER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for air barrier testing and air leak mitigation.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide air barrier testing and air leak mitigation services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Section 013100 "Project Management and Coordination" for coordination of testing and inspections with other construction activities.
 - 2. Section 014000 "Quality Requirements" for coordination with other quality requirements.
 - 3. Section 014100 "The Air Barrier System" for administrative and procedural requirements for accomplishing an airtight building enclosure that controls infiltration or exfiltration of air.
 - 4. Divisions 02 through 33 Sections for specific envelope components and for specific test and inspection requirements not listed herein.

1.3 DEFINITIONS

- A. Air Barrier Testing: Tests and inspections that are performed on-site for installation of the Work and for the completed Work.
- B. Air Leak Mitigation: Corrective actions to be taken by the Contractor to correct air-leakage issues, ensuring envelope meets testing criteria.
- C. Testing Agency: A prequalified air barrier testing entity engaged by the Contractor to perform specific tests, inspections, or both.

1.4 REFERENCE STANDARDS

- A. 2018 Washington State Energy Code, Commercial Provisions.
- B. ASTM E779 – Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
- C. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).
- D. ASTM E1186 – Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
- E. ASTM E1677 - Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls; 2011.
- F. ASTM E1827 – Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door.
- G. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2011.
- H. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2011.

1.5 CONFLICTING REQUIREMENTS

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

1.6 SUBMITTALS

- A. Qualification Data: Testing Agency and testing personnel qualifications conforming to or exceeding specified qualifications.
- B. Testing Plan and Procedures: Include a complete set of report forms and sample documentation conforming to ASTM E779 procedures.
- C. Test report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates for submittal to the building Owner and Authority Having Jurisdiction.
- D. Corrective Action report identifying leakage areas and corrective actions taken to correct the leaks.

1.7 ADMINISTRATIVE REQUIREMENTS

- A. Coordination with work of other Sections for following:
 - 1. Cooperate with testing and inspection agency.

2. Prepare building for testing and maintain testing conditions until testing completion.
3. Notify testing agency minimum 1 week prior to testing to allow time for assignment of personnel and scheduling of tests following installation of air tight transitions between air barrier wall assemblies, air barrier wall components, and roofing assemblies.

B. Pre-installation Meeting:

1. Attendance: Contractor, Commissioning Authority, installer, Owner, Architect, air barrier manufacturer's representative, designated testing agency, installers representing related work, and those requested to attend.
2. Meeting Time: Minimum 3 weeks prior to beginning work of this Section and work of related Sections affecting work of this Section.
3. Location: Project Site.
4. Agenda:
 - a. Review of installation procedures and sequencing of work.
 - b. Responsibilities at transitions between air barrier assemblies and components.
 - c. Procedures for preparation and conducting air leakage testing.
 - d. Orifice blower door pressurization testing.
 - e. Closing and sealing of windows, doors, ducts, plenums, and building areas of separation.

C. Sequencing and Scheduling: Conform to Section 013100 "Project Management and Coordination" to meet Critical Path of Construction Progress Schedule:

1. Sequence, and schedule construction activities to allow testing and inspections to proceed without interruption or conditions resulting in inconclusive results.
2. Arrange time period for conducting air barrier testing after penetrations of air barrier system are complete and prior to covering and becoming inaccessible due to subsequent construction.

D. Test Day: Close building access to non-testing personnel and suspend all construction activities on the day testing is to be performed to allow unimpeded air leakage testing.

1.8 QUALITY ASSURANCE

- A. Air Barrier Testing Agency: Contractor will hire a qualified firm and operator to perform testing and investigations of whole building envelope prior to closing off access to completed building air barrier system.
1. Specializing in work of this Section. Minimum 5 years demonstrated and documented experience testing to determine air leakage of air barrier assembly to ASTM E779.

1.9 QUALITY CONTROL

- A. Contractor Responsibilities: Air Barrier tests and inspections and air leak mitigation are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Prepare the building for specified testing in advance of the testing agency being on site per the direction of the testing agency.
 2. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 3. Engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 4. Submit a certified written report, in duplicate, of all air barrier testing.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Retesting/Re-inspecting: Provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- C. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which tests will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit electronically a PDF file of the certified written report of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- D. Associated Services: Cooperate with testing agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections, including access to power and water as necessary to perform specified testing.
 3. Security and protection for testing and inspecting equipment at Project site.
- E. Coordination: Coordinate sequence of activities to accommodate required testing services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

- F. Schedule of Tests and Inspections: Per Section 014000 "Quality Requirements.

1.10 FIELD CONDITIONS

- A. Ambient Conditions: Perform testing during conditions of calm winds to increase precision of test results.
1. Wind Velocity: Maximum 10 mph (4.47 m/s).
 2. Do not test in conditions where pressure gradients at building envelop caused by interior/exterior temperature differences, wind speed, and solar exposure are impractical for obtaining precise test results.
 3. Do not perform testing during periods of measurable precipitation to prevent moisture from sealing air leakage pathways or pressure tubes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. Allana, Buick and Bers, Inc. Tel (206) 443-6499
- B. Intertek, Tel (253) 395-5656
- C. Neudorfer Engineers, Inc. Tel (206) 621-1810
- D. NEXUS bec, Inc., Tel (253) 625-7090
- E. Soloveda, Tel (206) 793-0046
- F. Or approved substitute during the bid process per Division 00 Specification Section "Instructions to Bidders" and Division 01 Specification Section "Substitution Procedures".

3.2 TESTING LOCATIONS

- A. Testing shall be required in areas where the scope includes air barriers, such as but not limited to:
1. Enclosed portions of Building A.
- B. Testing may be removed from scope only at the Owner's request and with the approval of the AHJ.

3.3 EXAMINATION

- A. Verify conditions as satisfactory to receive work of this Section before beginning.

- B. Verify that continuous air barrier system at building envelope is complete and building is ready for air leakage testing procedures.

3.4 PREPARATION

- A. Intentional Exterior Air Barrier Penetrations: Seal intentional openings and penetrations of building envelope using air-tight films, by closing dampers in locked position, and by using means necessary to limit testing results to that of exterior air barrier system. Include:
 - 1. Air intake and exhaust louvers.
 - 2. Make-up air intakes.
 - 3. Pressure relief dampers and louvers.
 - 4. Exhaust vent dampers.
- B. Exterior Windows and Doors (Fenestrations): Close and lock. Do not seal using additional means of isolation.
- C. Plumbing Traps: Fill with water.
- D. HVAC System and Combustion Equipment: Shut down or disable for duration of test. Place combustion equipment in pilot position.
- E. Interior Doors and Other Fenestrations: Secure in open position during testing for each zone.
 - 1. Exceptions:
 - a. Interior doors that access interior spaces within a single zone may remain closed as long as an air barrier boundary separates tested zone from other zones not being tested.
 - b. Where doorways cannot be opened, measure pressure, using an under door probe, to verify that room on other side of door is within 10 percent of average building pressure when orifice blower door fan is in operation.
- F. Buildings with Dropped Ceiling Plenums: Remove ceiling panels at rate of one at each 500 square foot area.
 - 1. Inspect for potential air leakage from dropped ceilings, plenums, and seal sources of air leakage into tested zone from other zones.
 - 2. Remove additional ceiling panels at discretion of testing agency as necessary to achieve uniform pressure distribution within plenum space.
 - 3. When conducting thermal imaging, where practical, test prior to ceiling panel installation.
- G. Building Access: Prevent non-testing personnel access to and from building during testing.
- H. Building Test Conditions: Do not alter during testing.

3.5 AIR LEAKAGE TESTING

- A. Conform to NEBB Procedural Standards and requirements of the 2015 Washington State Energy Code, Commercial Provisions.

B. Fan Pressurization or Orifice Blower Door Testing:

1. Conduct in conformance to ASTM E779.
2. Leakage rate shall not exceed 0.17 cfm/sf at a pressure differential of 0.3 inches water gauge (75 Pa).

C. Compile and submit air leakage report to the Owner and authorities having jurisdiction prior to obtaining occupancy permit.

3.6 ADJUSTING

A. If air barrier testing does not meet the criteria of Fan Pressurization and/or Orifice Blower Door Testing, contractor shall perform the following air leak mitigation services:

1. Conduct a visual inspection using infrared thermography, smoke testing or other means as the testing Agency deems necessary of the air barrier to identify source(s) of leakage.
2. Provide a written report of potential sources of leakage and associated corrective actions to repair leaks then review with Owner, Commissioning Authority, and Architect.
3. Take corrective actions to seal the identified air leaks as approved by Architect.
4. Upon completion of repairs, provide a Corrective Action Report indicating sources of leaks and corrective action taken. Submit to Owner and Code Official.
5. Retest as necessary after corrective work is completed so as not to exceed allowable whole building leakage rates per 2018 WSEC Commercial Provisions.

END OF SECTION 014554

SECTION 071900 - WATER REPELLENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water Repellent and Anti-Graffiti Coating.

1.2 RELATED REQUIREMENTS

- A. 079200 - Joint Sealants.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with City of Everett Special Provisions.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.
 - 2. Manufacturer's representative's attendance for mockup and preinstallation conference is required.

1.4 SUBMITTALS

- A. Qualification Data: For manufacturer and installer.
- B. Product Data: Provide product description, details of tests performed, limitations, and chemical composition.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations. Email report to Architect the same day as inspection occurs; mail report on manufacturer's letterhead to Architect within 2 days after inspection.
- F. Field testing: Test surfaces with RILEM tube at:
 - 1. Center of masonry unit.
 - 2. Mortar joint between units.
- G. Installer's Qualifications: Submit documentation that proposed installer meets specified requirements.

- H. Mockup Summary: Include summary of components, assemblies, and accessories to be reviewed. Include schedule and location where mockup will be available for review. Include approval or corrections summaries until mockup is approved.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project. Confirm compatibility with cleaning materials and adjacent sealants.
 - 1. Refer to City of Everett Special Provisions, for additional provisions.
 - 2. Extra Anti-Graffiti Material: 2 gallons of the type installed.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.
- C. Owner reserves the right to provide continuous independent inspection of surface preparation and application of water repellent.
- D. Provide compatible water repellent and anti-graffiti coatings by same manufacturer.

1.6 MOCKUP

- A. Prepare a representative surface 36 by 36 inch in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mockup constitutes standard for workmanship.
- B. For proposed substitutions, prepare side-by-side mockups of specified and substitute products.
- C. Locate where directed.
- D. Test using RILEM tube test method described in Field Quality Control.
- E. Approved mockup may remain as part of the Work.

1.7 FIELD CONDITIONS

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.
- C. Do not apply water repellents when wind velocity is higher than 5 mph.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Water Repellent and Anti Graffiti Coating: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.

2.2 WATER REPELLENT AND ANTI GRAFFITI COATING

- A. Water Repellent & Anti-Graffiti Coating for Porous Masonry: Clear-drying, water-based silicone emulsion for weatherproofing concrete block and other porous masonry materials including interior and exterior masonry surfaces.
 - 1. Basis of Design: Prosoco Sure Klean® Weather Seal Blok-Guard® & Graffiti Control WB 1.
 - a. VOC Content: Less than 600 g/L, Low Solids Coating. Complies with all known federal, state and district AIM VOC Standards.
 - b. Specific Gravity: 0.81
 - c. Weight: 6.77 lbs/gal
 - d. Graffiti Removal Product: Prosoco Defacer Eraser® Graffiti Wipe.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.2 PREPARATION

- A. Protection of Adjacent Work:
 - 1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
 - 2. Protect adjacent surfaces not intended to receive water repellent such as weep holes at through wall flashing locations and sealant joint locations.
- B. Prepare surfaces to be coated as recommended by water repellent and anti-graffiti coating manufacturer for best results.

- C. Do not start work until masonry mortar and concrete substrate is cured a minimum of 60 days.
- D. Remove loose particles and foreign matter.
- E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.
- F. Scrub and rinse surfaces with water and let dry.
- G. Acid etch smooth concrete surfaces to be coated, using procedures described in Master Painters Institute Architectural Painting Specifications Manual; match approved mockup.
- H. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.3 APPLICATION

- A. Apply anti-graffiti coating on all masonry surfaces within 20 feet of grade and other horizontal public occupied surfaces.
- B. Apply at rate recommended by manufacturer, continuously over entire surface.
- C. Apply two coats, minimum.
- D. Provide manufacturer's field service representative to inspect preparation and application work for at least 3 hours on first day to ensure that manufacturer's "best practices" for preparation and application are being followed.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's representative's attendance for mockup and preinstallation conference is required.
- B. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.
- C. Field testing:
 - 1. Equipment: Vertical and Horizontal RILIM tubes, and putty are available at <http://www.prginc.com/>.

2. Procedure: The testing apparatus is affixed by interposing a tape of putty between the flat, circular brim of the pipe and the surface of the masonry material. To ensure adhesion, manual pressure is exerted on the cylinder. Water is then added through the upper, open end of the pipe until the column reaches the 0 gradation mark. The quantity of water absorbed by the material during a specified period of time is read directly from the graduated tube. The periods of time appropriate for the test depend on the porosity of the material on which the measurement is being made; generally 5, 10, 15, 20, 30 and 60 minute intervals provide the most useful data. Measure water absorption through the mortar joint as well as through the surface of the substrate.
3. Report: Results of the test measurements are presented in the form of a water absorption graph with the volume of water absorbed in cubic centimeters reported as a function of time in minutes. The masonry surface tested must be mentioned in the report.
4. Perform 3 tests on each surface coated and 3 at mortar joints in each type of masonry unit.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Foam board insulation.
- B. Fiber board insulation.
- C. Fiber batt insulation.
- D. Foam detailing insulation.

1.2 RELATED REQUIREMENTS

- A. 092116 - Gypsum Board Assemblies: For acoustic insulation installed as a component of assemblies.

1.3 SUBMITTALS

- A. Qualification Data: For installer, manufacturer, and design engineer.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Shop Drawings: Indicate required flashings, control joints, and expansion joints, and sealing details at openings, projections, penetrations, and sleeves to maintain continuous thermal barrier.
- D. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
 - 1. Include recommended fastening components and spacing to control sag.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Foam board, fiber board, batt and low expansion detailing foam thermal insulation.

2.2 FOAM BOARD INSULATION

- A. Extruded Polystyrene Board Insulation: ASTM C578, Type X.

1. Basis of Design: Styrofoam by Dow.
2. Performance Criteria:
 - a. Complies with fire-resistance requirements as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285 in cladding systems matching project.
 - b. Water Absorption: 4 percent by volume, maximum, when tested in accordance with ASTM D2842.
 - c. Water Vapor Transmission: 1.5 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
 - d. Board Density: 1.3 lb/cu ft.
 - e. Compressive Resistance: 15 psi.
 - f. Thermal Conductivity (k factor) at 25 degrees F: 0.28.
 - g. Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 5.4.
3. Features:
 - a. Board Size: 48 x 96 inches.
 - b. Board Thickness: 1-1/2 inches.
 - c. Board Edges: Square.
4. Location: Foundation surfaces & Below Grade insulation.

- B. Polyisocyanurate Board Insulation:

1. Rigid cellular foam, complying with ASTM C1289.
2. Basis of Design:
 - a. ECOMAXci by Rmax.

- b. Thermax by Dow.
- c. Product warranted by roofing manufacturer as component of their system.
- 3. Performance Criteria:
 - a. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - b. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - c. Complies with fire-resistance requirements as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285 in cladding systems matching project.
 - d. Water Absorption: <1 percent by volume, maximum, when tested in accordance with ASTM C209.
 - e. Water Vapor Transmission: <0.3 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
 - f. Board Density: 2 lb/cu ft.
 - g. Compressive Resistance: 25 psi.
 - h. Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 6.5.
- 4. Location: Continuous Roof Insulation.

2.3 FIBER BOARD INSULATION

A. Mineral Fiber Board Insulation:

- 1. Rigid mineral fiber, ASTM C612.
- 2. Basis of Design:
 - a. CavityRock DD by ROCKWOOL.
 - b. Rainbarrier 45 by Thermafiber.
- 3. Performance Criteria:
 - a. Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
 - b. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - c. Rated Non-combustible per NFPA 220 in accordance with ASTM E136.

- d. Water Absorption: 0.03 percent by volume, maximum, when tested in accordance with ASTM C1104/C1104M.
 - e. Water Vapor Transmission: 50 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
 - f. Board Density: 4.5 lb/cu ft.
 - g. Compressive Resistance: 25 psi.
 - h. Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 4.2.
 - 4. Features:
 - a. Board Thickness: 2.5 inches.
 - b. Installation: Glue or friction fit between z-clips; no stick pin through fastening.
 - 5. Location: Exterior wall insulation.
- B. Acoustical board insulation:
- 1. Rigid glass fiber, ASTM C612.
 - 2. Basis of Design Product: SelectSound Black Acoustic Board by Owens Corning.
 - 3. Performance Criteria:
 - a. Facing: Black non-woven mat.
 - b. Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
 - c. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - d. Water Absorption: <5 percent by weight, maximum, when tested in accordance with ASTM C209
 - e. Water Vapor Transmission: <0.3 perms when tested in accordance with ASTM E96/E96M based on 1 inch thickness.
 - f. Board Density: 3 lb/cu ft.
 - g. Compressive Resistance: 25 psi.
 - 4. Features:
 - a. Color: Black with no markings on face.

- b. Board Thickness: Range of 1-2 inches.

2.4 FIBER BATT INSULATION

- A. Mineral Fiber Batt Insulation (Sound Batt Insulation): Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Performance Criteria:
 - a. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
 - b. Manufactured with binder containing no added urea formaldehyde.
 - c. Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
 - d. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - e. Thermal Resistance (R Value) at 40 degrees F/inch of thickness: 3.1.
 - 2. Features:
 - a. Formaldehyde Free.
 - 3. Location: All Interior walls & exterior fiber cement siding and CMU veneer.

2.5 FOAM DETAILING INSULATION

- A. Low expansion foam complying with AAMA 812.
- B. Basis of Design: Froth Pak by Dow Chemical.
- C. Performance Criteria:
 - 1. Two-component closed-cell urethane foam with low-expansion pressure, 10 percent flexibility, and 1.75 to 2.0 lb/cu ft, suitable for installation adjacent to fenestration.
- D. Location: Exterior stud wall cavities.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Sheet Vapor Retarder: Specified in Section 072500 - Weather Barriers.

- C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 072500 - WEATHER BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Self-adhered weather barrier sheet.
- B. Liquid-applied weather barrier coating.
- C. Reinforced polyethylene vapor retarders.
- D. Flexible flashings.
- E. Air barrier/vapor retarder.

1.2 RELATED REQUIREMENTS

- A. 072100 - Thermal Insulation: Vapor retarder and air barrier components installed in conjunction with insulation.
- B. 076200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.3 DEFINITIONS

- A. Weather Barrier: Assemblies that form water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: 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.
- C. Vapor Retarder: 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.
- D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.4 SUBMITTALS

- A. Qualification Data: For manufacturer and installer.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C. Shop Drawings: Indicate extents, special joint or termination conditions, and conditions of interface with other materials. Indicate line of continuous air barrier at building exterior.

- D. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of air barrier system installation.
- E. Test Report: Submit report of full-size mockup test for NFPA 285 fire performance.
- F. Field test results.
- G. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, perimeter conditions requiring special attention, and storage and handling criteria.
- H. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience with local product representation available to review product installation.
- B. Installer Qualifications: Company specializing in performing the work of this section, using specified materials with minimum 5 years of experience on projects of similar size and complexity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A. Manufacturer's warranty for air barrier for a period of ten (10) years from date of Purchase.
 - 1. Preinstallation meeting and jobsite observations by air barrier manufacturer may be required for specified warranty.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Components of vapor retarder and air barrier assemblies under opaque cladding; including liquid, sheet, and flexible transition flashings.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Air Permeability:

1. The system: Air permeability not to exceed 0.04 cfm/sq ft under a pressure differential listed, when tested per ASTM E2357

B. Air Infiltration: 0.004 cfm/sq ft maximum per ASTM E283.

2.3 SELF-ADHERED WEATHER BARRIER SHEET

A. (WRB) Weather Resistant Barrier Membrane

1. Basis of Design: VaproShield; WrapFlashing SA.
2. Other Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Henry Company; Henry Blueskin VP160.
 - b. Soprema; SOPRASEAL Stick VP (Field-cut).
 - c. Or approved substitute during the bid process per Division 00 Specification Section "Instructions to Bidders" and Division 01 Specification Section "Substitution Procedures".
3. Locations: For use in conjunction with weather resistant barrier at all wall openings, such as doors, windows, louvers, and other penetrations, as detailed.

B. (WRBPS) Weather Resistant Barrier PreStrip

1. Basis of Design: VaproShield; WrapFlashing SA.
2. Other Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Henry Company; Henry Blueskin VP160.
 - b. Soprema; SOPRASEAL Stick VP (Field-cut).
 - c. Or approved substitute during the bid process per Division 00 Specification Section "Instructions to Bidders" and Division 01 Specification Section "Substitution Procedures".
3. Locations: For use in conjunction with weather resistant barrier at all wall openings, such as doors, windows, louvers, and other penetrations, as detailed.

C. Features:

1. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 6 months weather exposure.

2. Color: To be selected by Architect from manufacturer's full range.

2.4 LIQUID APPLIED WEATHER BARRIER COATING

A. (FAWP) Specification is based on Vaproshield Liqui-flash.

B. Performance Criteria:

1. Air Permeance: Pass: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
2. Water Vapor Permeance: 15 perms, minimum, when tested in accordance with ASTM E96/E96M.

C. Features:

1. Material Thickness: 12-15 mils as recommended by manufacturer to attain the performance criteria specified over the substrates present.
2. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for ultraviolet and weather exposure.

2.5 REINFORCED-POLYETHYLENE VAPOR RETARDERS

A. (VRM) Vapor Retarder Membrane: Interior Polyamide Vapor Retarders: 2-mil thick film of polyamide (nylon).

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. CertainTeed (Saint-Globain); MemBrain Vapor Retarder.
 - b. Or approved substitute during the bid process per Division 00 Specification Section "Instructions to Bidders" and Division 01 Specification Section "Substitution Procedures".
2. Characteristics:
 - a. Applicable Codes: Complies with ICC, CCMC 13278-R, and CAN/ULC-S102.
 - b. Material Standards: Complies with ASTM C665 Section 7.4, Water Vapor Permeance, and ASTM E96/E96M.
 - c. Fire Resistance: Complies with ASTM E84 surface burning characteristics; Maximum flame spread index of 20, and Maximum smoke developed index of 55.

- d. Water Vapor Permeance: Less than or equal to 1.0 perm, ASTM E96/E96M, Desiccant method.
3. Locations for Use: For general use at exterior walls and ceilings, except where another type is required to meet code.

2.6 FLEXIBLE FLASHINGS

- A. (SAM) Self-Adhering Flexible Flashing: SBS-modified bituminous sheet membrane, 30 mil minimum thickness, laminated to a cross-laminated polyethylene film, in factory cut widths.
 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Flashing product recommended by weather barrier manufacturer.
 - b. Vaprotape by Vaproshield.
 - c. W.R. Grace & Company Perm-A-Barrier Detail Membrane.
 - d. Henry; Blueskin SA.
 - e. Tremco, Inc.; ExoAir 110/110LT.
- B. (FFSAM) Foil-faced self-adhered flashing: SBS-modified or butyl based bituminous sheet membrane, 30-40 mil thickness, integrally laminated to a glass scrim reinforced aluminum foil, in factory cut widths.
 1. Flashing product recommended by weather barrier manufacturer.
 2. Protecto Wrap PS45.
 3. Henry Blueskin Metal Clad
- C. (TWF) Thru-Wall Flashing: Rubberized-Asphalt composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (40 mils).
 1. Products: Subject to compliance with requirements, provide one of the following products:
 - a. Carlisle CCW-705-TWF Thru-Wall Flashing.
 - b. GCP; Perm-A-Barrier Wall Flashing.
 - c. Henry Blueskin TWF Self-Adhesive Thru-Wall Flashing Membrane.

- d. Or approved substitute during the bid process per Division 00 Specification Section "Instructions for Bidders" and Division 01 Specification Section "Substitution Procedures".
- D. (HTSAM) High Temperature Self-Adhering Membrane Flashing: Meeting AAMA 711 specification for heat exposure range Level 3 Service temperature over 176 degrees: Butyl based bituminous sheet membrane, 30-40 mil thickness, laminated to a cross-laminated polyethylene film, in factory cut widths. One of the following:
 - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Blueskin PE 200HT by Henry Company.
 - b. CCW-705 HT by Carlisle Coatings & Waterproofing Inc.
 - c. Lastobond Shield HT by Soprema Inc.
- E. Liquid Mastic: Liquid mastic recommended by flashing manufacturer.
- F. Primers, Cleaners, Insulation Adhesive, Joint Compound, and Sealant Materials: As recommended by air barrier manufacturer, appropriate to application, and compatible with adjacent materials.

2.7 AIR BARRIER/ VAPOR RETARDER

- A. Interium Roofing: Self-Adhering-Sheet Air Barrier/Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40 mil- total thickness; maximum permeance rating of 0.1 perm; cold-applied, with slip-resisting surface and release paper backing. Provide primer when recommended by air barrier/vapor retarder manufacturer.
 - 1. Basis of Design: Sika Sarnafil; SA 31 Vapor Retarder.

2.8 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Liquid Flashing Membrane:
 - 1. At locations recommended by air and water-resistant membrane manufacturer.
- C. Primer:
 - 1. Liquid waterborne or solvent-borne primer recommended for substrate by air and water barrier material manufacturer.

D. Counter-flashing and Transition Strips:

1. Modified bituminous or butyl based, 40-mil thick, self-adhering sheet flashing, polyethylene or foil carrier sheet as location and function dictate.

E. Liquid-Applied Flashing:

1. Manufacturer's recommended gun-grade waterproofing, adhesive, and detailing company that combines the best of silicone and polyurethane properties. The single component, Silyl-Terminated-Poly-Ether (STPE) produces a highly durable, seamless, elastomeric that should treat joints, seams, cracks, and provide the flashing membrane in rough openings of structural walls and to counter-flash waterproofing and air barrier components.

F. Joint Reinforcing Strip:

1. Manufacturer's joint reinforcing tape.

G. Substrate-Patching Membrane:

1. Manufacturer's standard trowel-grade substrate filler.

H. Adhesive and Tape:

1. Manufacturer's standard adhesive and pressure-sensitive adhesive tape.

I. Metal Flashings:

1. Per 076200 - Sheet Metal Flashing and Trim.

J. Sprayed Polyurethane Foam Sealant:

1. Per 072100 - Thermal Insulation.

K. Joint Sealant:

1. Per 079200 - Joint Sealants.

L. Air Barrier Sealant:

1. Manufacturer's recommended sealant to seal field sheet-applied air barrier membrane to sheet-applied air barrier membrane; seal field sheet-applied air barrier membrane to self-adhered membrane; seal membrane flashing around opening to vinyl windows and doors.

M. Termination Mastic:

1. Fluid or sheet-applied air and water barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

- N. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- O. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.
 - 1. Adhesives shall have a VOC content of 70g/L or less.
- P. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
 - 1. Refer to Section 061000 - Rough Carpentry for support of ceiling vapor retarders.
- Q. Weather Resistant Barrier PreStrip (WRBPS)
 - 1. Basis of Design: VaproShield; WrapFlashing SA.
 - 2. Other Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Henry Company; Henry Blueskin VP160.
 - b. Soprema; SOPRASEAL Stick VP (Field-cut).
 - c. Or approved substitute during the bid process per Division 00 Specification Section "Instructions to Bidders" and Division 01 Specification Section "Substitution Procedures".
 - 3. Locations: For use in conjunction with weather resistant barrier at all wall openings, such as doors, windows, louvers, and other penetrations, as detailed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Follow specific requirements for lapping and integration with flashings described in the details to form an air and weather tight installation.

- C. Where primer is required, primer substrates at a rate required by air and water barrier manufacturer and allow it to dry. Limit priming to areas that will be covered by material on same day. Re-prime areas exposed for more than 24 hours.
 - 1. Where required, prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- D. Connect and seal exterior wall air and water barrier material continuously to the following areas where applicable, using accessory materials as indicated in the Drawings:
 - 1. Roofing-membrane, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings.
- E. Install air and water barrier as recommended by the manufacturer around window and door rough openings and at penetrations after sheathing is installed and penetrations have been secured. Provide minimum overlaps as require.
- F. Coordinate installations with Section 076200 - Sheet Metal Flashing and Trim to provide airtight transitions within the air and weather barrier membrane including but not limited to rough opening and penetration heads, ledger angles, and cross cavity through wall flashings. Install tapes and sealant continuously as required to provide an airtight installation.
- G. Secure and/or adhere the air and weather barrier system as required by manufacturer.
- H. Ensure that air and weather barrier is airtight, free from holes, tears, and punctures.
- I. Cover air and weather barrier system within manufacturer's recommended exposure timeframe.

3.4 CLEANING

- A. Clean dust, dirt, and debris from the surface of air and water-resistant barriers prior to installation of furring and/or cladding materials.
- B. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

- A. Protect air and water barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air and weather barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for longer than manufacturer's recommended timeframe, remove and replace fluid-applied air and weather barrier or install additional, full-thickness, fluid-applied air and weather barrier application after repairing and preparing the overexposed membrane according to fluid-applied air and weather barrier manufacturer's written instructions.
 2. Protect fluid-applied air and weather barrier from contact with incompatible materials and sealants not approved by fluid-applied air and weather barrier manufacturer.
- B. Repair damage before proceeding with subsequent construction.
- C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove masking materials after installation.

END OF SECTION

SECTION 074113 - FORMED METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Standing Seam Metal Roof Panels.

1.2 RELATED REQUIREMENTS

- A. 079200 - Joint Sealants: For joint sealant installed with system.

1.3 SUBMITTALS

- A. Qualification Data: For manufacturer, installer, and design engineer.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
 - 1. Summary of test results, indicating compliance with specified requirements.
 - 2. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
- D. Sample: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F. Mockup Summary: Include summary of components, assemblies, and accessories to be reviewed. Include schedule and location where mockup will be available for review. Include approval or corrections summaries until mockup is approved.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- H. Maintenance Data: For user operation and maintenance of system including:
 - 1. Methods for maintaining system's materials and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project.
 - 1. Not less than 5 years of documented experience.
 - 2. Accredited by IAS according to IAS AC472.
- B. Installer Qualifications: Company trained and authorized by roofing system manufacturer and specializing in performing the work of this section with minimum 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.6 WARRANTY

- A. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant chalking, cracking, or peeling within specified warranty period of 20 year period from date of Substantial Completion.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Complete roofing assemblies, including factory formed panels with factory applied finish roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for conformance with performance criteria.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330/E330M:
 - 1. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with code.
 - 2. Maximum Allowable Deflection of Panel: 1/180 of span.
- C. Roof Covering External Fire-Resistance Classification: UL Class A.

- D. Wind Uplift: Class 90 wind uplift resistance of UL 580.
- E. Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
- F. Provide continuity of thermal barrier at building enclosure elements and continuity of air barrier and vapor retarder seal at building enclosure elements in conjunction with materials specified in Section 072500 - Weather Barriers.
- G. Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
- H. Fabricate and finish panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- I. Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.3 MANUFACTURERS

- A. Specification is based on profiles and standard finishes by AEP Span.

2.4 MATERIALS

- A. Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

1. Features:

- a. Sheet Thickness: As scheduled below.
- b. Alloy: Manufacturer's standard, selected for best appearance and finish durability.

2.5 METAL ROOF PANELS

- A. Basis of Design Product: SpanSeam by AEP Span.
 - 1. Sheet Thickness: 22 gauge.
 - 2. Coverage: 16 inches.

3. Color: To be selected by Architect from manufacturer's full range of colors.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Miscellaneous Sheet Metal Items:
 1. Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels.
- C. Underlayment:
 1. Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
 - a. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - b. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 - c. High Temperature: Must meet AAMA 711 specification for heat exposure range Level 3.
 - d. Water Vapor Permeance: 0.067 perm, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 - e. Functional Temperature Range: Minus 70 degrees F to 212 degrees F.
- D. Sealants:
 1. As specified in Section 079200 - Joint Sealants.
 - a. Exposed sealant must cure to rubber-like consistency.
 - b. Concealed sealant must be non-hardening type.
- E. Rib and Ridge Closures:
 1. Provide prefabricated, close-fitting components of same material and finish as roof panels.
- F. Snow Fence:
 1. Provide prefabricated, components of same material and finish as roof panels, approved by metal roofing manufacturer with stainless steel clamp on installation.

G. Miscellaneous Secondary Framing:

1. Light gauge steel framing incidental to structural supports; fabricated from steel sheet.
 - a. Profile: Manufacturer's standard profile for conditions present.
 - b. Material: As required for material compatibility with panel sheet material.

H. Attachment:

1. Concealed System: Provide manufacturer's standard stainless steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Coordinate with installation of associated counterflashings and other components installed under other sections.

3.4 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.
- B. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 074646 - FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiber cement siding.

1.2 RELATED REQUIREMENTS

- A. 072100 - Thermal Insulation: For insulation installed with system.
- B. 072500 - Weather Barriers: For weather barrier underlayments installed with system wall panels.
- C. 079200 - Joint Sealants: For joint sealant installed with system.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with City of Everett Special Provisions.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.
 - 2. Review FM and Owner requirements for quality assurance and testing

1.4 SUBMITTALS

- A. Qualification Data: For manufacturer, design engineer, and installer.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and corner methods, and termination conditions.
- C. Shop Drawings: Indicate extents, special joint or termination conditions, and conditions of interface with other materials.
- D. Sample:
 - 1. Actual pieces of panels representing full range of available colors and finishes.
 - 2. Any exposed framing or clips.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.

- F. Mockup Summary: Include summary of components, assemblies, and accessories to be reviewed. Include schedule and location where mockup will be available for review. Include approval or corrections summaries until mockup is approved.
- G. Maintenance Data: For user operation and maintenance of system including:
 - 1. Methods for maintaining system's materials and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Fiber reinforced cement cladding panels. Panels have various profiles, attachment methods, fiber content, textures, colors and finishes.

2.2 FIBER CEMENT SIDING

- A. Fiber Cement Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for exposed fastener attachment.
 - 1. Basis of Design: Hardie Reveal Panel with Trim Batten Boards by James Hardie Building Products, Inc.
 - 2. Features:
 - a. Texture: Smooth.
 - b. Length (Height): 96 inches, nominal.

- c. Trim Batten Boards: manufacturer's standard dimension; at 2 feet on center unless indicated otherwise.
- d. Width: 48 inches.
- e. Thickness: 7/16 inch, nominal.
- f. Finish: Factory applied primer.
- g. Final Color: As scheduled.
- h. Warranty: 30 year limited; transferable.

2.3 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Miscellaneous Metal Subframing and Furring:
 - 1. Material recommended by manufacturer for compatibility with panel base metal and conditions present.
- C. Anchors:
 - 1. Galvanized steel or Stainless steel.
- D. Miscellaneous Secondary Framing:
 - 1. Light gauge steel framing incidental to structural supports; fabricated from steel sheet.
 - a. Profile: Manufacturer's standard profile for conditions present.
 - b. Material: As required for material compatibility with panel sheet material.
- E. Continuous Insulation Clips:
 - 1. Specification is based on perforated hat channels.
 - a. Depth: as indicated on assembly sheets.
 - b. Fasteners: As recommended by channel and siding manufacturer for substrate present.
- F. Fasteners:
 - 1. Manufacturer's standard type to suit application. Exposed fastener cap same color as exterior panel.

G. Miscellaneous Sheet Metal Items:

1. Provide flashings, trim, moldings, closure strips color matched to panel color.

H. Sealants:

1. As specified in Section 079200 - Joint Sealants.

I. Internal and External Corners:

1. Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

J. Expansion Joints:

1. Same material, thickness and finish as exterior sheets; 20 gauge; manufacturer's standard brake formed type, of profile to suit system.

K. Trim:

1. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

- L. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Coordinate with installation of associated counterflashings and other components installed under other sections.

3.4 TOLERANCES

- A. Maximum Offset from True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.6 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fabricated sheet metal items.

1.2 RELATED REQUIREMENTS

- A. 072500 - Weather Barriers: Moisture protection and underlayments under sheet metal flashings.
- B. 079200 - Joint Sealants: Sealants installed with sheet metal flashing and trim.

1.3 SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Shop Drawings: Indicate material profile, jointing locations, jointing details, fastening methods, flashings, terminations, and installation details. Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop and field assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners to adjoining work.
- C. Samples:
 - 1. Finish Sample: Submit two samples illustrating each metal finish color.
 - 2. Fabrication Sample: Submit sample of coping lap joint as it will occur every 10 feet.
- D. Warranty: Submit manufacturer's finish warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.6 WARRANTY

- A. Manufacturer's Finish Warranty: Correct defective work within a 20 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

- 1. Panel Finish Criteria are listed AAMA 2605.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Sheet metal including steel, stainless steel, and aluminum fabricated into items such as flashings, counterflashings, gutters, downspouts, and other items indicated and scheduled.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. General: Install sheet metal flashing and coping to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

- 1. Temperature Change (Range): 120 degrees, ambient; material surfaces.

2.3 MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal, shop pre-coated with PVDF coating.
 - 1. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As scheduled below and indicated on drawings.
- B. Pre-Finished Aluminum: ASTM B209; 0.032 inch thick; plain finish shop pre-coated with fluoropolymer coating.

1. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
2. Color: As scheduled below and indicated on drawings.
- C. Stainless Steel: for masonry use: ASTM A666 Type 304, soft temper, 0.018 inch thick; smooth mill finish.
- D. Stainless Steel: For all other uses: ASTM A666 Type 304, rollable temper, 0.018 inch thick; smooth No. 4 finish.

2.4 FABRICATION

- A. Conform to referenced SMACNA manual, Manufacturer's recommendations if premanufactured and as detailed. Conform to following general requirements:
 1. Form sections true to shape, accurate in size, square, and free from distortion or defects.
 2. Form pieces in longest possible lengths.
 3. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
 4. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
 5. Hem exposed edges 1/2 inch on unexposed side, miter and seam corners, unless noted otherwise.
 6. Cleats: Fabricate continuous cleats and starter strips from one gauge heavier material than sheet metal material, in widths required by SMACNA, interlockable with sheet.
 7. Fully soldered/welded stainless steel saddle and transition flashings at 3-D transitions such as roof to wall intersections, roof to elevator overrun, and the like.
 8. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 9. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection, and as required by SMACNA. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
 10. Shingle laps in flashings: 6-inch minimum, sealed with two distinct beads of non-skinning butyl sealant at each lap.

2.5 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Flexible Flashing:
 - 1. For use under metal copings and flashings Section 072500 - Weather Barriers; use high temperature type.
- C. Slip Sheet:
 - 1. Rosin sized building paper.
- D. Protective Backing Paint: See Section 099000 - Painting and Coating.
- E. Sealant: As specified in Section 079200 - Joint Sealants.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

3.6 SCHEDULE

- A. Unless otherwise noted all exposed exterior sheet metal flashing and trim is pre-finished galvanized steel.
- B. Counter Flashing:

1. Thickness: 20 gauge/0.0320 inches.
 2. Seaming: Fully-welded shop fabricated corners and end dams.
- C. Masonry Through Wall flashing:
1. Thickness: 20 gauge/0.0320 inches.
 2. Seaming: Fully-welded shop fabricated corners and end dams.
- D. Gutters:
1. Thickness: 20 gauge/0.0320 inches
- E. Downspouts:
1. Thickness: 20 gauge/0.0320 inches.
- F. Coping, Cap, Parapet, Sill and Ledge flashings:
1. Thickness: 20 gauge/0.0320 inches.
 2. Seaming: Butt joint with concealed splice plates.
 3. Corners: Fully-welded shop fabricated corners, ends and intersections.
- G. Pre-finished Metal Sill Flashing:
1. Thickness: 20 gauge/0.0320 inches.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sealants for exterior surfaces.
- B. Sealants for interior surfaces.

1.2 SUBMITTALS

- A. Qualification Data: For Manufacturer, Installer, Testing Agency.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Preliminary Selection Sample: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- E. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Data: For user operation and maintenance of system including:
 - 1. Methods for maintaining system's materials and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
 - 3. Recommendations on maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project. Minimum 5 years of documented experience in facilities of this size and scope.

1. Prequalification of single source installers for exterior sealants is encouraged.
- C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.5 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Ten (10) years from date of Substantial Completion.
- B. Special warranties exclude deterioration or failure of elastomeric joint sealants from the following:
 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Joint sealers for properly designed joints in interior and exterior materials; selected for durability, movement capacity, adhesion to substrates and non-staining characteristics.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

- C. Elastomeric Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.

2.3 MANUFACTURERS

- A. Specification is based on products listed below.
 - 1. Comparable products by one of the following are acceptable. Refer to City of Everett Special Provisions for submittal requirements.
 - a. Dow.
 - b. Pecora Corporation.
 - c. Tremco.

2.4 SEALANTS FOR EXTERIOR SURFACES

- A. (S-1): Exterior Joints Occurring in Paintable Surfaces: Silyl-terminated polyether elastomeric; ASTM C920, Grade NS, Class 25, Uses NT, M, G, A and O; single, or multi- component.
 - 1. Color: Standard and custom colors matching finished surfaces.
 - 2. Product: BASF MasterSeal NP 150.
- B. (S-2): Silicone Sealant: ASTM C920, Grade NS, Class 50, Uses NT, A, G, M, O; single component, neutral curing, non-sagging, non-staining, non-bleeding, extreme movement, low modulus.
 - 1. Movement Capability: +100/- 50 percent.
 - 2. Color: Standard colors matching finished surfaces.
 - 3. Product: 790 manufactured by Dow Corning.
- C. (S-3): Typical Exterior Weather-Proofing Joints (including metal to metal, metal to glass and perimeters): Silicone Sealant: ASTM C920, Grade NS, Class 50, Uses NT, A, G, M, O; single component, general purpose, medium modulus, neutral curing, non-sagging, non-staining, non-bleeding.
 - 1. Movement Capability: +/- 50 percent.

2. Color: Standard colors matching finished surfaces.
 3. Product: DOWSIL 795 manufactured by Dow.
 4. Designed for weather-proofing typical exterior materials including unprimed adhesion to anodized and fluoropolymer coated aluminum.
- D. (S-4): Exterior Weather-Proofing Joints (including porous natural stone, unit masonry, veneer masonry, and concrete applications): Surface Modified Silicone Sealant: ASTM C920, Grade NS, Class 50, Uses NT, A, G, M, O; single component, general purpose, medium modulus, neutral curing, non-sagging, non-staining, non-bleeding.
1. Movement Capability: +/- 50 percent.
 2. Color: Standard colors matching finished surfaces.
 3. Product: DOWSIL 756 manufactured by Dow.
 4. Designed for weather-proofing sensitive porous stone and light-colored metal panel substrates.
- E. (S-5): Concealed Sealants in sheet metal flashing, metal work and other joints calling for nonhardening, nonskinning, non-drying, nonmigrating sealant: Butyl Sealant: ASTM C1311.
1. Movement Capability: Plus and minus 12-1/2 percent.
 2. Product: Butyl Sealant by Tremco.
 3. Designed for concealed joints requiring non-drying sealant like lap joints in sheet metal flashing and trim.
- F. (S-6): Joints in Sidewalks and Other Concrete Paving: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single or multi-component.
1. Movement Capability: +/- 25 percent.
 2. Color: Color as selected to match concrete.
 3. Product: THC 901 by Tremco Inc.
 4. Designed for exposed, trafficked joints with pourable self-leveling installation.
- G. (S-7): Secondary Sealant Behind Directly-Applied Liquid Sealant: Preformed Compressible Foam Sealers.
1. Movement +25 percent, -25 percent (50 percent total) - permanently elastic.
 2. Color: Color as selected to match concrete.

3. Product: THC 901 by Tremco Inc.

a. Backerseal by Emseal.

b. illmod 600 by Tremco Inc.

H. (S-8): Concealed Air Barrier Sealant, Exterior: For sealing around rough openings at windows and

1. ASTM C920, Grade NS, Class 50, Uses NT, A, G, M, O; single component, general purpose, medium modulus, neutral curing, non-sagging, non-staining, non-bleeding.
2. Designed for weather-proofing typical exterior materials including unprimed adhesion to anodized and fluoropolymer coated aluminum.
3. Movement +50 percent, -50 percent.
4. Color: Color as selected by Architect.
5. Product: DOWSIL 758.

2.5 SEALANTS FOR INTERIOR SURFACES

A. (S-10): General Purpose Interior Sealant: polyurethane; single, or multi- component, paintable.

1. Color: Standard colors matching finished surfaces.
2. Product: Dymonic FC, Dymeric 240FC by Tremco Inc.
3. Designed for interior movement and non-moving joints adjacent to painted surfaces.

B. (S-11): Bathtub/Tile Sealant: Silicone; ASTM C920, Uses M and A; single component, mildew resistant.

1. Colors other than white may be required.
2. Product: DOWSIL Tub and Tile Sealant manufactured by Dow.
3. Sealant Used in Food preparation area must be USDA approved for that use.

C. (S-12): Acoustical Sealant: Acrylic sealant; ASTM C834.

1. Product: Tremco "Acoustical Sealant".
2. Non-hardening type.
3. Tested as part of acoustical assemblies.

D. (S-13): Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single or multi-component.

1. Approved by manufacturer for wide joints up to 1-1/2 inches.
2. Color: Standard colors matching finished surfaces.
3. Product: Vulkem 45 SSL by Tremco Inc.
4. Designed for exposed, trafficked joints with pourable self-leveling installation.

2.6 ACCESSORIES

A. Joint sealant backing:

1. General:
 - a. Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2. Cylindrical Sealant Backings:
 - a. ASTM C1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
3. Elastomeric Tubing Sealant Backings:
 - a. Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to -26 degrees F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
4. Bond-Breaker Tape:
 - a. Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

B. Miscellaneous Materials:

1. Primer:
 - a. Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
 2. Cleaners for Nonporous Surfaces:
 - a. Chemical cleaners acceptable to manufacturers of sealants and sealant-backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
 3. Masking Tape:
 - a. Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
- C. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 FIELD QUALITY CONTROL

- A. Field quality control to include field adhesion testing, field stain testing, test methods and evaluation of field test results.
- B. Perform all corrections necessary for issuance of warranty.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.6 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-fire rated steel doors.
- B. Steel frames.
- C. Thermally broken exterior frames

1.2 RELATED REQUIREMENTS

- A. 088000 - Glazing: For glass in doors and borrowed lites.
- B. 099000 - Painting and Coating: For field painting.

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. Include U-value data for thermally broken doors and frames.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- C. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Hollow metal frames for hollow metal doors, wood doors and glazing. Hollow metal doors for fire rated, non-fire rated, sound rated, and bullet resistant and insulated openings.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Accessibility Requirements: For doors required to be accessible, comply with applicable provisions in the Accessible and Usable Building Facilities ICC A117.1 and 2010 ADA Standards for Accessible Design – Department of Justice.
- B. Comply with ANSI A250.8 in general and for grade and style specified.
- C. SDI doors of equivalent or better construction are allowed.
- D. Exterior doors: Maximum U-Value 0.37.
- E. Exterior door frames: Maximum U-Value

2.3 MANUFACTURERS

- A. Specification is based on Doors and Frames by one of the following:
 - 1. Ceco.
 - 2. Curries.
 - 3. Republic Doors and Frames.
 - 4. Steelcraft.

2.4 STEEL DOORS

- A. Performance Criteria:
 - 1. Grade: ANSI A250.8 Level 3, physical performance Level C, Model 2, seamless.
 - 2. Thickness: 1-3/4 inches.
- B. Features:
 - 1. Door Top and Closures: Steel, Flush with top of faces and edges.
 - 2. Door Edge Profile: Beveled on both edges.
 - 3. Face Texture: Smooth.

4. Glazed Lights: Sizes and configurations as indicated on drawings. Provide secure glazing stops on secure side of door.
 - a. Glazing: Fully Tempered Float Glass specified in Section 088000 - Glazing.
5. Finish: Factory primed for field finishing.
6. Field Finish: In accordance with Section 099000 - Painting and Coating.
7. Field Finish Color: To be selected from manufacturer's full range.

2.5 FRAMES

- A. Basis of Design: Mercury MTB by Curries.
- B. Performance Criteria:
 1. Comply with the requirements of grade specified for corresponding door.
 2. Frames for Glass: Comply with frame requirements specified in ANSI A250.8 for Level 1, 18 gauge.
 3. Thermally broken with integral 2 inch wide flashing flange where shown on Drawings
- C. Features:
 1. Profile: TQU / Outswing.
 2. Assembly: Face welded per ANSI/SDI A250.8.
 3. Finish: Factory primed, for field finishing.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Glazing: As specified in Section 088000 - Glazing, factory installed.
- C. Mineral Fiber Insulation: For filling frame cavities.

2.7 FINISHING

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.
- C. Field Finish: In accordance with Section 099000 - Painting and Coating .

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.
- B. Coat inside of frames to be installed in masonry, with bituminous coating, prior to installation.
- C. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- C. Install fire rated units in accordance with NFPA 80.
- D. Seal seam at top closures after finish is applied to create a smooth surface without groove or pits.
 - 1. Seal with sealant Per Section 079200 - Joint Sealants.
- E. Pack all frames with insulation.
- F. Coordinate installation of hardware.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.

3.4 TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5 ADJUSTING

- A. Adjust and lubricate hardware for proper operation.
- B. Adjust for smooth and balanced door movement in accordance with manufacturer's instructions.

3.6 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.7 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 081416 - FLUSH WOOD DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-fire rated wood doors.
- B. Wood door frames.

1.2 RELATED REQUIREMENTS

- A. 099000 - Painting and Coating: For field painting.

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.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.5 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Wood doors for non-fire rated openings.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Accessibility Requirements: For doors required to be accessible, comply with applicable provisions in the Accessible and Usable Building Facilities ICC A117.1 and 2010 ADA Standards for Accessible Design – Department of Justice.
- B. Quality Level: Custom Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A for all doors with the following exceptions.

- C. Construction: Flush.
- D. Edge type (AWI "E" type) edge set in between door face veneers.
- E. Door Edge Profile: Beveled on both edges.
- F. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- G. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- H. Source Limitations: For doors and frames, obtain products from single source from single manufacturer.

2.3 MANUFACTURERS

- A. Specification is based on doors and frames by one of the following:
 - 1. Masonite Architectural: Graham-Maiman Wood Doors
architectural.masonite.com/graham-maiman/flush-wood-doors/
- B. Substitutions for products by manufacturers other than those listed above: See Section 016000 - Product Requirements.

2.4 MATERIALS

- A. Hardboard facing:
 - 1. Hardboard Facing for Opaque Finish: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides) hardboard, composition face, 1/8 inch thick.
- B. Cores:
 - 1. Cores Constructed with stiles and rails:
 - a. Provide solid blocks lock edge and top of door for closer for hardware reinforcement.
 - 2. Non-Rated Solid Core and 20 Minute Rated Doors: Type: No Added Urea Formaldehyde particleboard core (PC), plies and faces as indicated above.
- C. Non-fire rated wood doors.
 - 1. Features:
 - a. Thickness: 1-3/4 inches.
 - b. Core: Solid.

c. Facing Material:

- 1) Hardboard facing for opaque finish.

d. Color/Finish: To be selected from manufacturer's full range.

2.5 WOOD DOOR FRAMES

A. Pre-Hung Interior Wood Door Frames:

1. ANSI/WDMA I.S. 1A Quality Grade: Custom.
2. Wood Species and Cut: Match species and cut indicated for wood doors unless otherwise indicated.
3. Finish: To match door.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

2.7 FINISHING

- A. Field Finish: In accordance with Section 099000 - Painting and Coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Field-Finished Doors: Trimming to fit is acceptable.
1. Adjust width of non-rated doors by cutting equally on both jamb edges.
 2. Trim maximum of 3/4 inch off bottom edges.
 3. Trim fire-rated doors in strict compliance with fire rating limitations.
- C. Coordinate installation of hardware.
- D. Touch up damaged finishes.

3.3 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.4 ADJUSTING

- A. Adjust and lubricate hardware for proper operation.
- B. Adjust for smooth and balanced door movement in accordance with manufacturer's instructions.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.6 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 084313 - ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior storefront framing systems.
- B. Exterior entrance systems.
- C. Glazing.
- D. Finishes.

1.2 RELATED REQUIREMENTS

- A. 072500 - Weather Barriers: For adjacent components of continuous building air barrier requiring tie into work of this section.
- B. 076200 - Sheet Metal Flashing and Trim: For adjacent flashings and trim.
- C. 088000 - Glazing: For glass infill.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Provide glazed storefronts that comply with test-performance requirements indicated, as evidenced by reports based on Project-specific preconstruction testing or of tests performed on manufacturer's standard assemblies by a qualified testing agency.

1.4 SUBMITTALS

- A. Product Data: Provide product criteria, characteristics, accessories, material descriptions, dimensions of individual components and profiles, and finishes.
 - 1. Include sealants tested and approved as part of entrance and storefront system.
 - 2. Indicate glazed storefronts comply with performance requirements indicated, as evidenced by tests performed on manufacturer's standard assemblies by a qualified testing agency
- B. Qualification Data: For manufacturer, installer, and design engineer.
- C. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.

2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed Storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage templates and details.
 - c. Interface with adjoining building construction.
 - d. Referenced to detail numbers indicated on the Contract Drawings.
 - e. Expansion and seismic provisions.
 - f. Glazing.
 - g. Entrance Systems.
- D. Coordination Drawings: Show tie-back and intermittent stabilization anchors.
 1. Include required slab edge configuration, post tensioning locations, embedded or surface attachment anchors and channels, structural supports such as steel posts and girts, and door locations.
- E. Product Test Reports:
 1. Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed storefronts, indicating compliance with performance requirements.
- F. Sample: For each type of exposed finish required, in manufacturer's standard sizes.
- G. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- H. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Data: For user operation and maintenance of system including:
 1. Methods for maintaining system's materials and finishes.
 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
 3. Recommendations on maintenance schedule.
 4. Include ASTM C1401 recommendations for postinstallation-phase quality-control program.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A. Manufacturer's Finish Warranty: Correct defective work within a 10-year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
 - 1. Finish Criteria are listed AAMA 2605.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Factory fabricated and finished aluminum framing system with infill, and related flashings, anchorage and attachment devices. Systems do not typically equalize pressure or manage water intrusion within the system and are designed to bear on floor plates and be less than 12 feet tall.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. The storefront system begins at the primary structural members of the building frame and the edges of concrete slabs, include all support embeds, plates, angles and ancillary framing members required for structural integrity and support of the Storefront from the building structure.
- B. The Drawings:
 - 1. Indicate the design intent for profile, joints and configuration required together with relationship to structural frame and interior building elements.
 - a. Drawings do not purport to identify or solve completely the problems of thermal or structural movement, pressure equalization, weep system, vapor retarder, fixings and anchorage, flatness and stability of facing, or moisture management.
- C. General Performance:

1. Glazed storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - c. Glazing-to-glazing contact.
 - d. Sealant failure.
 - e. Glass breakage.
 - f. Noise or vibration created by wind and thermal and structural movements.
 - g. Loosening or weakening of fasteners, attachments, and other components.
 - h. Failure of operating units.

D. Structural Performance:

1. Story Drift (Interstory Movement): Accommodate design displacement of adjacent stories.
 - a. Design Displacement: As indicated on Structural Drawings.
 - b. Meets criteria for passing based on building occupancy type when tested per AAMA 501.4 and below.
 - 1) Run test procedure, apply and release loads through 10 cycles.
 - 2) Visually inspect the specimen at each displacement.
 - 3) Flex at anchors and racking of framing shall be recorded.

E. Accessibility:

1. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 lbf maximum.
 - a. ANSI/ICC A117.1 - 309.4 Operation.

2.3 MANUFACTURERS

A. Specification is based on products listed below.

1. Substitutions for products by manufacturers other than those listed above: Refer to City of Everett Special Provisions.

2.4 EXTERIOR STOREFRONT FRAMING SYSTEMS

A. Thermally Broken Exterior Storefront: Basis of Design: 451UT by Kawneer

1. Features:
 - a. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - b. Sight Line: 2 inches.
 - c. Depth: 4-1/2 inches.
 - d. Provide with jamb and head compensating receptors.
 - e. Manufacturer to supply matching prefinished break metal for adjacent conditions.
 - f. Maximum U Value: 0.26.

2.5 EXTERIOR ENTRANCE SYSTEMS

A. Basis of Design: 350 Medium Style Entrance by Kawneer

1. Features:
 - a. Thickness: 1-3/4 inches.
 - b. Top Rail: 3-5/8 inches wide.
 - c. Vertical Stiles: 3-1/2 inches wide.
 - d. Bottom Rail: 10 inches wide.
 - e. Glazing Stops: Square.

2.6 GLAZING

- A. Comply with Section 088000 - Glazing.
- B. Maximum Solar Heat Gain: 0.38

- C. Glazing Gaskets, Spacers, Setting Blocks, Sealant Backings, and Bond Breakers:
Manufacturer's standard permanent, nonmigrating types compatible with sealants and suitable for joint movement and assembly performance requirements.
- D. Weatherseal Sealant: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
 - 1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FINISHES

- A. Fluoropolymer Coatings: Factory applied, multicoat, thermo-cured Polyvinylidene Fluoride (PVDF) coating, composed of a primer specially formulated for aluminum and fluorocarbon topcoats as follows:
 - 1. PVDF Fluorosurfactant Free Resin Content: 70 percent unless indicated otherwise.
- B. Fluoropolymer Aluminum Extrusion Coatings, AAMA 2605: Minimum 70 percent PVDF resin, by weight, in color coat.
 - 1. Product: PPG Industries, Inc., Duranar.
 - 2. Pencil Hardness, ASTM D3363: F, minimum.
 - 3. Dry Film Thickness, ASTM D7091: 0.20 mil primer coat plus 1.0 mil color coat and 0.4 mil clear topcoat, 1.6 mil total, minimum thickness.
 - 4. Color: As selected by Architect from manufacturer's full range.

2.8 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Concealed Flashing:
 - 1. Dead-soft, 0.018 inch thick stainless steel, ASTM A240/A240M of type recommended by manufacturer, or prefinished aluminum only.
- C. Framing Sealants:
 - 1. Manufacturer's standard sealants with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), and 100 percent silicone.

- D. Manufacturer's recommended compensation head channels.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed Storefronts to comply with the following non-accumulating maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 ADJUSTING

- A. Adjust operating windows, ventilators, hardware, and accessories for smooth function and tight fit at contact points, and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
 - 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

3.6 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.7 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Provide complete door hardware and suitable fastenings for the Project in accordance with Drawings, Specifications, and Schedules.
 - 2. Furnishing items of proper design for use on doors and frames of the size, thicknesses, profile, swing, security and similar requirements indicated, as necessary for proper installation and function.
 - a. Provide UL Listed systems for exit doors.
 - b. Provide similar systems on non-latching doors where scheduled.
 - 3. Furnishing items not specifically mentioned, but necessary to complete the work. These are to match quality and finish of the items specified.
- B. Quantities: Those listed in any instance are for subcontractor's convenience only and are not guaranteed.
- C. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames"
 - 2. Division 08 Section "Aluminum-Framed Entrances and Storefronts"

1.3 REFERENCES

- A. Standards: Current edition at date of bid.
 - 1. ADAAG - Americans with Disabilities Act, "Accessibility Guidelines for Buildings and Facilities"
 - 2. ANSI/BHMA A156.18 - Materials and Finishes
 - 3. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities
 - 4. Underwriters Laboratories - Building Materials Directory
- B. Codes
 - 1. International Building Code
 - 2. Chapter 51-50 WAC Washington State Building Code

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 013300, Submittals Procedures.
- B. Product Data: Submit manufacturer's data for each item of finish hardware
- C. Hardware Schedule: Submit a detailed Door Hardware Schedule.
 - 1. The submitted Door Hardware Schedule shall indicate the complete designation of every item required for each door or opening.
 - 2. Furnish cover sheet listing title of project as shown on the Contract Documents, address, phone and fax numbers of Owner, Contractor, and Supplier, name of Certified Hardware Consultant, and date of submittal.
 - 3. Document format shall be 8-1/2" x 11" vertical.
 - 4. Do not combine Door Hardware Submittals with other Sections.
 - 5. List each opening individually under separate headings, in the same order as the door schedule. Do not group like or similar doors under a single heading. Do not continue individual headings on separate pages.
 - 6. Each heading shall indicate opening location, handing, degree of opening, door and frame size, type, and material.
 - 7. Indicate product manufacturer and incorporate cross-reference to symbols used in Article 2.4 Hardware Groups.
 - 8. Hardware Schedule shall document modifications required for application of new hardware specified on existing door and frames. See Paragraph 3.1 C.
 - 9. Include an index indicating door number, heading, page number, and locking function of each opening.
 - 10. Include a cross reference for any abbreviations or symbols used.
 - 11. Schedules in coded or horizontal format are unacceptable.
 - 12. Submittals not conforming to these requirements will be returned without review, for re-submittal. Following is an example of the required format:

1 Sgl. Door #104A – Corridor 102 from Waiting 104	RHR 90°
3-0 x 7-0 x 1-3/4" x 20 Minute x Type D	SC WD x HMF

1	Each Hinges	HA	BB1279 US26D (652) 4-1/2 x 4-1/2" NRP x 1/2MS
1	Lockset	BE	45H7D15H 630 RHR
1	Door Closer	LCN	4040XP-EDA Alum (689) x STB
1	Kick Plate	TI	B4EKP – 10 x 34 – US32D (630) x B4E x CTSK
1	Wall Stop	TR	1270CX US26D (626)
1	Set Gasket	NGP	5050C – 17' per Set

- D. Revisions: The Door Hardware Submittal shall be kept current throughout the project duration. All revisions incorporated shall be submitted in accordance with the above requirements. Submit only cover sheet and revised pages. All revisions shall clearly identify changes from previous submittal content.
- E. Samples: If requested by the Architect, submit one (1) sample of each exposed hardware category, finished as required, and tagged with full description for coordination with the hardware schedule. Samples will be reviewed, by the Architect, for design and finish only, compliance with other requirements is the responsibility of the Contractor. Units which are acceptable and remain undamaged through submittal procedures may be used on the project.

- F. Color Samples: Submit color charts and physical samples of each product requiring color selection.
- G. Key Schedule: Upon completion of the Key meeting indicated under sub-paragraph 2.3 C., submit a detailed key schedule indicating the complete project key system for approval. Obtain approval prior to proceeding with lock portion of the project.
- H. Wiring Diagrams and Risers:
 - 1. Submit electronic hardware system riser and terminal-to-terminal wiring diagrams for each Electronic Hardware application, cross-referenced to the Door Hardware Submittal and Door Schedule.
 - 2. Include voltage requirements along with product data and installation instructions. Indicate connection points to equipment provided under Divisions 26 and 28.
 - 3. Wiring Diagrams must be produced by the product manufacturer, or prior approved firms.
- I. Operations and Maintenance Data. Prior to substantial completion, furnish two Maintenance and Operations Manuals, furnished in a clearly marked, tabbed, 3-ringed binder. Manuals shall contain final copy of the Finish Hardware Submittal, Product Data, Key Schedule, Installation Instructions, and Warrantees.
- J. Certifications: Provide certification that all components are provided in compliance with "Buy America" requirements.

1.5 QUALITY ASSURANCE

- A. Supplier:
 - 1. Recognized door hardware supplier who has been furnishing hardware in the same area as the project for a period of not less than five (5) years.
 - 2. Factory direct, authorized, and stocking distributor of the Exit Devices, Locksets and Door Closers.
 - 3. Employ an Architectural Hardware Consultant (AHC), certified by the Door and Hardware Institute, who is available during the course of the work to meet with the Owner, Architect or Contractor for project hardware consultation.
- B. Source: Obtain each kind of Hardware (Butts, Locksets, Exit Devices, Door Closers, etc.) from only one manufacturer.
- C. Installer: Finish hardware shall be installed only by experienced tradesmen in compliance with trade union jurisdictions, either at the door and frame fabrication plant or at the project site.
- D. Templates: Furnish hardware templates for each fabricator of doors, frames and other work to be factory prepared for the installation of hardware. Upon request, check the shop drawings of such other work to confirm that provisions will be made for the proper installation of hardware.
- E. Regulatory Requirements:

1. All finish hardware shall comply with applicable local and/or state current building codes. All finish hardware shall meet the requirements of ADAAG, and ICC/ANSI A117.1 – Accessible and Usable Building and Facilities.
2. Provide only hardware which has been tested and listed by recognized testing agency for the types and sizes of doors required, and which complies with the requirements of the door and door frame labels. Provide Door Closers, Automatic self-latching bolts, coordinators, gasketing, astragals, or other components if required to conform to label requirements.

1.6 PRODUCT HANDLING AND STORAGE

- A. Packaging: Each item or package is to be separately tagged with identification related to the final hardware schedule. Basic installation instructions shall be included in the packages.
- B. Storage: Provide a locked room at the jobsite for the storage of the hardware.

1.7 WARRANTY

- A. Finish hardware shall be guaranteed against defects in workmanship and operation for a period of one (1) year, backed by a factory guarantee of the hardware manufacturer. The following products shall be guaranteed for periods beyond one year:
 1. Locks – two years
 2. Door Closers – thirty years

1.8 MAINTENANCE

- A. Furnish one set of special tools required for installation and adjustment which shall be delivered directly to the Owner prior to substantial completion, in accordance with Section 01700, Project Close Out.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Products may be furnished by the manufacturers listed under “As Specified” below, or equivalent products of type, grade, design, and function from manufacturers listed under “Acceptable Substitutions”. Requests for products not listed must be made in accordance with Section 012500 Substitution Requirements.

Product	As Specified	Acceptable Substitutions
Butt Hinges	Hager (HA)	Ives, Staley
Mechanical Locksets	Best (BE)	None
Electrified Locksets	Schlage (SC)	None
Cylinders	Best (BE)	None
Electric Strikes	RCI (RCI)	None

Product	As Specified	Acceptable Substitutions
Power Transfers	Von Duprin (VO)	None
Door Closers	Best (BE)	None
Kick & Mop Plates	Tice (TI)	Hager, Trimco
Overhead Stop and Holders	Glynn Johnson (GJ)	ABH
Wall and Floor Stops	Trimco (TR)	Pre-approved equal
Weatherstrip & Thresholds	National Guard (NGP)	Reese, Zero
Wire Harnesses	Best (BE) and Schlage (SC)	None

B. Finish: Finish in general shall be: US26D, Satin Chrome Plated, except:

1. Locksets, Overhead Stops, and Hinges: US32D, Satin Stainless Steel (BHMA 630).
2. Door Closers: Sprayed Aluminum (BHMA 689).
3. Kick Plates: US32D Satin Stainless Steel (BHMA 630).
4. Smoke Gasketing: As Selected.
5. Threshold, Weatherstrip & Door Bottoms: As listed

C. Butts and Continuous Hinges:

1. Quantity (per Leaf):
 - a. Door openings up to 60": two each.
 - b. Door openings 60 to 90": three each.
 - c. Doors over 90": Furnish one additional for each 30" increment or fraction thereof.
2. Sizes:
 - a. 1-3/4" Exterior & Vestibule Doors: 5 x 4-1/2"
 - b. 1-3/4" Interior Doors up to and including 36": 4-1/2 x 4-1/2"
 - c. 1-3/4" Interior Doors over 36" -- 5 x 4-1/2"
3. Width of Hinges shall be as required to clear projecting trim or other conditions to allow maximum degree of opening.
4. Hinges shall have Flat Button Tips.
5. Hinges shall have non-removable pins (NRP - Set Screw in Barrel).
6. For unusual size or weight doors, furnish type, size and quantity recommended by the hinge manufacturer.

D. Locksets and Cylinders

1. Furnish Lever Handle Locksets and Latches in 15H Design.
2. Backset: 2-3/4"
3. Cylinders:
 - a. Furnish Locksets and Cylinders with "Full Size" Key Removable Interchangeable Cores.
 - b. Provide appropriate cylinder type, length, collars, and cam type to operate specified Locksets and Exit Devices.
4. Locksets and Latchsets shall be listed with Underwriters Laboratories for A label and lesser class doors.
5. Provide Curved Lip Strikes with adequate projection to protect door trim.

6. Provide manufacturers standard wrought or plastic strike boxes.
7. Coordinate location, rough-in, and voltage requirements for Electronic Lock and Electric Strikes with electrical sub-contractor.
8. Wire Harness Plug Connector shall be compatible with specified electrified locking component.

E. Door Closers

1. Drop Plates: Furnish drop plates where doors have insufficient height top rails, or where Regular Arm Door Closers are used in conjunction with Concealed Overhead Stops.
2. Fluid: Furnish cold weather fluid, at exterior & vestibule doors.
3. Spacer Blocks: Furnish Spacer Blocks and/or shoe supports where frame stop does not provide for adequate support for the parallel arm soffit shoe.
4. Special Mounting: Provide special closer mounting as required where interference with weatherstrip or sound seals occurs.

F. Kick, Mop, and Armor Plates

1. Kick and Armor Plates shall be applied to the push side of the Door, Mop Plate applied to the pull side.
2. Plates shall be beveled four edges (B4E) and countersunk for screws.
3. Height: Kick Plates 10", Mop Plates 6", Armor Plates 34".
4. Plates shall be furnished with width as required to provide 1/4" clearance at sides of doors, frame stops, weatherstrip, sound seals, or astragals.

G. Stops & Holders

1. Furnish Overhead Stop and Holders sized as recommended by manufacturer.
2. Furnish Overhead Stop and Holders with special shims, brackets, or special template mounting where required.
3. Where wall stops are not applicable, furnish floor stops 1215CKU Series, or Overhead Stops if required.

H. Thresholds

1. Furnish all Thresholds with 1/4" - 20 x 2" Flat Head Sleeve Anchors.

I. Weatherstrip and Smoke Gasketing

1. Furnish weatherstrip and gaskets for complete perimeter of opening, including mullions, and astragals.
2. Rain Drips shall be full width of opening including frame faces.

J. Door Silencers

1. Furnish Rubber Door Silencers for openings not specified to have Gasketing or Weatherstrip.
2. Quantity: Furnish three (3) for each single door frame, and four (4) for each pair of door frames.
3. Type: Trimco 1229A.

2.2 KEYING

- A. Types: Establish a new factory registered Grand Master Key system for this project. The key operated products (Locksets, Cylinders, Deadlocks, etc.) specified in this Section shall be keyed to the new system.
- B. Construction Keying: Provide Brass Construction Cores and Keys for interchangeable core type cylinders during the construction period. Plastic Construction Cores are unacceptable.
- C. Key Conference: The Door Hardware Supplier shall meet with the Owner to prepare the permanent keying schedule. Submit Key Schedule for Approval in accordance with 1.4 G.
- D. Installation: The Permanent Cores, Master Keys, Change Keys, and Control Keys, prepared according to the approved keying schedule, shall be transmitted directly to the Owner, prior to substantial completion. The General Contractor shall remove the construction cores and install the permanent cores. Construction Cores shall be returned by the General Contractor to the Door Hardware Supplier.
- E. Transmittal: All Permanent Cores and Keys shall be sent direct from the lock manufacturer via Registered Mail, Return Receipt Requested, to the Owner. Construction Keys shall be sent to the General Contractor.
- F. Stamping: Stamp all Keys "Do not Duplicate" and with change designation as directed.
- G. Key Quantities: Furnish the following Key quantities:
 - 1. Four (4) change keys per Lockset or Cylinder
 - 2. Six (6) Construction Keys
 - 3. Six (6) Master Keys per set.
 - 4. Two (2) Construction Control Keys
 - 5. Two (2) Permanent Control Keys

2.3 HARDWARE GROUPS

HW-1

Door #100A, 101A

*	Each Hinges	HA	BB1199
1	Storeroom Lockset	BE	45H7D15H
1	Electric Strike	RCI	F2164
1	Door Closer	BE	9016-SDS90
1	Kick Plate	TR	K0050 x B4E
1	Threshold	NGP	659
1	Set Weatherstrip	NGP	700S (Head) x 700ES (Jambs)
1	Door Sweep	NGP	200NA
1	Lock Astragal	IV	LG14
1	Wire Harness – Frame	BE	WH-192
Card Reader, Power Supply, and Door Position Switch by Division 28			

Note: Power Supply shared with all Doors

HW-2

Door #102A

1	Anchor Hinge	HA	BB1195
*	Each Hinges	HA	BB1199
1	Storeroom Lockset	BE	45H7D15H
1	Electric Strike	RCI	F2164
1	Door Closer	BE	9016-SDS90
1	Kick Plate	TR	K0050 x B4E
1	Wall Stop	TR	1270CX
1	Set Gasket	NGP	2525C

HW- 3

Doors #103A, 104A

*	Each Hinges	HA	BB1199
1	Electrified Lockset	SC	L9492L-EU-CON 06N x DM x IS-LOC x OS-
OCC			
1	Mortise Cylinder	BE	1E74
1	Power Transfer	VO	EPT-10-CON
1	Door Closer	BE	9016-SDS90
1	Kick Plate	TR	K0050 x B4E
1	Threshold	NGP	659
1	Set Weatherstrip	NGP	700S (Head) x 700ES (Jambs)
1	Door Sweep	NGP	200NA
1	Lock Astragal	IV	LG13
1	Wire Harness – Door	SC	CON x Length as Required
1	Wire Harness – Frame	SC	CON-193P
	Card Reader, Power Supply, and Door Position Switch by Division 28		

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examination: Examine Doors, Frames, and related items for conditions that would prevent the proper application and operation of the Doors and Finish Hardware. Do not proceed until defects are corrected.
- B. Provide solid blocking for wall mounted components.
- C. Fasteners: Check all conditions and use fastening devices as needed to securely anchor all hardware as per manufacturer's published templates. Self-tapping sheet metal screws are not acceptable.

3.2 INSTALLATION

- A. Mounting Heights: Mounting Heights: Mount units at heights as recommended in "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames (2001)" by Doors and Hardware Institute, except as indicated below. Products not specifically covered shall be installed in accordance with the manufacturer templates and instructions.
 - 1. Hinges:
 - a. Top Hinge: 7-1/4", Top of frame rabbet to centerline of hinge.
 - b. Bottom Hinge: 12-1/4", Bottom of Frame to centerline of hinge
 - c. Intermediate Hinges: Centered, equal spacing between top and bottom hinges.
- B. Install each hardware item in compliance with manufacturer's instructions.

1. Cutting and Fitting: Wherever cutting and fitting are required to install hardware surfaces which will be painted or finished at a later time, install each item completely and then remove and store in a secure place. After completion of the finishes, re-install each item.
 2. Door and Frame Finishes: Do not install surface-mounted items until finishes have been completed on the substrate.
 3. Doors shall swing to the maximum degree that project conditions will allow. The swings indicated on the floor plan are intended to depict direction and do not indicate full degree of opening,
 4. Door Closers: Door Closer shall be located to allow maximum degree of opening that project conditions will allow. Door Closer shall not be used to stop the door, except for models equipped with an integral stop-on-the-arm feature.
 5. Overhead Stops: Furnish Overhead Stop and Holders with maximum degree of opening that project conditions will allow.
 6. Floor Stops: Locate Floor Stops at maximum degree of opening that project conditions will allow. Do not locate Floor Stops where they create a hazardous condition. Stops should be located no more than 1/3 Door width from the latch edge of the Door.
 7. Thresholds: Set all Exterior Thresholds in a bed of butyl rubber sealant in conformance with Division 07 requirements. Remove excess sealant. Caulk edges and joints to exclude moisture.
 8. Weatherstrip: Mount and adjust Rigid Jamb Weatherstrip prior to mounting Parallel Arm Door Closers. Weatherstrip shall be installed to provide a continuous seal at head and jambs. Do not notch Weatherstrip for Door Closer shoe. Provide Parallel Arm 5th hole spacer of increased thickness to allow for revised location.
 9. Mount Astragals on the pull side of active leaf for out-swinging applications, inactive leaf for in-swinging.
 10. Smoke Gasket
 - a. Completely clean frame and apply gasket in accordance with manufacturer's instructions.
 - b. Mount Gasket to stop face of Strike Jambs and Headers, Door Rabbet of Hinge Jamb.
- C. Adjust and check each operating item of hardware and each door to insure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.

3.3 Existing Doors and Frames

- A. Hollow Metal Doors and Frames: Prepare existing Hollow Metal Doors and Frames to accept new Door Hardware as specified. Doors and Frames are to be cut, reinforced, and welded as required. For estimation purposes, the General Contractor shall assume that all Frames cavities are grouted full with cement grout. All remaining holes are to be fitted with metal filler and ground smooth. Fill any cracks or gouges as required for refinishing.
- B. Existing Hardware: At Owner's option, existing Door Hardware that is scheduled to be removed or replaced as part of this contract shall be turned over to the Owner.

3.4 ADJUSTMENT

- A. Final Adjustment: Wherever hardware installation is made more than one (1) month prior to acceptance or occupancy, make a final check and adjustment of all hardware items during the week prior to acceptance or occupancy. Clean and lubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Door Closer Adjustment: After mechanical systems have been balanced, adjust Door Closers to comply with following ICC/ANSI A117.1 - 2003 requirements, as modified by WAC 51-50 and the International Building Code:
 - 1. Closing Speed: Door Closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to an open position of 12 degrees shall be 5 seconds minimum.
 - 2. Opening Force: The maximum force for pushing or pulling a door open shall be as follows: (these forces do not apply to the force required to retract latch bolts or disengage other devices securing the door).
 - a. Exterior Doors: 10.0 lbf (44.4 N).
 - b. Interior Doors: 5.0 lbf. (22.2 N.)
 - 3. Adjust backcheck to prevent damage to the closer, hardware, door and frame, and wall.
- C. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass glazing.
- B. Insulated glazing units.
- C. Glazing films.

1.2 RELATED REQUIREMENTS

- A. 081113 - Hollow Metal Doors and Frames: For assembly requiring components from this section.
- B. 084313 - Aluminum Framed Entrances and Storefronts: For assembly requiring components from this section.
- C. 102800 - Toilet Accessories : For framed mirrors.

1.3 SUBMITTALS

- A. Qualification Data: For installer, fabricator and design engineer.
- B. Product Data:
 - 1. Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
 - 2. Glazing Compounds & Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements and identify available colors.
- C. Shop Drawings: For any glazing installed with components from this section alone.
 - 1. Submit shop drawings for glazing installed within other systems in accordance with the system submittal requirements.
- D. Sample: Submit two samples in manufacturer's standard size of glass type units, showing coloration and design.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.6 WARRANTY

- A. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- B. Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Glazing and accessories installed as monolithic glazing or insulating glazing units within framing systems and support structures specified elsewhere.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Thermal Performance:
 - 1. U-Value:
 - a. Prescriptive Energy Code Limits: Based on NFRC 100 gateway size.
 - 1) Fixed Glazing, including frame: U-value 0.34 maximum.
 - 2. Solar Heat Gain Coefficient (SHGC), 0.38 Maximum: For the overall glazed assembly vision area and adjacent framing.
 - 3. Visible Light Transmission (VLT), 0.50 Minimum: For the overall glazed assembly vision area and adjacent framing.
- B. By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

- C. Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.
- D. Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C1048.
- E. Thickness: As required for loads indicated.
- F. Deflection no greater than 1/175 of the longest dimension or 1/2 inch, whichever is less.

2.3 MANUFACTURERS

- A. Allowable Manufacturers.
 - 1. Guardian Glass.
 - 2. Cardinal Glass Industries
 - 3. Substitutions for products by manufacturers other than those listed above: See Section 016000 - Product Requirements.

2.4 GLASS GLAZING

- A. Float Glass:
 - 1. Performance Criteria:
 - a. By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - b. Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.
 - c. Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C1048.
 - d. Tinted Types: Performance and features to match basis of design product.
 - 2. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 - 3. Heat-Strengthened in accordance with ASTM C1048.
 - 4. Fully Tempered in accordance with ASTM C1048.
 - a. Safety Glazing: Comply with 16 CFR 1201 test requirements for Category II.

2.5 INSULATED GLAZING UNITS

A. Fabricator:

1. Any of the manufacturers specified for float glass.
2. Any fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified performance, features and warranty.

B. Sealed Insulating Glass Units:

1. Performance:
 - a. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - b. IGU Performance: IGUs without spandrel glass to comply with ASTM E2188.
 - c. Resistance to Fogging: IGUs without spandrel glass to comply with ASTM E2189.
 - d. Edge Spacers: Material as required to meet performance criteria listed for assemblies.
 - 1) Color: Black.
 - e. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 - 1) Color: Black.
 - f. Air Space: Air.

2.6 GLAZING FILMS

A. Glazing Film:

1. Specification is based on FASA by 3M Scotchcal Specialty Film.
 - a. Pattern: As selected from manufacturer's standard range.
 - b. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications. See Section 016000 - Product Requirements for submittal requirements.
2. Performance Criteria:
 - a. Durable, dimensionally stable film designed for electro cut graphics.
 - b. Thickness: 2 mils.

- c. Manufacturer: Submit 5 years of documented in-service history with same product in similar environment and use.
- 3. Features:
 - a. Color and level of opacity.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 089100 - LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fixed louvers.

1.2 RELATED REQUIREMENTS

- A. 076200 - Sheet Metal Flashing and Trim.
- B. 079200 - Joint Sealants.

1.3 SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- D. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.6 WARRANTY

- A. Manufacturer's Finish Warranty: Correct defective work within a 20 year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
 - 1. Panel Finish Criteria are listed AAMA 2605.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Factory fabricated and assembled architectural louvers including fixed, operable and acoustic types.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. AMCA Certified in accordance with AMCA 511.
- B. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
- C. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at 850 feet per minute, when tested in accordance with AMCA 500-L.
- D. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
- E. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

2.3 FIXED LOUVERS

- A. Fixed Louver:
 - 1. Basis of Design: Model ELF445DXH by Ruskin. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
 - 2. Performance Criteria:
 - a. Free Area: 50 percent, minimum.
 - b. Static Pressure Loss: 0.15 inch wg maximum per square foot of free area at velocity of 900 fpm, when tested in accordance with AMCA 500-L.
 - 3. Features:
 - a. Blades: Drainable.
 - b. Frame: Depth as indicated on drawings, channel profile; corner joints mitered and with continuous recessed caulking channel each side.
 - c. Aluminum Thickness: Frame 12 gauge, 0.0808 inch minimum; blades 12 gauge, 0.0808 inch minimum.
 - d. Finish: Manufacturer's standard .

- 1) Color: As selected by Architect.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Blank-Off Panels:
 1. Same material as louver, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- C. Bird Screen:
 1. Interwoven wire mesh of steel, 14 gauge, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.
- D. Fasteners and Anchors:
 1. Stainless steel.
- E. Flashings:
 1. Of same material as louver frame, formed to required shape, single length in one piece per location.
- F. Sealant:
 1. Type, as specified in Section 079200 - Joint Sealants.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Install perimeter sealant and backing rod in accordance with Section 079200 - Joint Sealants.
- C. Coordinate with installation of mechanical ductwork.

D. Coordinate with installation of louver actuators.

3.4 CLEANING

A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.5 PROTECTION

A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 092116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Gypsum board.
- B. Mold-resistant gypsum board.

1.2 RELATED REQUIREMENTS

- A. 061000 - Rough Carpentry: Building framing and sheathing.
- B. 079200 - Joint Sealants: Acoustic sealant.

1.3 SUBMITTALS

- A. Qualification Data: For Installer and design engineer.
- B. Product Data: Provide data on gypsum board, glass mat faced gypsum board, accessories, joint finishing system, and cement board.
- C. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- D. Test Reports: For all stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.4 QUALITY ASSURANCE

- A. Designer Qualifications: Professional structural engineer with 5 years of documented experience in design of this work and licensed in the location of the project.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Includes Gypsum wallboard finishing, metal trim and accessories, and acoustical sealants and insulation.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Provide completed gypsum board assemblies complying with ASTM C840 and GA-216.
- B. Fire Rated Assemblies: Provide completed assemblies complying with UL listed assemblies indicated and ratings indicated on life safety drawings.
 - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.
- C. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.3 GYPSUM BOARD

- 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, unless otherwise indicated.
 - 2. Type X: Thickness 5/8 inch.
 - a. Edges: Tapered.
 - b. Products:
 - 1) Georgia-Pacific Gypsum; ToughRock, and ToughRock Fireguard.
 - 2) CertainTeed Gypsum, Inc.; GlasRoc.
 - 3. Type C: Thickness: As indicated.
 - a. Edges: Tapered.
 - b. Products:
 - 1) ToughRock FireGuard C Gypsum Wallboard.
 - 2) CertainTeed Gypsum, Inc.; Type C Fire-Resistant Drywall.

2.4 MOLD-RESISTANT GYPSUM WALLBOARD

- A. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 1. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
- B. Mold Resistant Paper Faced Products:
 - 1. CertainTeed Corporation; M2Tech 5/8 inch Type C Moisture & Mold Resistant Drywall.
 - 2. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.

2.5 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Acoustic Sealant:
 - 1. As specified in Section 079200 - Joint Sealants.
- C. Finishing Accessories:
 - 1. ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
 - a. Types: As detailed or required for finished appearance.
 - b. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
- D. Joint Materials:
 - 1. ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - a. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - b. Typical: Ready-mixed vinyl-based joint compound.
 - c. Exterior Soffits: Chemical hardening type compound.
- E. Anchorage to Substrate:
 - 1. Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Comply with ASTM C840 and GA-216. Install to minimize butt end joints, especially in highly visible locations.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
- E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.4 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 - 2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.
- D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area specified.

3.5 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.

- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Only where indicated.
 - 2. Level 4: Walls and ceilings typical.
 - 3. Level 3: In utility areas, behind cabinetry.
 - 4. Level 2: In utility areas, behind cabinetry.
 - 5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 - 6. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.
 - 7. Level 0: Surfaces indicated to be finished in later stage of project.
- D. 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.
 - 2. Taping, filling, and sanding is not required at surfaces behind fixed cabinetry.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.6 FIELD OBSERVATION AT "PUNCH"

- A. Finish will be judged from a viewing distance of 4 feet.
- B. Ceilings will be viewed from a standing position.
- C. Finished lighting system or temporary lighting similar to proposed finished lighting should be used for judging the wall.
- D. Eye catching discrepancies and or blemishes, including "fuzzy" wall board surfaces, will be rejected.

3.7 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.8 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

END OF SECTION

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Acoustical units.
- B. Suspension systems.

1.2 RELATED REQUIREMENTS

- A. 079200 - Joint Sealants: Acoustical sealant.
- B. 092116 - Gypsum Board Assemblies: Acoustical insulation.

1.3 SUBMITTALS

- A. Qualification Data: For manufacturer and installer.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, mechanical and electrical items installed in the ceiling, and perimeter molding and suspension/bracing details.
- C. Product Data: Provide data on suspension system components, acoustical units, and perimeter molding/seismic connections.
- D. Samples: Submit two samples 48 x 48 inch in size illustrating material and finish of acoustical units.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Data: For user operation and maintenance of system including:
 - 1. Methods for maintaining system's materials and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.

- B. Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.6 WARRANTY

- A. Provide 10-year manufacturer's warranty on all acoustical panels for sagging and warping, grid system, rusting, and manufacturer's defects.
- B. Provide 15-year warranty for all products using additional "Humidity and Sag resistance" control systems.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Suspended metal grid ceiling systems with seismic edge clips and manufactured edge trim at changes in plane. Fiberglass and gypsum based acoustical units.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Seismic Requirements:
 - 1. Classification: Conform to ASTM C635/C635M, Heavy Duty Classification.
 - 2. Code Compliance: IBC, American Society of Civil Engineers ASCE 7, and CISCA (AC) Guidelines. Comply with edition dates per local Authorities Having Jurisdiction.
- B. Components: Lock together in a positive manner.
- C. Pull out tension:
 - 1. Cross Tee Connections: Minimum 300 pounds.
 - 2. Main Tee Splices: Minimum 200 pounds.
- D. Seismic Lateral Design: Conform to IBC and ASCE 7 especially requirement for independent support from structure above for light fixture and mechanical services installed into acoustical lay-in panel ceiling systems.
- E. Install to conceal plenum space above acoustical ceiling system and to allow access.
- F. Make provisions for vertical as well as horizontal suspension systems.

2.3 MANUFACTURERS

- A. Specification is based on products listed in Color and Material Schedule on Drawings.

2.4 SUSPENDED ACOUSTICAL UNITS

- A. Suspended Acoustical Panels:
 - 1. Features:
 - a. Size: As indicated on Drawings.
 - b. Surface Color: White.
 - c. Suspension System: Concealed grid.

2.5 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 - 1. Same as for acoustical units.
 - 2. Substitutions: Refer to City of Everett Special Provisions.
- B. Suspension Systems - General: ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled light-duty.
 - 1. Profile as specified in Color and Material Schedule on the drawings.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Support Channels and Hangers:
 - 1. Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- C. Perimeter Moldings at Changes in Elevation:
 - 1. Same material and finish as grid.
 - a. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid. Basis of Design: Axiom Trim and Transitions by Armstrong Commercial Ceilings.

- b. At Concealed Grid: Provide concealed molding.
- D. Seismic Suspension Edge Clips:
 - 1. Manufacturer's approved, to meet code required movement without 2 inch wall angles.
 - a. Basis of Design: Seismic RX BERC2 clip components by Armstrong or ACM7 seismic clips components by USG.
- E. Demountable Ceiling Grid Clips:
 - 1. Basis of Design: C1430 variable placement hook clip by Armstrong.
- F. Acoustical Sealant for Perimeter Moldings:
- G. Touch-up Paint:
 - 1. Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Suspension system:
 - 1. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
 - 2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
 - 3. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

- a. See also reflected ceiling plans. Where 50 percent unit cannot be achieved, consult Architect before installation.
4. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
5. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
6. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
7. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
8. Do not support components on main runners or cross runners if weight causes excess deflection.
9. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
10. Do not eccentrically load system or induce rotation of runners.
11. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

C. Acoustical Units:

1. Install acoustical units in accordance with manufacturer's instructions.
2. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
3. Lay directional patterned units with pattern parallel to longest room axis if not shown on reflected ceiling plans.
4. Fit border trim neatly against abutting surfaces.
5. Install units after above-ceiling work is complete.
6. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
7. Cutting Acoustical Units:
 - a. Cut to fit irregular grid and perimeter edge trim.

- b. Make field cut edges of same profile as factory edges.
 - c. Double cut and field paint exposed reveal edges.
 - d. Seal cut edges of ceiling panels to encapsulate edges to same level as factory finish using manufacturer's recommended touch up materials.
- 8. Where obstructions occur, provide preformed closures to match perimeter molding.
 - 9. Install hold-down clips on panels within 20 ft of an exterior door.

3.4 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.6 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

END OF SECTION

SECTION 096500 - RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Resilient installation accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with City of Everett Special Provisions.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.3 SUBMITTALS

- A. Qualification Data: For installer.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plan.
- D. Flooring Sample: Submit two samples, 6 x 6 inch in size illustrating color and pattern for each resilient flooring product specified; heat weld rod samples for selection.
- E. Base and Accessory Samples: Submit manufacturer's complete set of color samples for initial selection.
- F. Certificate: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- G. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- H. Mockup Summary: Include summary of components, assemblies, and accessories to be reviewed. Include schedule and location where mockup will be available for review. Include approval or corrections summaries until mockup is approved.
- I. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

J. Maintenance Data: For user operation and maintenance of system including:

1. Methods for maintaining system's materials and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
3. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.4 MAINTENANCE MATERIAL

A. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Flooring Material: 10 square feet of each type and color.
2. Extra Wall Base: 20 linear feet of each type and color.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.7 WARRANTY

- A. Provide minimum Manufacturers Limited 5 year commercial warranty for manufacturing defects.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Resilient sheet and tile flooring, resilient stair accessories, resilient base and installation accessories for transition to other flooring types.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.

2.3 RESILIENT TILE FLOORING

- A. (LVT) Luxury Vinyl Tile: Homogenous sheet good; ASTM F1913 without backing.
 - 1. Basis of Design: Ground Rules by Bently Mills.
 - a. Color: Coffee First.
 - 2. Performance Requirements:
 - a. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 3. Features:
 - a. To be determined.

2.4 RESILIENT BASE

- A. (RB) Resilient Base: ASTM F1861, top set Style A straight, and as follows:
 - 1. Basis of Design: color and profile: To be selected by Architect.
 - 2. Type: Thermoset Rubber Base.
 - 3. Thickness: 0.125 inch thick.
 - 4. Height: Refer to drawings.
 - 5. Material: TS - Thermoset Vulcanized Rubber
 - 6. Finish: Satin.
 - 7. Styles: B - Cove
 - 8. Length: Roll (4 foot sections are not acceptable except as maintenance stock).

2.5 RESILIENT INSTALLATION ACCESSORIES

- A. (RA#) Nosing for resilient flooring, reducer strip for resilient flooring, joiner for tile and carpet, transition strips.
 - 1. Basis of Design Product: Products by manufacturer of resilient flooring or base. Comparable and substituted products will be judged based on color match and available profiles.
 - 2. Profile and Dimensions: As indicated or required for conditions present.
 - 3. Colors and Patterns: As selected from full range of industry colors.

4. Locations: Provide rubber molding accessories in areas indicated and as recommended by flooring manufacturer for complete installation.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Subfloor Filler:
 1. White premix latex; type recommended by adhesive material manufacturer.
- C. Primers, Adhesives, and Seaming Materials:
 1. Waterproof; types recommended by flooring manufacturer.
- D. Moldings, Transition and Edge Strips:
 1. Same material as flooring.
- E. Filler for Coved Base:
 1. Plastic.
- F. Sealer and Wax:
 1. Types recommended by flooring manufacturer.
 2. Heat Weld Rod
 - a. Color to closely match resilient flooring, as selected by Architect from manufacturer's standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.
- B. Verify existing conditions meet the manufacturer's requirements before starting work, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified, are dust-free, and are ready to receive resilient base.
- D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. General:

1. Install all materials in accordance with manufacturer's instructions based on conditions present.
2. Starting installation constitutes acceptance of subfloor conditions.
3. Fit joints tightly.
4. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
5. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - a. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
 - b. Resilient Strips: Attach to substrate using adhesive.
6. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
7. Install flooring in recessed floor access covers, maintaining floor pattern.

3.4 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Initial cleaning and finishing are the responsibility of the contractor.
 1. Follow manufacturer's recommendations for initial cleaning and finishing procedures.
 2. Not all types of flooring require finishing.

3.5 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 099000 - PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior Painting System by Substrate.
- B. Exterior Transparent Coating System by Substrate.
- C. Interior Painting System by Substrate.
- D. Surface Preparation for Field-Applied Painting and Coating.

1.2 RELATED REQUIREMENTS

- A. 033000 - Cast-in-Place Concrete: For fluid-applied concrete finishing products such as stains and sealers.
- B. 033543 - Polished Concrete Finishing: For fluid applied products related to concrete slab polishing process.
- C. 071900 - Water Repellents: For fluid applied products.
- D. 092116 - Gypsum Board Assemblies: For finish levels required of substrates.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Surface Preparation Meeting: Convene within 30 days of paint scope award:
 - 1. Agenda items:
 - a. Review surface preparation plan.
 - b. Review proposed specialty surface preparation techniques.
- B. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with City of Everett Special Provisions.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.4 SUBMITTALS

- A. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- B. Substrate Preparation Plan:

1. Cleaning sample area selection.
 2. Preparation and execution including pollution control and safety procedures.
 3. Coordination with other Work.
- C. Shop Drawings: Include annotated architectural drawing indicating scope and location of:
1. Existing substrates to be cleaned and painted or coated.
 2. Exposed Overhead Work and Open to Structure areas to receive painting or coating.
- D. Sample: Submit three cardstock "draw down" samples, 8.5 x 11 inch in size, including standard and custom paint color formula and availability information, illustrating range of color and texture available for each surface finishing product scheduled.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years of experience and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.
- B. Store, mix, apply and dispose of paint related materials in accordance with requirements of Authorities Having Jurisdiction.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Field-applied painting and coatings and substrate preparation.

2.2 GENERAL

- A. Provide all paint and coating products used in any individual system from the same manufacturer, unless noted otherwise below.
- B. Sheen, unless otherwise noted:

1. Walls: Eggshell.
 2. Ceilings: Flat.
 3. Standing and running trim: Semi-Gloss.
- C. "Dry-Fall" or other similar paint product formulation may be required depending upon the location and are allowed but must be submitted.
- D. Surfaces to paint:
1. Interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.

2.3 PERFORMANCE AND DESIGN CRITERIA

- A. Project Environmental Classification:
1. Provide exterior coatings rated for the following environmental classification based on project location, in accordance with ISO12944-2018 Corrosion Protection of Steel Structures by Protective Paint Systems: C1: Very Low Corrosivity; Dry or cold with very low pollution.

2.4 MANUFACTURERS

- A. Paints:
1. **MPC:** Miller Paint Company; www.millerpaint.com.
 2. **S-W:** Sherwin-Williams Co.; www.sherwin-williams.com.
- B. Transparent Coatings:
1. **MPC:** Miller Paint Company; www.millerpaint.com.
 2. **S-W:** Sherwin-Williams Co.; www.sherwin-williams.com.

2.5 EXTERIOR PAINTING SYSTEM BY SUBSTRATE

- A. Aluminum:
1. Acrylic:
 - a. **MPC:**
 - 1) Primer: Acrimetel 3102 Int./Ext. DTM Acrylic Primer; 1.5 mils dft.

2) Topcoat: Acrimetal 3104 Satin Int./Ext. DTM Acrylic; 2.3 mils dft.

b. **S-W:**

1) Primer: Pro Industrial Pro-Cryl Universal Primer B66-1310 Series; 1.9 mils dft.

2) Topcoat: Pro Industrial Eg-Shel Acrylic, B66-660 Series; 2.2 mils dft.

B. Concrete:

1. Refer to Section 071900 - Water Repellents for water repellent or anti-graffiti coating.

2. **MPC:**

a. Primer: Kril 620-0 Primer Sealer; 1.5 mils dft.

b. Topcoat: Acrilite 510-2 Exterior Latex Velvet; 1.5 mils dft.

3. **S-W:**

a. Primer: Loxon Concrete & Masonry Primer LX02 Series; 8.0 mils wet, 3.2 mils dry.

b. Topcoat: SuperPaint Exterior Latex Satin A89 Series; 1.5 mils dft per coat.

C. Ferrous Metal:

1. **MPC:**

a. Primer: Acrimetal 3102 Int./Ext DTM Acrylic Primer; 1.5 mils dft.

b. Top Coat: Acrimetal 3104 Satin Int./Ext DTM Acrylic; 2.3 mils dft.

2. **S-W:**

a. Primer: Pro Industrial Pro-Cryl Universal Primer B66-1310 Series; 1.9 mils dft.

b. Topcoat: Pro Industrial Eg-Shel Acrylic B66-660 Series; 2.2 mils dft per coat.

D. Fiber Cement:

1. **MPC:**

a. Primer: Kril 620-0 Primer Sealer; 1.5 mils dft.

b. Topcoat: Acrilite 510-2 Exterior Latex Velvet; 1.5 mils dft.

2. **S-W:**

a. Primer: Loxon Concrete & Masonry Primer LX02 Series; 8.0 mils wet, 3.2 mils dft.

- b. Topcoat: SuperPaint Exterior Latex Satin A89 Series; 1.5 mils dft per coat.

E. Galvanized Surfaces:

1. **MPC:**

- a. Primer: Acrimetal 3102 Int./Ext DTM Acrylic Primer; 1.5 mils dft.
- b. Top Coat: Acrimetal 3104 Satin Int./Ext DTM Acrylic; 2.3 mils dft.

2. **S-W:**

- a. Primer: Pro Industrial Pro-Cryl Universal Primer B66-1310 Series; 1.9 mils dft.
- b. Topcoat: Pro Industrial Eg-Shel Acrylic B66-660 Series; 2.2 mils dft per coat.

F. Gypsum Board:

1. **MPC:**

- a. Primer: Acrylitex MPI 50 Primer/Sealer; 1.5 mils dft.
- b. Topcoat: Acrilite 510-2 Exterior Latex Velvet; 1.5 mils dft.

2. **S-W:**

- a. Primer: PrepRite ProBlock Interior/Exterior Latex Primer B51-600 Series; 4.0 mils wet, 1.4 mils dry.
- b. Topcoat: SuperPaint Exterior Latex Satin A89 Series; 1.5 mils dft per coat.

G. Wood:

1. **MPC:**

- a. Primer: Miller Prime 470-0 Stain Blocking Primer; 1.5 mils dft.
- b. Topcoat: Acrilite 510-2 Exterior Latex Velvet; 1.5 mils.

2. **S-W:**

- a. Primer: PrepRite ProBlock Interior/Exterior Latex Primer B51-600 Series; 4.0 mils wet, 1.4 mils dry.
- b. Oil-Based Primer: Exterior Oil-Based Wood Primer Y24W8020; 2.3 mils dft.
- c. Topcoat: SuperPaint Exterior Latex Satin A89 Series; 1.5 mils dft per coat.

2.6 EXTERIOR TRANSPARENT COATING SYSTEM BY SUBSTRATE

A. Wood, Transparent for vertical surfaces and soffit:

1. Semi-transparent Stain:
 - a. **MPC:**
 - 1) First Coat: Olympic Maximum Semi-Transparent Stain 20095; one coat.
 - b. **S-W:**
 - 1) First Coat: WoodScapes Semi-Transparent Stain A15T5.
 - 2) Second Coat: WoodScapes Semi-Transparent Stain A15T5; 100-350 sq ft/gal.

2.7 INTERIOR PAINTING SYSTEM BY SUBSTRATE

A. Aluminum

1. Acrylic:
 - a. **MPC:**
 - 1) Primer: Acrimetal 3102 Int./Ext DTM Acrylic Primer; 1.5 mils dft.
 - 2) Top Coat: Acrimetal 3104 Satin Int./Ext DTM Acrylic; 2.3 mils dft.
 - b. **S-W:**
 - 1) Primer: Pro Industrial Pro-Cryl Universal Primer B66-1310 Series; 1.9 mils dft.
 - 2) Topcoat: Pro Industrial Eg-Shel Acrylic, B66-660 Series; 2.2 mils dft.

B. Concrete:

1. Acrylic-Enamel; two coats over primer:
 - a. **MPC:**
 - 1) Primer: As recommended by manufacturer.
 - 2) Topcoat: Performance Plus Eggshell Acrylic Latex Eggshell; 1.5 mils dft.
 - b. **S-W:**
 - 1) Primer: Loxon Concrete & Masonry Primer LX02 Series; 8.0 mils wet, 3.2 mils dry.

- 2) Topcoat: Duration Home Interior Latex, A97-1200 Series; 1.6 mils dft.
- 3) Alternate Topcoat: ProMar 200 HP Zero VOC Latex, B20-1900 Series; 1.7 mils dft.

C. Ferrous Metal:

1. Acrylic:

a. **MPC:**

- 1) Primer: Acrimetal 3102 Int./Ext DTM Acrylic Primer; 1.5 mils dft.
- 2) Top Coat: Acrimetal 3104 Satin Int./Ext DTM Acrylic; 2.3 mils dft.

b. **S-W:**

- 1) Primer: Pro Industrial Pro-Cryl Universal Primer B66-1310 Series; 1.9 mils dft.
- 2) Topcoat: Pro Industrial Eg-Shel Acrylic, B66-660 Series; 2.2 mils dft.

D. Gypsum Board

1. Acrylic-Enamel; two coats over primer:

a. **MPC:**

- 1) Primer: As recommended by manufacturer.
- 2) Topcoat: Performance-Plus Acrylic Eggshell; 1.5 mils dft.

b. **S-W:**

- 1) Primer: PrepRite ProBlock Interior Latex Primer, B51-600 Series; 1.4 mils dft.
- 2) Primer: ProMar 200 Zero VOC Primer B28 Series; 1.5 mils dft.
- 3) Topcoat: Duration Home Interior Latex Satin, A97-1200 Series; 1.6 mils dft.
- 4) Alternate Topcoat: ProMar 200 HP Zero VOC Latex Eg-Shel, B20-1900 Series; 1.7 mils dft.

E. Masonry - Concrete Masonry Units:

1. Acrylic-Enamel; two coats over primer:

a. **MPC:**

- 1) Primer: Kril 620-0 Primer Sealer; 1.5 mils dft.

- 2) Topcoat: Premium 100% Acrylic Latex Eggshell.

b. **S-W:**

- 1) Primer: Loxon Concrete & Masonry Primer LX02 Series; 8.0 mils wet, 3.2 mils dry.
- 2) Topcoat: Duration Home Interior Latex Satin, A97-1200 Series; 1.6 mils dft.
- 3) Alternate Topcoat: ProMar 200 HP Zero VOC Latex Eg-Shel, B20-1900 Series; 1.7 mils dft.

F. Wood, high-touch areas:

1. Acrylic-Enamel; two topcoats over primer:

a. **MPC:**

- 1) Primer: As recommended by manufacturer.
- 2) Topcoat: Acrinamel Semi-Gloss Acrylic Enamel 320-5.

b. **S-W:**

- 1) Primer: PrepLite ProBlock Interior Latex Primer B51-600 Series; 1.4 mils dft.
- 2) Topcoat: Pro Industrial Water-Based Alkyd Urethane Enamel B53-1050 Series; 4.0 mils wet, 1.4 mils dry per coat.

G. Wood, low-touch areas:

1. Acrylic-Enamel; two topcoats over primer:

a. **MPC:**

- 1) Primer: Miller Prime 2840 Enamel Undercoat.
- 2) Topcoat: Acrinamel Semi-Gloss Acrylic Enamel 320-5.

b. **S-W:**

- 1) Primer: PrepLite ProBlock Interior Latex Primer B51-600 Series; 1.4 mils dft.
- 2) Topcoat: Pro Industrial Eg-Shel Acrylic B66-660 Series; 2.2 mils dft.

2.8 ACCESSORIES

- A. Protective Backing Paint: As needed at dissimilar metals and at metal-to-concrete or metal-to-metal-to-masonry.

1. **MPC:**

- a. Amercoat 78 HB Amine-cured Coal Tar Epoxy; 12.0-16.0 mils dft.

2. **S-W:**

- a. Macropoxy HS High Solids Epoxy B58-400 Series; 5.0-6.0 mils dft.

- B. Material for patching and concealing fastener heads: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate surfaces are ready to receive work to include the removal or protection of adjacent materials not to be painted and cleaning to remove particulate or residues that are incompatible or may impact the bonding capability of the coating.
- B. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance.
- C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent, and fully cured.

3.2 SURFACE PREPARATION BY SUBSTRATE

- A. Concrete and Masonry:
 - 1. Concrete: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - a. Prepare the surface in accordance with SSPC-SP 13 standards.

- b. Abrade surface per ASTM D4259 to remove all efflorescence and laitance, to expose subsurface voids, and to provide a surface roughness suitable for material and intended use.
- c. Test for moisture by conducting a plastic sheet test in accordance with ASTM D4263.
- d. Fill voids as necessary with suitable filler material recommended by manufacturer of coating system selected.
- e. For slabs on grade, test for moisture in accordance with ASTM F1869 (calcium chloride test).
- f. The maximum allowable moisture transmission is 3 lbs / 1000 sq ft / 24 hours. Refer to Information Sheet 1496ACUS for further details regarding moisture measurements.

B. Metal:

1. Aluminum:

- a. Clean and remove loose surface oxidation. Mechanically abrade or abrasive blast in accordance with SSPC-SP 16 guidelines to achieve suitable anchor profile for material specified. Size and hardness of abrasive should be adjusted as necessary based on the hardness of the substrate and anchor profile desired for adhesion.
- b. Aluminum may be treated with a surface treatment compliant with Mil-DTL-5541 or equivalent (non-immersion applications only).

2. Ferrous Metal:

- a. Solvent clean according to SSPC-SP 1.
- b. Shop-Primed Surfaces: 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.
- c. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer or blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3. Shop-Primed Steel: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

4. Galvanized Metal:

- a. Clean metal to remove oils, contaminants with detergent, emulsion cleaner or other appropriate means per SSPC-SP 1.
- b. A light abrasive blast performed per SSPC-SP-16 is preferred. If this is not feasible, then abrade the surface by means of hand tool per SSPC-SP 2, or power tool per SSPC-SP 3, to achieve clean, roughened profile suitable for adhesion.

C. Wood:

1. Wood Substrate, General:

- a. Wash with a detergent solution, rinse thoroughly with clean water, and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
- b. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

2. Wood for Opaque Coatings:

a. Exterior and Interior Wood:

- 1) Scrape and clean knots, and apply coat of knot sealer before applying primer.
- 2) Sand surfaces that will be exposed to view, and dust off.
- 3) Prime edges, ends, faces, undersides, and backsides of wood.
- 4) After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

4. Doors:

- a. Wood Doors to be field finished: Seal wood door top and bottom edge surfaces with clear sealer.
- b. Metal Doors to be field painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

- A. General: Apply all coatings in accordance with manufacturer's instructions based on conditions present.

- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Apply products in accordance with manufacturer's written instructions.
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- H. Sand wood and metal surfaces lightly between coats to achieve required finish.
- I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- J. Wood to Receive Transparent Coatings: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- L. 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.

3.4 FIELD QUALITY CONTROL

- A. Owner will provide field inspection.
- B. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

END OF SECTION

SECTION 101400 - SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Dimensional character signs.
- B. Panel signs.
- C. Applied decal signs.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with City of Everett Special Provisions.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.3 SUBMITTALS

- A. Qualification Data: For fabricator and design engineer.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and attachment methods.
- C. Shop Drawings:
 - 1. Show sign mounting heights, locations of supplementary supports, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
 - 3. Wiring Diagrams: Power, signal, and control wiring.
- D. Sample: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
 - 2. Aluminum: For each form, finish, and color, on 6 inch long sections of extrusions and squares of sheet at least 4 by 4 inches.
 - 3. Acrylic Sheet: 8 by 10 inches for each color required.
 - 4. Polycarbonate Sheet: 8 by 10 inches for each color required.

5. Panel Signs: Not less than 12 inches square for each type.
6. Accessories: One of each, for each type.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F. Mockup Summary: Include summary of components, assemblies, and accessories to be reviewed. Include schedule and location where mockup will be available for review. Include approval or corrections summaries until mockup is approved.
- G. Maintenance Data: For user operation and maintenance of system including:
 1. Methods for maintaining system's materials and finishes.
 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.
 3. Include manufacturers' brochures and parts lists describing the actual materials installed.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualification: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Signage as required by code and to facilitate wayfinding.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Tactile and Braille Characters: Text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1 1. Produce precisely formed characters with square-cut edges free from burrs and cut marks. Text shall be accompanied by Grade 2 Braille. Braille dots with domed or rounded shape produced using Raster Method.

1. Raised-Copy Thickness: Not less than 0.7 millimeters and not more than 3 millimeters.

2.3 MANUFACTURERS

- A. Allowable Manufacturers.

1. Seattle SignCo.
2. Best Sign Company Seattle
3. Substitutions for products by manufacturers other than those listed above: See Section 016000 - Product Requirements.

2.4 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- B. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- C. Steel Sheet: Uncoated, cold-rolled, ASTM A1008/A1008M, commercial steel, Type B, exposed.
- D. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- E. Steel Members Fabricated from Plate or Bar Stock: ASTM A529/A529M or ASTM A572/A572M, 42,000 psi minimum yield strength.
- F. Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- G. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
1. Impact Resistance: 16 ft-lb/in per ASTM D256, Method A.
 2. Tensile Strength: 9000 psi per ASTM D638.

3. Flexural Modulus of Elasticity: 340,000 psi and , suitable for exterior applications per ASTM D790.
 4. Heat Deflection: 265 degrees F at 264 psi per ASTM D648.
 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D1044.
- H. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing 340,000 psi , suitable for exterior applications.
1. Opaque Vinyl: Basis of Design: 3M Scotchcal Electro Cut Graphic Film, or a comparable product by the following:
 - a. Gerber Scientific Products.
 2. Translucent Vinyl: Basis of Design: 3M Scotchcal Electro Cut Graphic Film, Dusted Crystal Translucent Vinyl, or a comparable product by the following:
 - a. Gerber Scientific Products.
 3. Printed Vinyl Sheet: Digitally printed vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing. Apply UV and water-resistant coating to face of sheet. Apply sheet to panels indicated.

2.5 FINISHES

- A. Aluminum Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.7 mils or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611.
- B. Stainless Steel: No. 4 finish.
- C. Painted Finishes: Specification is based on products listed by Matthews Paint.
1. Steel and Galvanized Steel:
 - a. Primer: 274 Series Epoxy Primer, color as required for topcoat color indicated, 1.5-2.0 mils DFT.
 - b. Topcoat: MAP Low VOC Satin Acrylic Polyurethane, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.
 2. Aluminum:
 - a. Primer: 274 Series Epoxy Primer, color as required for topcoat color indicated, 1.5-2.0 mils DFT.

- b. Topcoat: MAP Low VOC Satin Acrylic Polyurethane, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.
- 3. Acrylic, Polycarbonate:
 - a. Primer: 74777SP/01 Tie Bond 0.4-0.6 mils DFT.
 - b. Topcoat: MAP Low VOC Satin Acrylic Polyurethane, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.
- 4. Clear Coat:
 - a. 281228SP/01, VOC Satin Clear, 2.0 mils DFT minimum, satin sheen unless indicated otherwise.

2.6 FABRICATION

A. Dimensional character signs:

- 1. Fabricated Channel Characters: Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories.
- 2. Provide manufacturer's hardware for projection mounting of channel characters at distance from wall surface indicated.
- 3. Signage material, color and finish as Scheduled.

B. Panel Signs:

- 1. Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner-to-corner signs.
- 2. Edge Condition: Square.
- 3. Corner Condition: Square.
- 4. Mounting: Unframed, as indicated.
 - a. Wall or Projection mounted with concealed attachment.
 - b. Manufacturer's standard anchors for substrates encountered.
- 5. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.

C. Applied Decal Signs:

1. Applied Vinyl Characters: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing. Apply copy to surfaces indicated.

D. Aluminum Panel Signs:

1. Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner-to-corner signs.
2. Material: Aluminum.
3. Edge Condition: Square.
4. Corner Condition: Square.
5. Mounting: Unframed, as indicated.
 - a. Wall or Projection mounted with concealed attachment.
 - b. Manufacturer's standard anchors for substrates encountered.
6. Finish: Where color indicated use painted finishes listed above.

2.7 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.
- B. Manufacturer's optional accessories required by the project:
 1. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
 2. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.

3.4 ADJUSTING

- A. Adjust and lubricate hardware for proper operation.

3.5 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.6 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria and warranty.

END OF SECTION

SECTION 102800 - TOILET ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Toilet Room Accessories.

1.2 SUBMITTALS

- A. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- B. Sample: Submit 1 sample of each accessory, illustrating color and finish.
- C. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- D. Maintenance Data: For user operation and maintenance of system including:
 - 1. Methods for maintaining system's materials and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.3 MAINTENANCE MATERIAL

- A. Keys: Provide 3 keys for accessories to Owner; master key all lockable accessories.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Accessories to be installed in toilet and janitorial rooms.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Comply with ANSI/ICC A117.1, Americans with Disabilities Act (ADA Standards).

- B. Grab bars, shower seats, and dressing room benches shall be designed to resist a single concentrated load of 250 pounds applied in any direction, at any point on the grab bar or seat so as to produce the maximum loading effects, in accordance with ICC (IBC) Section 1607.8.2.
- C. Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

2.3 MANUFACTURERS

- A. Specification is based on products listed.

2.4 MATERIALS

- A. Stainless Steel Sheet:
 - 1. ASTM A666, Type 304.
 - 2. 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Stainless Steel Tubing:
 - 1. ASTM A269/A269M, Type 304 or 316.
- C. Back paint, in accordance with Section 099000 - Painting and Coating, where contact is made with building finishes to prevent electrolysis.
- D. Fasteners, Screws, and Bolts:
 - 1. Stainless steel, tamper-proof, security type.
- E. Expansion Shields:
 - 1. Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.5 ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Bobrick and other products indicated herein or comparable product by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation.
 - 4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

5. Excel Dryer, Inc.
6. Tubular Specialties Manufacturing, Inc.
7. Or approved substitute during the bid process per the “Instructions to Bidders”.

B. Toilet Room Accessories:

1. (PTD) Paper Towel Dispenser.
 - a. Responsibility: OFCI.
 - b. Basis of Design Product: Bobrick model B-35903, “TrimLineSeries” recessed.
2. (SD) Soap Dispenser.
 - a. Responsibility: OFCI. b. Basis of Design Product: To be determined.
 - b. Basis of Design Product: B-878 Counter-Mounted Automatic Designer Series™ Top-Fill Liquid Soap Dispenser, Polished Chrome.
3. (TSCD) Toilet Seat Cover Dispenser.
 - a. Responsibility: OFCI.
 - b. Basis of Design Product: Bobrick model B-4221 “ConturaSeries” surfaced-mounted, tumbler lock type
 - c. Finish: Stainless Steel No 4.
4. (TPD) Toilet Paper Dispenser.
 - a. Responsibility: OFCI.
 - b. Basis of Design Product: Bobrick model B-3888, “ClassicSeries” recessed single roll.
5. (FND) Feminine Napkin Disposal.
 - a. Responsibility: OFCI.
 - b. Basis of Design Product: Bobrick model B-270 “ConturaSeries” Stainless steel satin finish.
6. (CH) Coat Hook.
 - a. Responsibility: To be determined.
 - b. Basis of Design Product: B-9541: Surface-Mounted Coat Hook with Bumper, Satin Finish Steel.

7. GRAB BARS: 1-1/2" O.D. typical
 - a. Straight: B-5806 x 36: 36" (915mm) satin finish
 - b. 90degree: B-6898.99 satin Finish
8. (MIR-#) Mirror with Stainless Steel Frame:
 - a. Product: Bobrick B-165.

2.6 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

3.4 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/8 inch.

3.5 ADJUSTING

- A. Adjust and lubricate hardware for proper operation.

3.6 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.

3.7 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 113012 - APPLIANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Kitchen appliances.

1.2 SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Data: Manufacturer's data indicating dimensions, rated power figures, capacity, and operating features of each piece of residential equipment specified.
- C. Copies of Warranties: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Electric Appliances: Listed and labeled by CSA/UL and complying with NEMA standards.
- C. Gas Appliances: Bearing design certification seal of AGA.

1.4 WARRANTY

- A. Provide five (5) year manufacturer's warranty on refrigeration system of refrigerators.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Kitchen Appliances: All equipment eligible for Energy Star Rating.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Accessibility Requirements: For appliances required to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

2.3 KITCHEN APPLIANCES

- A. A. Refrigerator/Freezer: Two-door refrigerator/freezer with freezer on bottom and complying with AHAM HRF-1.: (Contractor Furnished/Contractor Installed)

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Whirlpool 30-inch Wide French Door Refrigerator - 20 cu. ft., WRF560SMHV.
 - b. Or substitute as approved by Owner.
2. Type: Freestanding, French door.
3. Dimensions:
 - a. Width: 29-1/2 inches.
 - b. Depth: 34-5/8 inches.
 - c. c. Height: 68-1/2 inches.
4. Storage Capacity:
 - a. Refrigeration Compartment Volume: 13.34 cu. ft.
 - b. Freezer Volume: 6.34 cu. ft.
 - c. Total Capacity: 19.68 cu. ft.
5. General Features:
 - a. Door Configuration: Overlay.
 - b. Door ajar / open alarm.
 - c. NO Built-in water-filtration system.
 - d. Dual refrigeration systems.
 - e. Separate touch-pad temperature controls for each compartment.
 - f. Others: As standard for the basis-of-design product.
6. Refrigerator Features:
 - a. Interior light in refrigeration compartment.
 - b. Compartment Storage: Two humidity-control drawers.
 - c. Door Storage: Adjustable, includes gallon-milk-container storage.
7. Freezer Features: One freezer compartment with door configured with pull-out bins.

- a. Automatic defrost.
 - b. Interior light in freezer compartment.
 - c. Automatic icemaker and storage bin.
8. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
9. Appliance Color/Finish: stainless steel.
- B. Microwave: (Contractor Furnished/Contractor Installed)
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. GE 1.6 Cu. Ft. Under cabinet mounted Microwave Oven, JES1657BMTS.
 - b. Or substitute as approved by Owner.
 2. Mounting: underside of upper cabinet.
 3. Type: Conventional.
 4. Dimensions:
 - a. Width: 21-3/4 inches.
 - b. Depth: 17-3/4 inches.
 - c. Height: 12-7/8 inches.
 5. Capacity: 1.6 cu. ft.
 6. Oven Door: Door with observation window and pushbutton latch release.
 7. Microwave Power Rating: 1150W.
 8. Electric Power Supply: 120 V, 60 Hz, 1 phase, 14.5 A.
 9. Controls: Digital panel controls and timer display.
 10. Other Features: Turntable, control lock-out.
 11. Appliance Color/Finish: stainless steel.
- C. Flatscreen TVs (Owner Furnished/Contractor Installed)
 1. 42inch Oled (Qty 2)

2. Mounting bracket (Owner Furnished/Contractor Installed)
3. Blocking within wall (Contractor Furnished/Contractor Installed)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify utility rough-ins are present and correctly located.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.

3.3 ADJUSTING

- A. Adjust operating equipment to efficient operation.

3.4 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.
- B. Remove packing materials from equipment.
- C. Wash and clean equipment.

END OF SECTION

SECTION 123505 - MANUFACTURED CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Breakroom casework.
- B. Countertops

1.2 RELATED REQUIREMENTS

- A. 102800 - Toilet Accessories: For counter mounted accessories.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before the start of work for this section in accordance with City of Everett Special Provisions.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.4 SUBMITTALS

- A. Qualification Data: For manufacturer, fabricator, and installer.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
- C. Shop Drawings: Indicate extents, special joint or termination conditions, and conditions of interface with other materials.
- D. Sample: 12 x 12 inch sample representative of all exposed surfaces, full set of hardware.
- E. Manufacturer's Installation Instructions: Indicate special preparation of substrate, installation and attachment methods, and perimeter conditions requiring special attention.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Data: For user operation and maintenance of system including:
 - 1. Methods for maintaining system's materials and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to components, finishes, and performance.

1.5 MAINTENANCE MATERIAL

- A. Sets of Hardware: 2 each typical.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of work specified in this section with minimum 5 years of experience.
- B. Fabricators Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum of 5 years of experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. As required by the manufacturer for a warrantable installation of the installed products to meet the Performance and Design Criteria.

1.8 WARRANTY

- A. Installation Warranty: Contractor shall correct defective Work within a 2 year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.
- B. Manufacturer's Warranty: Provide 1 year warranty for casework failing to perform as advertised.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Casework purchased as finished products from a manufacturer. Site installed countertops.

2.2 BREAKROOM CASEWORK

- A. Basis of Design: AWI Commercial Grade. Comparable and substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
- B. Performance Criteria:
 - 1. Drawers: 100 pound rating.
- C. Features:
 - 1. Door Category: flush overlay.

2. Exposed Finish: Slate Gray D91-60 matte and Regimental Red D12 by Wilsonart..
3. Interior Finish: thermofused laminate.
 - a. Color: To be determined.
4. Shelf Supports: Metal pins in drilled holes.
5. Oversized finished end panels at refrigerators.
6. Hardware: Basis of Cost: Mockett - DP177.
 - a. Soft close hinges.
 - b. Drawer Guides: Soft close/ full extension drawer system.
 - c. Hardware:
 - 1) Hardware Finish: Satin Nickel.
 - 2) DP177A at casework less than 12 inches.
 - 3) DP177B at casework greater than 12 inches.

2.3 COUNTERTOPS

A. Natural quartz and resin composite countertops

1. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
 - a. Basis of Design: Caesar Stone, Ice Stone, or comparable; substituted products will be judged based on the following performance criteria, features, warranty, and qualifications.
 - b. Performance Criteria:
 - 1) Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA-2 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - 2) Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
 - 3) Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.

- 4) NSF approved for food contact.

c. Features:

- 1) Flat Sheet Thickness: 3/4 inch, minimum.
- 2) Other Components Thickness: 3/4 inch, minimum.
- 3) Exposed Edge Treatment:
 - (a) Built up to minimum 1-1/4 inch thick; square edge and as detailed.
- 4) Back and End Splashes: Same sheet material, square top; minimum 4 inches high and as indicated on drawings.

2.4 ACCESSORIES

- A. All accessory materials required by the manufacturer for a warrantable installation of the installed products in a manner that meets the Performance and Design Criteria.

2.5 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings, and unit entries.
- B. Fabricate corners and joints without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
- C. Fabricate each unit to be rigid and not dependent on building structure for rigidity.
- D. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- E. Form smooth edges. Form material for countertops, shelves, and drain boards from continuous sheets.
- F. Provide cutouts for plumbing fixtures, appliances, and fixtures and fittings. Prime paint contact surfaces of cut edges.
- G. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions meet the manufacturer's requirements before starting work.

3.2 PREPARATION

- A. Prepare surfaces to receive work in accordance with manufacturer's instructions.

3.3 CASEWORK INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Use anchoring devices to suit conditions and substrate materials encountered.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Use filler strips; not additional overlay trim for this purpose.
- E. Close ends of units, back splashes, shelves and bases.

3.4 COUNTERTOP INSTALLATION

- A. General: Install all materials in accordance with manufacturer's instructions based on conditions present.
- B. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- C. Seal joint between back/end splashes and vertical surfaces.
 - 1. Where indicated use rubber cove molding.
- D. Joints between adjacent pieces of surfacing.
 - 1. Securely join with manufacturer's approved adhesive.
 - 2. Fill joints level with surfacing.
 - 3. Clamp or brace surfacing in position until adhesive sets.
 - 4. Joints shall be flush, tight fitting, level, and neat.
- E. Countertop Tolerances
 - 1. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
 - 2. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
 - 3. Field Joints: 1/8 inch wide, maximum.

3.5 ADJUSTING

- A. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

3.6 CLEANING

- A. Dispose of all waste material in accordance with project's Waste Management Plan.
- B. Clean casework, countertops, shelves, and hardware.

3.7 PROTECTION

- A. Protect installed work as required by the manufacturer to maintain product performance, design criteria, and warranty.

END OF SECTION

SECTION 200000 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

- A. Includes, but not limited to, furnishing labor, materials, and equipment for completion of work unless indicated or noted otherwise. See Division 1 for sequence of work.
- B. Work indicated on the mechanical plans and in the specifications that will not be performed by this Mechanical Contractor (i.e. duct and pipe block-outs, penetrations through walls, floors, and attic, wall patching, work indicated to be performed by other Contractors, etc.) shall be coordinated with the General Contractor prior to bid. The Mechanical Contractor is responsible for identifying quantity, size, and type of work with the General Contractor. Work not coordinated will be the responsibility of the Mechanical Contractor and shall not be charged as additional cost to the Owner.
- C. All work included in Divisions 22 and 23 shall be the responsibility of a single Mechanical Subcontractor. The scope of work identified in these sections can be performed by different subcontractors, but one must take responsibility for coordination. The subcontractor will be identified by the General Contractor at the Pre-Construction Meeting.
- D. This Contractor shall obtain and pay for all permits required by State and local authorities governing the installation of the mechanical work. It is the Contractor's responsibility to contact all utility organizations serving the building, prior to bid, and to include all charges for inspections, installation of materials, equipment, and connection of all required utilities.
- E. Furnish exact location of electrical connections and complete information on motor controls to Division 26, prior to bid.
- F. Put heating, ventilating, cooling, and exhaust systems into full operation and continue their operation during each working day of testing and balancing.
- G. Make changes in mechanical drive systems (pulleys, belts, VFD's, motor speed, etc.) and dampers or add dampers as required for correct balance as recommended by Section 230593 and at no additional cost to Owner. All equipment shall be provided with a single point electrical connection, unless otherwise indicated.
- H. The drawings and specifications are complementary and what is called for in either is binding as if called for in both.
- I. The ductwork and accessibility to HVAC equipment shall take precedence over all other equipment in the ceiling interstitial spaces or other mechanical areas including, but not limited to, sprinkler piping, heating piping, domestic water piping, and electrical conduit (except fire pump rooms where fire sprinkler equipment takes precedence).

1.2 RELATED SECTIONS

- A. General and Supplementary Conditions and Division 1 apply to this Section.

1.3 SUBMITTALS REQUIREMENTS OF THIS SECTION

- A. Access doors

1.4 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 - 1. Perform work in accordance with applicable Codes.
 - 2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern.
- B. Product Approvals: See paragraphs elsewhere in this specification.
- C. Warranties:
 - 1. In addition to guarantee specified in General Conditions, guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
 - 2. In order to be protected, secure proper guarantees from suppliers and Subcontractors.
 - 3. Provide certificates of warranty for each piece of equipment. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation & Maintenance Manual.
- D. Manufacture: Use domestic made pipe, pipe fittings, and motors on Project.
- E. Identification: Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to Owner.

1.5 CODES AND STANDARDS

- A. Codes and agencies having jurisdictional authority over mechanical installation.
 - 1. Washington State Energy Code – Latest Approved Edition
 - 2. International Building Code – Latest Approved Edition
 - 3. International Fire Code – Latest Approved Edition
 - 4. International Mechanical Code – Latest Approved Edition
 - 5. Uniform Plumbing Code – Latest Approved Edition
 - 6. Local Sewer and Water District Requirements
 - 7. State and County Department of Health
 - 8. Local Fire Marshal
 - 9. State Boiler Inspector
 - 10. Puget Sound Air Pollution Control
 - 11. State of Washington Boiler and Unfired Pressure Vessel Inspection Law
 - 12. Occupational Safety and Health Administration (OSHA)

13. Washington Industrial Safety and Health Act (WISHA)
14. National Fire Protection Association (NFPA)

- B. ASME code stamp required on all pressure vessels and relief valves. Certificate required from the State Boiler Inspector showing approval of the equipment and its installation.

1.6 SYSTEMS DESCRIPTION

A. Site Inspection:

1. Examine premises and understand the conditions which may affect the performance of work of this Division before submitting proposals for this work.
2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

1.7 DESIGN DRAWINGS

- A. Mechanical drawings are not shop drawings and are intended to show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
- B. Consider architectural, structural, and electrical drawings as part of this work in so far as these drawings furnish information relating to design and construction of building. Architectural drawings take precedence over mechanical drawings.
- C. Because of the small scale of mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Mechanical Contractor shall include in the bid a sufficient quantity of offsets, fittings, and accessories for the size of the project, based upon the contractor's experience, necessary to facilitate mechanical utility installation. No additional costs shall be charged for additional offsets, fittings, and accessories required for installation of the mechanical utilities shown on the design drawings. Investigate structural and finish conditions affecting this work and arrange work, accordingly, providing such fittings, valves, and accessories required in meeting the design conditions.

1.8 PRE-CONSTRUCTION COORDINATION MEETING

- A. This Contractor is responsible to participate in coordination meetings with the General Contractor, Fire Protection Contractor, and other subcontractors needing to coordinate special requirements (such as electrical contractor, HVAC contractor, plumbing contractor, etc.)
- B. Coordination meetings shall consider elevations, required clearances, and routings of all trades to assure that all trades can be installed without conflict.
- C. The outcome of this coordination shall allow each system (Mechanical, Fire Protection, Plumbing, Electrical, etc.) to be installed without further conflicts for space or locations.
- D. Failure to coordinate with other trades and/or existing conditions that result in the removal and re-installation of systems shall not be charged as additional costs.

1.9 COORDINATION DRAWINGS

- A. Develop coordination drawings, and other pre-installation coordination methods as necessary to coordinate layouts prior to installation. Coordination drawings shall consist of overlay drawings, or other similar methods to graphically indicate plumbing, fire protection, HVAC, electrical, and other similar elements in a single location in order to identify conflicts. All elements shall be drawn to scale. Coordination drawings are not required to be submitted for approval, except where indicated otherwise in the specification. However, a minimum of one hard copy of coordination drawings shall be present on site at all times and made available to the Architect/Engineer (A/E) Representative upon request. If coordination drawings are not on file, or if systems are not installed per coordination drawings, costs and delays of required re-engineering, replacement, and other work required to correct conflicts shall be solely the Contractor's.
 - 1. Contractor shall have the underground coordination drawings available upon request by A/E Representative within 60 days after Notice to Proceed.
 - 2. Contractor shall have the aboveground coordination drawings available upon request by A/E Representative within 90 days after Notice to Proceed.
- B. Coordination drawings shall consist of:
 - 1. Drawing sheets developed sequentially by each trade with all components drawn to scale and color coded to represent each trade.
- C. Where coordination drawings, or other preinstallation coordination methods show that available space is inadequate or that modifications will affect architectural elements, request information from the Architect before proceeding with work. No additional payment will be made for installation conflicts which could have been identified by coordination drawings or other pre-installation coordination methods.
- D. Make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. Each subcontractor shall:
 - 1. Indicate the exact name, location, and dimension of each element to be provided by that subcontractor.
 - 2. Arrange components as necessary to avoid conflict with new and existing conditions and the work of other subcontractors as directed by the General Contractor.
 - 3. Note requirements for sleeves, block-outs, cutting, patching, access doors, blocking, supports, inserts, and other similar items.
 - 4. Notify the General Contractor of conflicts.
 - 5. Approve the coordination drawings when all conflicts are resolved, and an acceptable layout is obtained.
- F. The General Contractor shall coordinate the layouts indicated on the coordination drawings and resolve any conflicts prior to commencement of subject portions of the work.

1.10 ELECTRICAL

- A. All electrical work, conduit, boxes, and devices in connection with control wiring as required to install the control equipment as specified herein or shown on the drawings shall be furnished and installed complete by the Division 26 Contractor.
- B. All electrical work performed under this Section of the Specifications shall conform to all applicable portions of the Division 26 specifications and shall conform to all governing codes.
- C. All equipment shall be factory wired to a junction box for connection to electrical service.
- D. Where a piece of equipment specified includes an electric motor, the motor shall be furnished and mounted by this Contractor. Motor starter, disconnect switches, and wiring from the electrical panel to the motor control devices and to the motor shall be provided by the Division 26 Contractor unless stated otherwise in the mechanical specification and/or on the mechanical drawings.
- E. All motor controllers and equipment panels (including but not limited to packaged equipment, custom control panels, custom air handler panels, etc.) shall comply with NEC (including, but not limited to, marking on controllers and labeling requirements).

1.11 TEMPORARY HEATING

- A. Temporary heating for facility during construction phase shall not be supplied by the permanent system installed under these specifications, unless all of the following are satisfied:
 - 1. Product warranties shall be extended to account for construction use. Contractor shall furnish certified document stating such extended warranties.
 - 2. Contractor shall obtain letter of approval from the Owner stating that they understand equipment expected life may be shortened due to severe usage.
 - 3. Contractor shall be responsible for pressure cleaning all coils and vacuum cleaning all ductwork prior to occupancy.

1.12 PRODUCT HANDLING AND PROTECTION

- A. Contractor is responsible for protection of all material, equipment and apparatus provided under this Section from damage, water, corrosion, freezing and dust, both in storage and when installed, until final project acceptance.
- B. Provide temporary heated and sheltered storage facilities for material and equipment.
- C. Completely cover motors and other moving machinery to protect from dirt and water during construction.
- D. Handle and protect equipment and/or material in manner precluding unnecessary fire hazard.
- E. Equipment requiring rotation and/or lubrication during storage shall have records maintained and witnessed on a monthly basis and forwarded to the Architect/Engineer prior to acceptance. Provide recorded maintenance for the O&M Manual.

- F. Material or equipment damaged because of improper storage or protection will be rejected.
- G. Equipment finish that is damaged by handling, storage, etc. shall be corrected by the Contractor at no additional cost to the Owner.

1.13 DEFINITIONS

- A. Finished Spaces: Spaces used for habitation or occupancy where rough surfaces are plastered, paneled, or otherwise treated to provide a pleasing appearance
- B. Unfinished Spaces: Spaces used for storage or work areas, such as fan rooms, mechanical and boiler rooms, etc., where appearance is not a factor
- C. Concealed Spaces: Spaces out of sight. For example, above ceilings; below floors; between double walls; furred-in areas; pipe and duct shafts; and similar spaces
- D. Exposed: Open to view. For example, pipe running through a room and not covered by other construction
- E. Outside: Open to view up to 5 feet beyond the exterior side of walls, above the roof, and unexcavated or crawl spaces
- F. Conditioned Space: An area, room, or space within the building envelope insulation
- G. Replace: Existing mechanical equipment and components shall be demolished and discarded from the project site or as directed otherwise. New mechanical equipment and components shall be installed in the area where the existing mechanical equipment and components were demolished or as indicated on the contract documents.
- H. Removed: Existing mechanical equipment and components identified on the contract documents shall be taken apart, taken down, and discarded from the project site unless directed otherwise on plan. Removed items shall not be brought back to the project site for use or reinstallation.
- I. Reinstall: Existing mechanical equipment and components identified on the contract documents that need to be taken down and installed in the same or new location.

1.14 ABBREVIATIONS

ADA	Americans with Disabilities Act
A/E	Architect/Engineer
AFF	Above Finish Floor
AGA	American Gas Association
AMCA	Air Moving & Conditioning Association
ANSI	American National Standards Institute
APWA	American Public Works Association
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing & Materials
AWWA	American Water Works Association
BFF	Below Finish Floor

BHP	Brake Horsepower
BTU	British Thermal Unit
CFM	Cubic Feet per Minute
CISPI	Cast Iron Soil Pipe Institute
fpm	feet per minute
FS	Federal Specifications
FDC	Fire Department Connection
FCO	Flush Cleanout
FD	Floor Drain
FPWH	Freeze Proof Wall Hydrant
GPM	Gallons per Minute
HP	Horsepower
IAPMO	International Association of Plumbing and Mechanical Officials
IAQ	Indoor Air Quality
IEEE	Institute of Electrical and Electronics Engineers
KW	Kilowatt
LPG	Liquefied Petroleum Gas
MBH	One Thousand British Thermal Units per Hour
MS	Military Specifications
MSS	Manufacturers Standardization Society
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NP	Non-Potable Water
NPSH	Net Positive Suction Head
OS&Y	Outside Screw and Yoke
PIV	Post Indicator Valve
PDI	Plumbing and Drainage Institute
per	in accordance with
POC	Point of Connection
PSI	Pounds per Square Inch Gauge Pressure
PVC	Polyvinyl Chloride
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SP	Static Pressure
SWP	Steam Working Pressure
UL	Underwriter's Laboratories
VFD	Variable Frequency Drive
VTR	Vent Thru Roof
wg	Water Gauge (inches of water)
WP	Working Pressure
WPL	Weatherproof Louver
WQA	Water Quality Association

Additional abbreviations are as listed on the drawings or elsewhere in these specifications.

1.15 SCHEDULE OF VALUES

- A. General: Provide schedule of values per Division 1 and related project requirements:
1. Divisions 22 and 23 Breakdown: Provide schedule of values for each building, broken down into labor and materials per specification section at a minimum. Further breakdown into subcategories is at the option of the Contractor, except as noted below:
 - a. Section 200000 - General Mechanical Requirements: Provide a subcategory for "Mechanical Punchlist, Closeout and Owner Training". The dollar value for this subcategory shall be no less than 2.25% of the total dollar value of the Divisions 22 and 23 work (or as indicated in Division 1, whichever is higher). The contractor shall receive payment upon completion of all Mechanical Punchlist and Closeout items and Owner Training.
 - b. Section 200000 - General Mechanical Requirements: Provide a subcategory for "Pre-Construction Coordination Meeting." The dollar value for this subcategory shall be no less than 1% of the total dollar value of the Divisions 22 and 23 work. Contractor shall submit the meeting's sign in sheet to the Engineer for review. The sign-in sheet shall include the printed and signed names of the General and all subcontractors who attended the meeting. The contractor shall receive payment once the sign-in sheet has been verified to meet the Pre-Instruction Coordination requirements of this Section.
 - c. Section 200000 - General Mechanical Requirements: Provide a subcategory for "Coordination Drawings". The dollar value for this subcategory shall be no less than 1% of the total dollar value of the Divisions 22 and 23 work. The contractor shall receive payment upon Engineer's verification of Coordination Drawing completion, in accordance with the requirements of this Section.
 - d. Section 230800 - Commissioning HVAC System: The dollar value for "Commissioning" shall in no case be less than 0.75% of the total dollar value of the Divisions 22 and 23 work (or as indicated in Division 1, whichever is higher). The contractor shall receive payment upon completion of all outstanding commissioning items as identified by the commissioning agent, Engineer, and/or Owner.
 - e. Section 230900 - Energy Management & Control Systems: Provide a subcategory for "Trend Logs". The dollar value for this subcategory shall be no less than 1% of the total dollar value of Division 23 work. The contractor shall receive payment upon completion of the trend logs in accordance with the requirements of this Section and Section 230900.
- B. The Contractor is advised that in addition to payments held out for retainage and project final completion (i.e. "Mechanical Punchlist, Closeout, and Owner Training"), as specified above and in Division 1, the Owner reserves the right to withhold 10% of the funds for any of the above categories until the systems (of that category) have been proven to operate as specified and have been completely tested, adjusted, and balanced.

1.16 SUBMITTAL PROCEDURES

- A. All material used on the project shall be new and free of defects. The Architect and/or Engineer reserve the right to reject any material, the appearance of which has been damaged on the site or in shipment. The material shall be of pre-approved equal quality to that which is specified. Should the make and type of material differ from that specified, the Contractor may be required to submit catalog and engineering data (samples if requested) necessary to make a comparison and determine its suitability. The Contractor shall also bear the cost of all changes to any aspect of the project (electrical, mechanical, building, etc.) made necessary by any approved substitutions. Approved substitutions include those listed as approved manufacturers or approved substitutions. Tentative approval of substitute material and equipment will be made prior to bid only. Such request for approval shall be made two weeks in advance of the bid opening to allow time to assess its suitability. Failure to obtain approval prior to bid shall require the successful bidder to furnish materials and equipment only as specified herein (see paragraph 2.01, this specification).
- B. Equipment submittals shall be submitted per one of the following processes as selected by the Architect/Engineer Representative and/or Owner:
 - 1. Electronic Submittal Process:
 - a. The Contractor shall upload one complete PDF file of the Electronic Submittal Package to the Architect's SharePoint Site for approval. The Electronic Submittal package shall include the following:
 - 1) All required submittals (i.e. equipment cut sheets, shop drawings, etc.) per each specification section.
 - 2) Table of contents identifying each specification section, submittal requirement of each specification, and the manufacturer name and model number of each item submitted.
 - 3) Index sheet for each specification section.
 - 4) Submission of PDF files of individual specifications or equipment cuts will be automatically rejected.
 - 5) The Contractor shall complete and upload a Submittal Information Form, in Microsoft WORD format, for the A/E team to review. The equipment submittal will not be considered "Received" nor will a review be provided until both the Electronic Submittal Package and Submittal information Form have been uploaded.
 - 6) If the Electronic Submittal Process is not feasible for a particular submittal section (i.e. samples, certain shop drawings, recorded videos, CD's, etc.), the Contractor shall submit a request in writing to the A/E Representative to deviate from the Electronic Submittal Process. If acceptable by the A/E Representative the Contractor shall follow the Hard Copy Submittal Process for the submission.

2. Hard Copy Submittal Process:
 - a. The Contractor shall submit to the Architect, for approval, complete information on all equipment and materials to be provided on the project. Provide copies as specified by Division 1 and at a minimum provide six (6) copies of the manufacturer's catalog and engineering data, shop drawings of shop fabricated equipment, and instruction data for each item included under this Section of the Specifications. The Contractor shall submit a typed, signed list including all items to be furnished on the project. The signature on the aforementioned list shall indicate that the Contractor has examined the suitability of all material and equipment with respect to compliance with these specifications. The Contractor's approval shall also indicate that the physical dimensions of the equipment have been verified with the installation requirements and were found to cause no interference therewith.
 - b. Furnish submittals in a hard-back, three-ring binder. The binder shall have tabs which are indexed with a Table of Contents. The Table of Contents shall correlate an index number for each individual specification number. If the equipment submittal is not bound to the Engineer's satisfaction, it may be rejected.
3. Review of submittal data by the Engineer or Architect does not relieve the Contractor of responsibility for quantities, measurements, and compliance with the intent of all contract documents.
4. Furnish submittals generally according to the list below. Individual sections may contain more specific submittal listing of the particular section labeled "Submittal Requirements." Furnish on each particular section and the following equipment:
 - a. Pipe
 - b. Pipe Insulation
 - c. Duct Insulation and Lining
 - d. Hot Water Tanks
 - e. Boilers
 - f. Plumbing Fixtures
 - g. Valves
 - h. Pipe Hangers
 - i. Piping Specialties
 - j. Pumps
 - k. Gas Flues
 - l. Fire Sprinkler Equipment
 - m. HVAC Equipment
 - n. Temperature Control Equipment and Shop Drawings
 - o. Air Balance Contractor
 - p. Hydronic Equipment
 - q. Air Compressor & Devices
 - r. Natural Gas Components
 - s. Fire Marshal Stamped and Approved Shop Drawings for Fire Sprinkler System
 - t. Any material found to be installed without prior approval will be required to be removed and replaced with only specified material at Contractor's cost.
 - u. Mechanical Drawings for the project have been developed by the Engineer using AutoCAD™ Revision 2015 software. These drawing files will be made available to the Contractor for development of shop drawings and/or "As-Built" for a fee of \$30.00 per sheet. Full payment to be made prior to release of drawing files.

1.17 OPERATION AND MAINTENANCE MANUAL FOR MECHANICAL SYSTEMS

- A. Bind Operation & Maintenance Manual for Mechanical Systems in three-ring, hard-backed binder with clear plastic pocket on spine. Spine of each binder shall have the following typewritten lettering inserted:

OPERATION
AND
MAINTENANCE
MANUAL
FOR MECHANICAL SYSTEMS

- B. Provide master index at beginning of Manual showing items included. Use plastic permanent tab indexes for Sections of Manual.
- C. First Section shall consist of name, address, and phone number of Architect, General Contractor, and Mechanical, Plumbing, Sheet Metal, Refrigeration, Temperature control, and Electrical Subcontractors. Also include complete list of equipment installed with name, address, and phone number of each vendor.
- D. Provide Section for each type of item of equipment.
- E. Submit copies as specified by Division 1 and at a minimum provide three (3) copies of Operation & Maintenance Manual to Architect for his approval.
- F. Include descriptive literature (Manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
- G. Include all warranties/guarantees including extended warranties.
- H. Include all start-up logs.
- I. Operating Instructions shall include:
1. General description of each mechanical system.
 2. Step-by-step procedure to follow in putting each piece of mechanical equipment into operation.
 3. Provide schematic control diagrams for all systems. Each diagram shall show locations of start-stop switches, insertion thermostats, room thermostats, thermometers, firestats, pressure gauges, automatic valves, and refrigeration accessories. Mark the correct operating settings for each control instrument on these diagrams.
 4. Provide diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays.
 5. Provide drawing of each temperature control panel identifying components on panels and their function.

J. Maintenance Instructions shall include:

1. Manufacturer's maintenance instructions for each piece of mechanical equipment installed in Project. Instructions shall include the name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
2. Summary list of mechanical equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
3. List of mechanical equipment used, indicating name, model, serial number, and name plate data of each item together with number and name associated with each system item.
4. For hydronic systems, include gallons in system, amounts and types of each chemical, etc. Also, include step-by-step procedure to recharge the system.

1.18 COMMISSIONING

A. General Requirements: The building's systems shall be tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with the approved plans and specifications. This shall include the following:

1. Commissioning Plan
2. Systems Testing and Balancing
3. Controls Functional Performance Testing
4. Preliminary Commissioning Report
5. Post Construction Documentation
6. Final Commissioning Report

B. Commissioning Plan: A commissioning plan shall be developed by a registered design professional or approved agency and shall include at a minimum the following:

1. A detailed explanation of the design intent
2. Equipment and systems to be tested
3. Functions to be tested (for example, economizer control, discharge air temperature control, etc.)
4. Conditions under which the test shall be performed
5. Measurable criteria for acceptable performance

C. System Testing and Balancing: Provide testing and balancing as specified in Sections 230593 and 230595.

D. Controls Functional Performance Testing: Functional testing shall demonstrate the correct installation and operation of each component, system, and system to system intertie relationship in accordance with the plans and specifications. This demonstration is to prove operation, function, and maintenance serviceability for each of the commissioned systems. Testing shall include all modes of operation, including:

1. All modes as described in the sequence of operation
2. Performance of alarms
3. Mode of operation upon a loss of power and restored power

4. The HVAC control system shall be tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with the plans and specifications.
- E. Preliminary Commissioning Report: The preliminary commissioning report, completed and certified by the registered design professional or approved agency, shall be provided to the Owner. The preliminary commissioning report shall include test procedures and results, and shall identify the following:
 1. Deficiencies found during testing which have not been corrected at the time of report preparation and the anticipated date of correction.
 2. Deferred tests which cannot be performed at the time of report preparation due to climatic conditions. Include the climatic conditions required for testing and the anticipated date of each deferred test.
 3. Record of progress and completion of operator training.
- F. Post Construction Documentation: Provide Operation and Maintenance (O&M) data, as-built record drawings, final commissioning report, and test and balance report, as specified in this section, within 90 days of the date of receipt of the Certificate of Occupancy.
- G. Final Commissioning Report: Provide a complete report of test procedures and results to the Engineer and the Owner. The report shall identify the following:
 1. Procedures and results of all functional performance tests
 2. Disposition of all deficiencies found during testing, including details of corrective measures used or proposed
- H. The Contractor is responsible to submit to the code official a commissioning compliance checklist, Figure C408.1.2.1 of the WSEC, signed by the building owner.

1.19 WARRANTY

- A. All warranty information shall be submitted as part of the "Operation and Maintenance Manual for Mechanical Systems" in this section.
- B. All warranties for mechanical and plumbing equipment shall start upon completion of commissioning.

1.20 AS-BUILT DRAWINGS

- A. The Contractor shall maintain, in addition to coordination drawings, an as-built set of prints that clearly identify all deviations from the original design. The As-Built drawings shall be drafted per one of the following methods:
 1. Draft all revisions on a separate dark layer, on the coordination drawing set. The Contractor shall maintain a copy of the original coordination drawing set.
 2. Draft all revisions on the design drawings with a red color pencil.

- B. This red lined set shall identify all drawing revisions including addenda items, change orders, and Contractor revisions.
- C. Drawings shall show locations of all underground pipe and duct installed by this Contractor. Underground pipes and ducts shall be shown with cross section elevations. All pipe, raceway, manholes, or lines of other trades shall be included.
- D. The Contractor shall update all references to specific products to indicate products actually installed on project. This shall include, but not be limited to, air handlers, heat pumps etc.
 - 1. Upon completion of the Divisions 22 and 23 Work, the Contractor shall deliver the red lined drawings and one set of neatly drafted as-built drawings on electronic media in ACAD 2015 format and PDF files to the Engineer for transmittal through the Engineer to the Owner.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Any reference to the specifications or on the drawings to any article, device, product, material, fixture, form, or type of construction by manufacturer, name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.
- B. The manufacturers listed as Approved Manufacturers are approved to bid the project for the items indicated without obtaining prior approval. Other manufacturers desiring to bid on the project require prior approval.
- C. The listing of a manufacturer as an Approved Manufacturer does not necessarily mean that the products of that manufacturer are equal to those specified. The listing is only an indication of those manufacturers which may be capable of manufacturing, or have in the past manufactured, items equal to those specified, and is intended to aid the Contractor in identifying manufacturers.
- D. Products provided by Approved Manufacturers shall be equal to or superior to the specified manufacturer's item in function, appearance, and quality, and shall fulfill all requirements of the plans and specifications. The Architect/Engineer shall be the final judge as to whether an item meets these requirements or not. If a manufacturer is not certain that his product meets these requirements or not, then the manufacturer shall submit data as required to obtain the Design Consultant's approval prior to bid opening.
- E. The approval of a manufacturer applies to the manufacturer only and does not relieve the Contractor from the responsibility of meeting all applicable requirements of the plans and specifications.
- F. Contractor shall be responsible for all costs to other trades and all revisions required in accommodating any products which are different from those specified or shown.

- G. In reviewing a manufacturer for acceptance, factors considered include the following: engineering data showing item's performance, proper local representation of manufacturer, likelihood of future manufacturer's local support of product, service availability, previous installation, previous use by Owner/Engineer/Architect, and record, product quality, availability/quality of maintenance and operation data, capacity/performance compared to specified items, acoustics, items, geometry/access utility needs, and similar concerns.
- H. If approval is received to use other than specified items, responsibility for specified capacities and ensuring that items to be furnished will fit space available lies with this Division.
- I. If non-specified equipment is used and it will not fit job site conditions, this Division assumes responsibility for replacement with items named in Specification.

2.2 ACCESS DOORS

- A. This Contractor shall be responsible for furnishing and installing flush mounted access doors in walls, ceilings, floors, and chases where the following equipment is concealed and is not accessible through same.
 - 1. Valves (shut off, balancing, control, trap primers, etc.)
 - 2. Dampers (control, balancing, fire, smoke, etc.)
- B. Doors shall be UL listed 20 ga. cold rolled steel with concealed hinge, screwdriver operated lock and prime coated. Furnish suitable for area mounted. Provide stainless steel access doors for non-painted surfaces (i.e. tile, MDF).
- C. Approved Manufacturers:
 - 1. Milcor
 - 2. Acudor
 - 3. Greenheck
 - 4. Nystrom
 - 5. Duro Dyne

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. This Contractor shall provide completed systems with a neat and finished appearance. If, in the judgment of the Engineer, any portion of the work has not been performed in a workmanlike manner or is left in a rough, unfinished state, this Contractor will be required to remove, reinstall, or replace same and patch and paint surrounding surfaces in a manner acceptable to the Engineer, without increase in cost to the Owner.

3.2 FINAL INSPECTION

A. Final Inspection:

1. Prior to acceptance of the mechanical work, the Contractor shall put all mechanical systems into operation for a period of not less than 5 working days so that they may be inspected by the Architect/Engineer and the Owner's representatives.
2. The time of the final inspection shall be mutually agreed to by the Owner, Engineer, and Contractor.
3. The Contractor shall furnish adequate staff to operate the mechanical systems during inspection.

3.3 OPERATION AND MAINTENANCE TRAINING

A. Upon completion of the work, and after all tests and final inspection of the work by the Authority(s) having jurisdiction, the Contractor shall demonstrate and instruct the Owner's designated operation and maintenance personnel in the operation and maintenance of the various mechanical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be Superintendents or Foremen knowledgeable in each system and Supplier's Representative when so specified.

B. Scheduled instruction periods shall be:

- | | |
|--|----------|
| 1. HVAC System Controls | 16 Hours |
| 2. HVAC Equipment Maintenance | 8 Hours |
| 3. Plumbing Equipment | 4 Hours |
| 4. Boiler Start-Up and Training with Factory Rep | 16 Hours |

C. The contractor shall, at a minimum, include an Owner Training sign-in sheet in the O&M Manual that indicates the start and end times of the training, and the type of training provided. Owner shall sign off on the Owner training sign-in sheet to be considered complete and satisfactory to Owner.

D. Costs for time involved by Contractor shall be included in the bid.

3.4 CLOSEOUT SUBMITTALS

A. Requirements: Final approval of mechanical installation will be recommended upon completion of the following:

1. Completion of all punchlist items
2. Owner Training Sign-In sheet with Owner's signature
3. Permit Submittal
4. Valve Diagrams
5. Reproducible As-Built drawings delivered to Architect
6. Air and/or Water Balance Report
7. Asbestos Free Statement
8. Guarantees

9. Equipment Manufacturer of all HVAC compressor units shall provide start-up logs
10. EMCS Trend Logs

3.5 PREPARATION

- A. New Buildings: Each Section of this Division shall bear the expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- B. Existing Buildings:
 1. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
 2. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes by General Contractor.
 3. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
 4. This work shall be scheduled such that utility services and/or existing systems for the facility are not interrupted during normal operating hours, without prior written permission of the Owner's representative. Work that is performed during normal operational hours shall not interfere with the normal function of the facility's daily operation.
 5. The Mechanical Contractor shall be responsible for the removal of all existing mechanical equipment and utilities indicated to be removed on the drawings. The Mechanical Contractor shall also be responsible for the removal and reinstallation of all existing mechanical equipment and utilities that will interfere with installation and operation of any new construction indicated or required and shall be responsible for the removal of all existing mechanical equipment and utilities indicated to be abandoned that will interfere with installation and operation of any new construction indicated or required. All mechanical equipment (other than piping) to be removed shall remain the property of the Owner, and shall be transported, stored, or disposed of, as directed by the Owner. This will be at no cost to the Owner.

3.6 INSTALLATION

- A. Install mechanical equipment to permit easy access for normal maintenance, and so that parts requiring periodic replacement or maintenance, (e.g., coils, heat exchanger bundles, sheaves, filters, motors, bearings, etc.) can be removed. Relocate items which interfere with access.
- B. Provide access doors in equipment, ducts, and walls/ceilings as required to allow for inspection and proper maintenance.
- C. Valves, damper operators, and other devices which are manually adjusted or operated shall be located so as to be easily accessible by a person standing on the floor. Any such items which are not in the open shall be made accessible through access openings in the building construction.
- D. Gauges, thermometers, instrumentation, and other components which are installed to monitor equipment performance, operating conditions, etc., shall be oriented so as to be easily read by a person standing on the floor. Provide necessary brackets and hangers as needed.

- E. If circumstances at a particular location make the accessible installation of an item difficult or inconvenient, the situation shall be discussed with the Architect/Engineer before installing the item in a poor access location.
- F. Belts, pulleys, couplings, projecting set screws, keys, and other rotating parts which may pose a danger to personnel, shall be fully enclosed or guarded in accordance with OSHA regulations.
- G. Dissimilar Metals: Provide separations between all dissimilar metals. Where not specified in another way, use 10 mil black plastic tape wrapped at point of contact or plastic centering inserts.
- H. Provide offsets around all electrical panels (and similar electrical equipment) to maintain space clear above and below panel to structure and clearance of 3.5 feet directly in front of panel, except where indicated otherwise or required by NEC to be more. Such offsets are typically not shown on the drawings but are required per this paragraph.
- I. Piping Through Framing: Piping through framing shall be installed in the approximate center of the member. Where located such that nails or screws are likely to damage the pipe, a steel plate at least 1/16-inch thick shall be installed to provide protection. At metal framing, wrap piping to prevent contact of dissimilar metals. At metal and wood framing, provide plastic pipe insulators at piping penetrations through framing nearest each fixture and on at least 48-inch centers.
- J. Safety Protection: All ductwork, piping, and related items installed by this Contractor that present a safety hazard (i.e., items installed at/near head height, items projecting into maintenance access paths, etc.) shall be covered (at hazardous area) with 3/4" thick elastomeric insulation and 2" wide reflective red/white striped self-sticking safety tape.
- K. Equipment Access: Access to equipment is of utmost importance. Contractor shall apply extra attention to the laying out of pipe and duct routings, and in coordinating all work. Poor access to equipment will not be accepted. Contractor shall note that in essentially all areas, piping routed in ceiling space needs to run in joist space, necessitating elbows/fittings/transitions at crosses with other trades, at structural beams, and at all connections to mains and branches. Hatched areas at HVAC units indicate equipment access areas. These (and all other) access areas shall be clear of obstructions. The Mechanical Contractor is responsible to coordinate and ensure that all trades stay clear of access areas for any Divisions 22 and 23 furnished equipment.
- L. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.
- M. Pipe Installation: Install piping in longest reasonable lengths. The use of short lengths of pipe with multiple couplings where a single length of pipe could have been used is not acceptable.

3.7 CONCRETE BASES

- A. Provide a 3-inch high "minimum" concrete base under boilers, hot water tanks, and floor-mounted pumps located in mechanical/utilities spaces. Provide 6" thick structural concrete pad for equipment located outside the building or as detailed on drawings.

3.8 ADJUSTMENT AND CLEANING

- A. Properly lubricate equipment before Owner's acceptance.
- B. Clean exposed piping, ductwork, equipment, and fixtures, remove debris from site. Repair all damaged finishes and leave everything in working order.
- C. Remove stickers from fixtures and adjust flush valves.

3.9 PAINTING

- A. Paint all exposed pieces of equipment if not factory finished or painted under the Architectural Section of these specifications. Paint shall be one coat of primer, and two coats of enamel color as directed by the Architect.

3.10 REBATES

- A. Furnish vendor invoices on heat pumps to Owner after installation for power company rebates.

3.11 REQUESTS FOR INFORMATION (RFI)

- A. It is our intent to provide a timely response for RFIs regarding Divisions 22 and 23 Work. To further expedite this process, if a suggestion can be determined or derived at by the initiator of the RFI, it is required this suggestion be supplied with the submitted RFI. If no suggestion is given where one is possible, the RFI will be returned as incomplete. RFI's will be returned to the Contractor within seven (7) business days from the time received by the Architect/Engineer Representative.

END OF SECTION 200000

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SECTION 220300 - EXCAVATION AND BACKFILL FOR MECHANICAL UNDERGROUND UTILITIES

PART 1 - GENERAL

1.1 GENERAL INCLUDES

- A. Excavation and Associated Grading
- B. Trenching and Trench Protection
- C. Backfilling and Compaction
- D. Verification of Existing Utilities
- E. Protection of Utilities

1.2 RELATED SECTIONS

- A. Section 221005 - Plumbing Piping
- B. Section 231100 - Natural Gas

1.3 QUALITY ASSURANCE

- A. Inspection of Job Conditions: Prior to starting work and during work, the installer shall examine the work by others, site and job conditions under which excavation, trenching, and backfilling for underground utilities work will be performed, and notify the General Contractor in writing of unsatisfactory conditions or work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Codes and Standards: Comply with requirements of the following codes and standards (Latest Edition) except as modified herein:
 - 1. International Conference of Building Officials, "Uniform Building Code"
 - 2. Local requirements for all utility work
 - 3. OSHA and WISHA regulations
 - 4. APWA Standard Specifications

1.4 RESPONSIBILITY

- A. The Contractor is solely responsible for compliance with the requirements of the drawings, specifications, local codes and standards, proper construction coordination with work of other trades, and protection and worker's safety. Contractor shall advise Design Consultant of any discrepancy in, or disagreement with, the specifications and/or drawings prior to starting work and not proceed until issue is resolved. Commencement of work shall indicate Contractor's acknowledgement of his expertise in this type of work. Any delay resulting from failure to comply with this procedure will not be the basis for an extension of the completion date.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced.
- B. American Society of Testing and materials (ASTM) publications:
- | | | |
|----|-----------|---|
| 1. | D 422-63 | Particle Size Analysis of Soils |
| 2. | D 423-66 | Liquid Limit of Soils |
| 3. | D 424-59 | Plastic Limit and Plasticity Index of Soils |
| 4. | D 1557-78 | Moisture Density Relations of Soils using a 10 lb. (4.54kg) Rammer and 18-inch (457 mm) Drop |
| 5. | D 2167-66 | Density of Soil In-Place by the Rubber Balloon Method |
| 6. | D 2217-66 | Wet preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Contents |
| 7. | D 2487-69 | Classification of Soils for Engineering Purposes |
| 8. | D 2922-81 | Test Methods for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth) |
| 9. | E 548-79 | Generic Criteria for Use in the Evaluation of Testing and Inspection Agencies |

1.6 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

Not Applicable

PART 2 - MATERIALS

2.1 APPROVED MANUFACTURERS

Not applicable

2.2 SATISFACTORY MATERIALS

- A. Materials classified as ASTM D2487, Unified Soil Classification System as SW, SP, GW, and GP are satisfactory for backfill use. Materials classified as SP-SM, GP-GM, GM, GC, and ML are also satisfactory for backfill use provided that they contain moisture contents suitable for the intended use and are reasonably free of organic matter. Native material, not considered unsatisfactory as specified below, may comply, except that no material shall have any object with a dimension exceeding 2 inches.

2.3 UNSATISFACTORY MATERIALS

- A. Materials classified in ASTM D2487, Unified Soil Classification System as PT, OH, and OL are unsatisfactory. Unsatisfactory materials also include man-made fills, refuse and all materials containing excessive organic matter or having moisture contents which are not suitable for the intended use, or having objects with dimensions exceeding 2 inches (boulders, etc.).

2.4 UNSTABLE MATERIAL

- A. Unstable material shall consist of material too wet to properly support the utility pipe, conduit or appurtenance structure.

2.5 GRAVELLY SAND BORROW MATERIAL

- A. Gravelly sand borrow material to provide backfill, or replace unsuitable soil, shall meet the requirements of SW, SP, GW, and GP materials, except that the maximum percentage passing the No. 200 sieve shall not exceed 5% based on the soil fraction passing the U.S. No. 4 sieve, and not contain discrete particles greater than 2 inches in diameter.

2.6 DEGREE OF COMPACTION

- A. Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557, Method C. Minimum compaction requirements shall be as specified in PART 3.

2.7 DRAINAGE GRAVEL

- A. Shall be 3/4-inch washed gravel with no more than 2% passing 1/2-inch sieve opening.

2.8 SPECIAL BEDDING AND INITIAL BACKFILL MATERIAL

- A. Minus 3/8-inch washed pea gravel

Unified Soil Classification (USC) System (from ASTM D 2487)				
Major Divisions			Group Symbol	Typical Names
Course-Grained Soils More than 50% retained on the No. 200 sieve	Gravels 50% or more of course fraction retained on the No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands 50% or more of course fraction passes the No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils More than 50% passes the No. 200 sieve	Silts and Clays Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock four, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Prefix: G = Gravel, S = Sand, M = Silt, C = Clay, O = Organic Suffix: W = Well Graded, P = Poorly Graded, M = Silty, L = Clay, LL < 50%, H = Clay, LL > 50%

PART 3 - EXECUTION

3.1 EXCAVATION

- A. If workers enter any trench or other excavation four or more feet in depth that does not meet the open pit requirements of WSDOT Section 2.09.3(3)B, it shall be shored and cribbed. The Contractor alone shall be responsible for worker safety. All trench safety systems shall meet the requirements of the Washington Industrial Safety and Health Act, Chapter 49.17 RCW.

- B. Excavation of every description and of whatever substances encountered shall be performed to allow the installation of all utilities at the lines and grades as required. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides or cave-ins. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes, or other approved methods. The stockpiles shall also be protected from contamination with unsatisfactory excavated material or other material that may destroy the quality and fitness of the suitable stockpiled material.
- C. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on-site or imported material from approved sources at no additional cost to the Owner.
- D. Excavated material not required or not satisfactory for backfill shall be removed from the site and shall be disposed of off site, at the Contractor's expense, at the Contractor's waste area. Any excess satisfactory excavated materials shall not be mixed with unsatisfactory materials. Unsatisfactory materials shall not cover available suitable materials or be disposed of in such a manner as to interfere with subsequent borrow operations.
- E. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed so that the stability of the bottom and sides of the excavation is maintained. Unauthorized over-excavation shall be backfilled in accordance with paragraph 3.05 BACKFILLING at no additional cost to the Owner.
- F. The Contractor shall provide any dewatering needed and is considered incidental to the Contract.

3.2 TRENCH EXCAVATION

- A. The trench shall be excavated as recommended by the manufacturer of the pipe to be installed unless shown otherwise on the drawings. Where recommended trench widths are exceeded, redesign shall be performed by the Contractor using stronger pipe or special installation procedures. The cost of this redesign and the increased pipe or installation procedures shall be borne by the Contractor without additional cost to the Owner.
- B. Bottom Preparation: The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe and for bedding. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 2 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.
- C. Removal of Unsuitable Material: Where unsuitable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph 3.05 BACKFILLING. When removal of unsuitable material is required due to the fault or neglect of the Contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Owner.

- D. Bedding: The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. The pipe shall be bedded carefully in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of pipe or arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type of joint. Provide bedding using pea gravel where noted on the drawings.

3.3 EXCAVATION FOR APPURTENANCES

- A. Excavation for manholes, catch basins, inlets, or similar structures below ground shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.4 JACKING, BORING, AND TUNNELING

- A. Unless otherwise indicated, excavation shall be by open cut, except that sections of a trench may be jacked, bored, or tunneled if the pipe, cable or duct can be safely and properly installed and backfill can be properly tamped in such sections.

3.5 BACKFILLING

- A. Backfill material shall be compacted to 6" layers and as specified in Paragraph 3.07.
 - 1. Trench Backfill: Trenches shall be backfilled to finish grade. The trench shall be backfilled to above the top of pipe prior to performing the required pressure tests (except that where piping requires insulation, the pipe shall have an initial test prior to insulating and then a final test as specified herein). The joints and couplings shall be left uncovered during the pressure test.
 - 2. Replacement of Unstable Material: Unstable material removed from the bottom of the trench of excavation shall be replaced with select granular material or gravel borrow placed in layers not exceeding 6 inches loose thickness.
 - 3. Bedding and Initial Backfill: Bedding shall consist of satisfactory materials. Initial backfill shall be in a 6-inch lift.

3.6 SPECIAL REQUIREMENTS

- A. Special requirements for excavation, backfill, and bedding relating to the specific utilities are as follows:
 - 1. Combination Fire/Water Lines: Trenches shall be of a depth to provide a minimum cover of 3.5 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. Bedding shall use "special bedding" materials as specified in paragraph 2.07.

2. Domestic Water Lines: Trenches shall be of a depth to provide a minimum cover of 3.0 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. Except that branch lines serving individual fixtures within building footprint shall have minimum of 1.0-foot cover. Bedding shall use "special bedding" materials as specified in paragraph 2.07.
3. Backflow Preventer Fire Vault: Provide special bedding as specified in this Section.
4. Chilled Water Lines: Provide special bedding as specified in this Specification Section.
5. Where piping passes under footings, provide concrete fill starting 12 inches above pipe for excavated length and width of footing above pipe for footing support. Concrete specification shall match same provided for footing.

3.7 COMPACTION

- A. Each layer of fill, or the excavated subgrade, shall be compacted to at least 95%, per ASTM D1557, of laboratory maximum density. Compaction shall be accomplished by approved tamping rollers, pneumatic-tired rollers, three-wheel power rollers, or other approved compaction equipment.

3.8 PROTECTION

- A. Newly graded excavated or bedded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes.

END OF SECTION 220300

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SECTION 220513 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. General construction and requirements
- B. Single phase electric motors
- C. Three phase electric motors
- D. Electronically Commutated Motors (ECM)

1.2 RELATED REQUIREMENTS

- A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections
- B. Section 262913 - Enclosed Controllers

1.3 REFERENCE STANDARDS

- A. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2004
- B. NEMA MG 1 - Motors and Generators; 2017
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements

1.4 SUBMITTALS

- A. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- C. Operation Data: Include instructions for safe operating procedures.
- D. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.5 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. All motors shall be UL listed.
- C. Motors shall not be smaller than indicated on drawings; however, motors shall be of adequate size to drive the respective equipment when handling the quantities specified without exceeding the nameplate full load current at any conditions encountered in actual operation. If it becomes evident that a motor furnished is too small to meet these requirements as a result of the Contractor using substituted equipment or having revised the system arrangement, the Contractor shall replace it with a motor of adequate size at no additional cost to the Owner. This Contractor shall also arrange with the Electrical Contractor to increase the size of the wiring, motor starter, and other accessories as required to serve the larger motor at no additional cost to the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Baldor Electric Company/ABB Group
- B. Leeson Electric Corporation
- C. General Electric
- D. Westinghouse
- E. Reliance
- F. Allis-Chalmers
- G. Gould
- H. Century
- I. Wagner
- J. US Motors Marathon
- K. Regal-Beloit Corporation (Century)

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 260583 for required electrical characteristics.
- B. Nominal Efficiency:
 - 1. All motors 1 HP and larger shall be energy efficient type and shall meet the 2015 Washington State Energy Code requirements.
- C. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Motors located outdoors exposed to weather shall have corrosion resistant finish and shall be totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) type.
 - 3. Design for continuous operation in 104 degrees F environment.
 - 4. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, and power factor.
- E. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.3 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque
- B. Starting Current: Up to seven times full load current
- C. Breakdown Torque: Approximately 200 percent of full load torque
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.4 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque
- B. Starting Current: Up to six times full load current
- C. Multiple Speed: Through tapped windings

- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector

2.5 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque
- B. Starting Current: Less than five times full load current
- C. Pull-up Torque: Up to 350 percent of full load torque
- D. Breakdown Torque: Approximately 250 percent of full load torque
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.6 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque
- B. Starting Current: Six times full load current
- C. Power Output, Locked Rotor Torque, Breakdown or Pull-Out Torque: NEMA Design B characteristics
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors
- E. Insulation System: NEMA Class B or better
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 262913
- I. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.

- J. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112
- K. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112

2.7 VARIABLE FREQUENCY DRIVES

- A. See Section 230513 Common Motor Requirements.

2.8 ELECTRONICALLY COMMUTATED MOTORS (ECM)

- A. Manufacturers:
 - 1. US Motors, a brand of NIDEC Motor Corporation
- B. ECM shall conform to the motor requirements listed above. In addition, the Contractor purchasing the equipment that includes the ECM is responsible for ensuring the ECM motor speed control is set to match the required component operation. The ECM motor speed control may be preset by the equipment manufacturer. The Contractor purchasing the equipment shall provide documentation showing the appropriate ECM motor control board jumper pins, dip switches and/or multi-pin plugs settings for correct HVAC equipment component operation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION 220513

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SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe sleeves
- B. Pipe sleeve-seals

1.2 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping

1.3 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017)

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures
- B. Seals

1.5 QUALITY ASSURANCE

- A. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

PART 2 - PRODUCTS

2.1 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2-inch angle set in silicon adhesive around opening.

4. Drilled Penetrations: Provide 1-1/2-inch angle ring or square set in silicone adhesive around penetration.
- B. Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- C. Pipe Passing Through Below Grade Exterior Walls:
 1. Zinc coated or cast-iron pipe
 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 2. Connect sleeve with floor plate except in mechanical rooms.
- E. Pipe Passing Through Mechanical, Laundry, and Kitchen above Basement:
 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 2. Connect sleeve with floor plate except in mechanical rooms.
- F. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.
- G. Clearances:
 1. Provide allowance for insulated piping.
 2. Wall, Floor, Partitions, and Beam Flanges: 0.5 inch greater than external/pipe diameter.
 3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.2 PIPE-SLEEVE SEALS

- A. Manufacturers:
 1. Flexicraft Industries; PipeSeal
 2. GPT Thunderline; Link-Seal
- B. Modular/Mechanical Seal:
 1. Provide watertight seal between pipe and wall/casing opening.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

- B. Remove scale and foreign material, from inside and outside, before assembly.

3.2 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Structural Considerations:
- E. Provide sleeves when penetrating footings, floors, walls, partitions, and similar elements. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 - 3. All Rated Openings: Caulk tight with fire stopping material conforming to ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
 - 4. Caulk exterior wall sleeves watertight with mechanically expandable chloroprene inserts with mastic-sealed components.
- F. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 - 3. Locate piping in the center of sleeve or penetration.
 - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 - 5. Tighten bolting for a water-tight seal.
 - 6. Install in accordance with manufacturer's recommendations.
- G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
- H. Insulation shall run continuous through sleeves in non-fire rated elements. Insulation shall not run continuous through sleeves in fire rated elements unless the fire sealant system used is UL accepted for use with insulated pipes.

- I. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade.

END OF SECTION 220517

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Angle valves
- B. Ball valves
- C. Butterfly valves
- D. Check valves
- E. Gate valves
- F. Globe valves
- G. Lubricated plug valves
- H. Thermostatic balancing valves
- I. Balancing valves

1.2 RELATED REQUIREMENTS

- A. Section 200000 - General Mechanical Requirements
- B. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment
- C. Section 220553 - Identification for Plumbing Piping and Equipment
- D. Section 220719 - Plumbing Piping Insulation
- E. Section 221005 - Plumbing Piping
- F. Section 221500 - General-Service Compressed-Air Systems

1.3 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure
- B. EPDM: Ethylene propylene copolymer rubber
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber
- D. NRS: Non-rising stem

- E. OS&Y: Outside screw and yoke
- F. PTFE: Polytetrafluoroethylene
- G. RS: Rising stem
- H. TFE: Tetrafluoroethylene
- I. WOG: Water, oil, and gas

1.4 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017
- D. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2017
- E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012
- F. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017
- G. ASME B31.9 - Building Services Piping; 2014
- H. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017
- I. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2016)
- J. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2014)
- K. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014)
- L. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings; 2015
- M. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017
- N. AWWA C606 - Grooved and Shouldered Joints; 2015
- O. MSS SP-45 - Bypass and Drain Connections; 2003 (Reaffirmed 2008)
- P. MSS SP-67 - Butterfly Valves; 2017
- Q. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; 2011
- R. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011, with Errata (2013)

- S. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a
- T. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; 2011
- U. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013
- V. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; 2011
- W. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010
- X. MSS SP-125 - Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves; 2010
- Y. NSF 61 - Drinking Water System Components - Health Effects; 2017
- Z. NSF 372 - Drinking Water System Components - Lead Content; 2016

1.5 SUBMITTALS

- A. Product Data: Provide data on valves including manufacturer's catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
- C. Maintenance Materials: Furnish Owner with one wrench for every ten plug valves, in each size of square plug valve head.

1.6 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from a single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Welding Materials and Procedures: Conform to ASME BPVC-IX.
- C. Domestic water fittings, joining materials, and all other appurtenances in contact with potable water shall be lead-free except those specifically exempted in Section 3874 of the Safe Water Drinking Act.
 - 1. Lead-free shall mean:
 - a. Not containing more than 0.2% lead when used with respect to solder and flux; and
 - b. Not more than a weighted average of 0.25% when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
5. Secure check valves in either the closed position or open position.
6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:

1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain them in place until installation.
 - a. Store valves indoors in a dry environment.
 - b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:

1. Handle large valves with sling, modified to avoid damage to exposed parts.
2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 - PRODUCTS

2.1 APPLICATIONS

A. See drawings for specific valve locations.

B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

C. Provide the following valves for the applications if not indicated on drawings:

1. Shutoff: Ball, butterfly, gate
2. Dead-End: Single-flange butterfly (lug) type
3. Throttling: globe or butterfly
4. Swing Check (Pump Outlet):
 - a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc
 - b. 2-1/2 NPS and Larger for Domestic Water: Iron swing check valves with closure control, metal or resilient seat check valves

D. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.

E. Required Valve End Connections for Non-Wafer Types:

1. Steel Pipe:

- a. 2 inch and Smaller: Threaded ends
- b. 2-1/2 inch to 4 inches: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below
- c. 5 inch and Larger: Grooved or flanged ends
- d. Grooved-End Copper Tubing and Steel Piping: Grooved

2. Copper Tube:

- a. 2 inch and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below
- b. 2-1/2 inch to 4 inches: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below
- c. 5 inch and Larger: Grooved or flanged ends

F. Low Pressure, Compressed Air Valves 150 psig or Less:

1. 2 NPS and Smaller:

- a. Ball: One-piece, full port, bronze with bronze trim
- b. Bronze Lift Check: Class 125, bronze disc
- c. Bronze Swing Check: Class 125, bronze disc
- d. Bronze Gate: Class 125, NRS

2. 2-1/2 NPS and Larger:

- a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded or press ends.
- b. Iron Single-Flange Butterfly: 200 CWP, NBR Seat, aluminum-bronze disc
- c. Iron Grooved-End Butterfly: 175 CWP
- d. Iron Swing Check: Class 125, metal seats
- e. Iron Grooved-End Swing Check: 300 CWP
- f. Iron Center-Guided Check: Class 125, compact-wafer, metal seat
- g. Iron Plate-Type Check: Class 125; single plate; metal seat
- h. Iron Gate: Class 125, NRS

G. Domestic, Hot and Cold Water Valves:

1. 2 NPS and Smaller:

- a. Ball: One-piece, full port, bronze with bronze trim
- b. Bronze Swing Check: Class 125, bronze disc
- c. Bronze Gate: Class 125, NRS
- d. Bronze Globe: Class 125, bronze disc

2. 2-1/2 NPS and Larger:

- a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded or flanged ends
- b. Iron Ball: Class 150

- c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, aluminum-bronze disc
- d. Iron Grooved-End Butterfly: 175 CWP
- e. Iron Swing Check: Class 125, metal seats
- f. Iron Swing Check with Closure Control: Class 125, lever and spring
- g. Iron Grooved-End Swing Check: 300 CWP
- h. Iron Center-Guided Check: Class 125, compact-wafer, metal seat
- i. Iron Plate-Type Check: Class 125; single plate; metal seat
- j. Iron Gate: Class 125, NRS
- k. Iron Globe: Class 125

2.2 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
 - 1. Handwheel: Valves other than quarter-turn types
 - 2. Hand Lever: Quarter-turn valves 6 NPS and smaller
 - 3. Wrench: Plug valves with square heads
- D. Valves in Insulated Piping: With 2 NPS stem extensions and the following features:
 - 1. Gate Valves: Rising stem
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck
 - 4. Memory Stops: Fully adjustable after insulation is installed
- E. Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves
 - 3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inches: ASME B16.5
 - 4. Solder Joint Connections: ASME B16.18
 - 5. Grooved End Connections: AWWA C606
- F. General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34
 - 2. Solder-joint Connections: ASME B16.18
 - 3. Building Services Piping Valves: ASME B31.9
- G. Valve Materials for Potable Water: NSF 61 and NSF 372
- H. Bronze Valves:

- I. Valve Bypass and Drain Connections: MSS SP-45
- J. Source Limitations: Obtain each valve type from a single manufacturer.

2.3 BRONZE, ANGLE VALVES

- A. Class 125: CWP Rating: 200 psig:
 - 1. Comply with MSS SP-80, Type 1
 - 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet
 - 3. End Connections: Pipe thread
 - 4. Stem: Bronze
 - 5. Disc: Bronze
 - 6. Packing: Asbestos free
 - 7. Handwheel: Bronze or aluminum
 - 8. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo
 - d. McGuire
 - e. Chicago Faucets

2.4 BRONZE, BALL VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. One Piece, Reduced Port with Bronze Trim:
 - 1. Comply with MSS SP-110
 - 2. WSP Rating: 400 psi
 - 3. CWP Rating: 600 psi
 - 4. Body: Bronze
 - 5. End Connections: Pipe press
 - 6. Seats: PTFE
- C. Two Piece, Full Port with Stainless Steel Trim:
 - 1. Comply with MSS SP-110
 - 2. WSP Rating: 150 psi
 - 3. WOG Rating: 600 psi
 - 4. Body: Forged bronze or dezincified-brass alloy
 - 5. Ends Connections: Pipe thread or solder
 - 6. Seats: PTFE or TFE
 - 7. Stem: Bronze, blowout proof
 - 8. Ball: Stainless steel, vented

9. Manufacturers:

- a. Nibco
- b. Stockham
- c. Apollo
- d. Jomar

D. Three Piece, Full Port with Stainless Steel Trim:

- 1. Comply with MSS SP-110
- 2. WSP Rating: 150 psi
- 3. CWP Rating: 600 psi
- 4. Body: Bronze
- 5. End Connections: Pipe thread or press
- 6. Seats: PTFE or TFE
- 7. Stem: Stainless steel
- 8. Ball: Stainless steel, vented
- 9. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo
 - d. Jomar

2.5 STAINLESS STEEL, BALL VALVES

A. Two Piece, Full Port with Stainless Steel Trim:

- 1. Comply with MSS SP-110
- 2. WSP Rating: 150 psi
- 3. CWP Rating: 2,000 psi
- 4. Seats: PFTE
- 5. Stem: Stainless steel, blowout proof
- 6. Ball: Stainless steel, vented
- 7. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

B. Three Piece, Full Port with Stainless Steel Trim:

- 1. Comply with MSS SP-110
- 2. WSP Rating: 150 psi
- 3. WOG Rating: 2,000 psi
- 4. Seats: PFTE
- 5. Stem: Stainless steel, blowout proof
- 6. Ball: Stainless steel, vented
- 7. Bolts: Stainless steel

8. Manufacturers:

- a. Nibco
- b. Stockham
- c. Apollo

2.6 IRON, BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:

- 1. Comply with MSS SP-72
- 2. CWP Rating: 200 psi
- 3. Body: ASTM A536, Grade 65-45-12, ductile iron
- 4. End Connections: Flanged
- 5. Seats: PTFE or TFE
- 6. Stem: Stainless steel
- 7. Ball: Stainless steel
- 8. Operator: Lever with locking handle
- 9. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.7 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead-end service without use of downstream flange

- 1. Comply with MSS SP-67, Type I
- 2. Body Material: ASTM A126, cast iron or ASTM A536, ductile iron
- 3. Stem: One or two-piece stainless steel
- 4. Seat: EPDM
- 5. Disc: Stainless steel
- 6. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.8 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psig (1200 kPa)

- 1. Comply with MSS SP-67, Type I
- 2. Body: Coated ductile iron
- 3. Stem: Two-piece stainless steel
- 4. Disc: Coated ductile iron
- 5. Disc Seal: EPDM

6. Manufacturers:

- a. Nibco
- b. Stockholm
- c. Apollo

2.9 BRONZE, LIFT CHECK VALVES

A. General:

- 1. Fabricate from dezincification resistant material.
- 2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125:

- 1. Comply with MSS SP-80, Type 1, Metal Disc to Metal Seat and Type 2, Nonmetallic Disc to Metal Seat.
- 2. CWP Rating: 200 psi
- 3. Design: Vertical flow
- 4. Body: Comply with ASTM B61 or ASTM B62, bronze
- 5. End Connections: Threaded
- 6. Disc (Type 1): Bronze
- 7. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.10 BRONZE, SWING CHECK VALVES

A. General:

- 1. Fabricate from dezincification resistant material.
- 2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125: CWP Rating: 200 psig (1380 kPa).

- 1. Pressure and Temperature Rating: MSS SP-80, Type 3
- 2. Design: Y-pattern, horizontal or vertical flow
- 3. Body: Bronze, ASTM B62
- 4. End Connections: Threaded
- 5. Disc: Bronze
- 6. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.11 IRON, HORIZONTAL SWING CHECK VALVES

A. Class 125:

1. Pressure and Temperature Rating: MSS SP-71, Type I
2. WOG Rating: 200 psi
3. Body: ASTM A126, gray cast iron with bolted bonnet
4. End Connections: Flanged
5. Trim: Composition
6. Seat Ring and Disc Holder: Bronze
7. Disc: PTFE or TFE
8. Gasket: Asbestos free
9. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.12 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125 with Lever and Spring-Closure Control:

1. Comply with MSS SP-71, Type I
2. Description:
 - a. CWP Rating: 200 psi
 - b. Design: Clear or full waterway
 - c. Body: ASTM A126, gray iron with bolted bonnet
 - d. Ends: Flanged as indicated
 - e. Trim: Bronze
 - f. Gasket: Asbestos free
 - g. Closer Control: Factory installed, exterior lever, and weight
3. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.13 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP:

1. CWP Rating: 300 psi
2. Body: ASTM A536, Grade 65-45-12 ductile iron
3. Seal: EPDM
4. Disc: Ductile iron
5. Coating: Black, non-lead paint

6. Manufacturers:

- a. Nibco
- b. Stockham
- c. Apollo

2.14 IRON, CENTER-GUIDED CHECK VALVES

A. Class 125, Compact-Wafer:

- 1. Comply with MSS SP-125
- 2. CWP Rating: 200 psi
- 3. Body: 316 stainless steel
- 4. Metal Seat: Stainless steel
- 5. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo
 - d. Wheatly
 - e. Hammond

2.15 BRONZE, GATE VALVES

A. General:

- 1. Fabricate from dezincification resistant material.
- 2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Non-Rising Stem (NRS):

- 1. Class 125: CWP Rating: 200 psig
- 2. Ends: Threaded or solder joint
- 3. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.16 IRON, GATE VALVES

A. NRS:

- 1. Pressure and Temperature Rating: MSS SP-70, Type I
- 2. Class 125: CWP Rating: 200 psig
- 3. Body: ASTM A126, gray iron with bolted bonnet
- 4. End Connections: Flanged
- 5. Trim: Bronze

6. Disc: Solid wedge
7. Packing and Gasket: Asbestos free.
8. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.17 BRONZE, GLOBE VALVES

A. General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125: CWP Rating: 200 psig:

1. Disc: PTFE.
2. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.18 IRON, GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:

1. Comply with MSS SP-85, Type I
2. Body: Gray iron; ASTM A126, with bolted bonnet
3. Connection Ends: Flanged.
4. Trim: Bronz
5. Packing and Gasket: Asbestos free, adjustable
6. Operator: Handwheel or chainwheel
7. Manufacturers:
 - a. Nibco
 - b. Stockham
 - c. Apollo

2.19 BALANCING VALVES

- A. Each valve shall have two 1/4" NPT brass metering ports with Nordel check valves and gasketed caps located on both sides of valve seat. Two additional 1/4" NPT connections with brass plugs are to be provided on the opposite side of the metering ports for use as drain connections. Drain connections and metering ports are to be interchangeable to allow for measurement flexibility when valves are installed in tight locations.

- B. Valves are to be of the "Y" pattern, modified, equal percentage globe style, and provide three functions:
 - 1. Precise flow measurement
 - 2. Precision flow balancing
 - 3. Positive drip tight shut off
- C. Valves shall provide multi-turn, 360° adjustable with a micrometer type indicator located on valve handwheel. Valve handwheel shall have a memory feature, which will provide a means for locking the valve position after the system is balanced. 90° turn adjustable valves are not acceptable.
- D. Valve Sizes 1/2" - 2": Valve body shall be bronze with ultra-high strength engineered resin or stainless-steel plug. The plug shall have precision-contoured channels to distribute flow uniformly across valve seat. Low-lead brass stem and high strength resin handwheel and sleeve. Valves shall have a minimum of four full 360° handwheel turns.
- E. Single Turn Mini Sweat Size (1/2" to 3/4"):
 - 1. Valve shall be a globe style design with bronze body, solder end connection, bronze trim with EPDM plug, high strength resin handwheel with valve position locking inserts, and two 1/4" NPT brass metering ports with Nordel check valves and gasketed caps located on both sides of the valve seat.
 - 2. Valve shall provide three functions:
 - a. Precision flow measurement
 - b. Precision flow balancing
 - c. Positive drip tight shut-off
 - 3. Valve shall provide 360° single turn adjustment range with indicating scale on valve handwheel.
 - 4. The valve shall be installed with flow in the direction of the arrow on the valve body and installed at least five pipe diameters downstream from any fitting, and at least ten pipe diameters downstream from any pump, with two pipe diameters downstream from the valve free of any fittings. When installed, easy unobstructed access to the valve handwheel and metering ports for adjustment and measurements shall be provided. Mounting of valve in piping must prevent sediment build-up in metering ports.
- F. Insulation (1/2" to 2"):
 - 1. Each valve shall be furnished with a pre-formed removable PVC insulation jacket to meet ASTM D 1784/class 14253-C, MEA#7-87, ASTM-E-84 and ASTM-136 with a flame spread rating of 50 or less. There will be provided sufficient mineral fiberglass insulation to meet ASHRAE 90.1-1989 specifications in operating conditions with maximum Fluid Design Operating Temperature Range of 141-200°F and Mean Rating Temperature of 125°F.
- G. Manufacturers:
 - 1. Red-White Valve

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges is completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should the valve be determined to be defective, replace it with a new valve.

3.2 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Lift Check: Install with stem plumb and vertical.
 - 2. Swing Check: Install horizontal maintaining hinge pin level.
 - 3. Orient plate-type and center-guided into horizontal or vertical position, between flanges.

3.3 INSTALLATION OF THERMOSTATIC BALANCING VALVES

- A. Install Thermostatic Balancing Valves in each domestic hot water return piping branch beyond last hot water device on that branch.

END OF SECTION 220523

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SECTION 220548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Seismic Restraints shall be bidder-designed. Seismic Design Criteria are to be established per the International Building Code and ASCE along with Project Structural drawings.
- B. Items not included in this specification shall not relieve the contractor of the responsibility of providing seismic bracing that meets all the criteria required by the referenced codes and in accordance with the seismic design guidelines and the project structural drawings.

1.2 SECTION INCLUDES

- A. Vibration-isolated equipment support bases
- B. Vibration isolators
- C. External seismic snubber assemblies
- D. Seismic restraint systems
- E. Vibration-isolated and/or seismically engineered roof curbs

1.3 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete

1.4 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; 2016
- B. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016
- C. MFMA-4 - Metal Framing Standards Publication; 2004
- D. ICC (IBC) - International Building Code; 2018
- E. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008
- F. Applicable Project Structural Drawings for Seismic Design Criteria

- G. Applicable Manufacturer's Seismic Design Guides for Proprietary listed seismic braces and mounting hardware

1.5 SEISMIC DESIGN CRITERIA

- A. Occupancy Category of Structure (I-IV) per ICC (IBC) or ASCE 7
- B. Component Importance Factor (I_p) per ASCE 7
- C. Mapped Acceleration Parameters (S_1 and (S_s) per ICC (IBC) and Project Structural Drawings
- D. Site Class (A - F) per ICC (IBC) and Project Structural Drawings
- E. Site Coefficient (F_a) per ICC (IBC) and Project Structural Drawings
- F. Site Coefficient (F_v) per ICC (IBC) and Project Structural Drawings
- G. Seismic Design Category (A - D) based on Short Period Response Accelerations per ICC (IBC) and Project Structural Drawings
- H. Seismic Design Category (A - D) based on 1-Second Period Response Acceleration per ICC (IBC) and Project Structural Drawings
- I. Amplification Factor a_p per ASCE 7
- J. Response Modification Factor R_p per ASCE 7

1.6 SUBMITTALS

- A. Shop Drawings:
 - 1. Include the seal of the Professional Engineer registered in the State of Washington in which the Project is located, on drawings and calculations which at a minimum include the following:
- B. Periodic Special Inspections: The mechanical contractor shall provide a list of components/systems requiring periodic special inspections per ICC (IBC).
- C. Special Certification Requirements: Each contractor responsible for the construction of a "Designated Seismic System" for active plumbing equipment that must remain operable following the design earthquake, or components with hazardous contents certified by the manufacturer to maintain containment following the design earthquake, shall submit a Manufacturer's Certificate of Compliance for review and approval by the Registered Design Professional responsible for the design of the system. This information shall then be submitted to the AHJ.

1.7 QUALITY ASSURANCE

- A. Comply with applicable building code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Kinetics Noise Control, Inc
- B. Mason Industries
- C. Vibration Eliminator Company, Inc

2.2 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. All vibration isolators, base frames, and inertia bases are to conform to all uniform deflection and stability requirements under all operating loads.

2.3 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

2.4 VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.

2.5 EXTERNAL SEISMIC SNUBBER ASSEMBLIES

- A. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.
- B. Seismic Snubbing Elements:
 - 1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
 - 2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.
- C. Lateral External:
 - 1. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.

D. Omni Directional External:

1. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.

E. Horizontal Single Axis External:

1. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.

2.6 SEISMIC RESTRAINT SYSTEMS

A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

B. Cable Restraints:

1. Comply with ASCE 19
2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength
3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19
4. Use protective thimbles for cable loops where potential for cable damage exists.

C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

D. Cable Restraints:

1. Connections:
 - a. Use overlapping wire rope U clips, cable clamping bolts, swaged sleeves, or seismically rated tool-less wedge insert lock connectors.

2.7 VIBRATION-ISOLATED AND/OR SEISMICALLY ENGINEERED ROOF CURBS

A. Vibration Isolation Curbs:

1. Non-Seismic Curb Rail:

- a. Location: Between existing roof curb and rooftop equipment
- b. Construction: Aluminum
- c. Integral vibration isolation to comply with requirements of this section
- d. Weather exposed components consist of corrosion resistant materials

2. Non-Seismic Curb:

- a. Location: Between structure and rooftop equipment
- b. Construction: Aluminum

- c. Integral vibration isolation to comply with requirements of this section
 - d. Weather exposed components consist of corrosion resistant materials
- 3. Seismic Curb:
 - a. Location: Between structure and rooftop equipment
 - b. Construction: Steel
 - c. Integral vibration isolation to comply with requirements of this section
 - d. Snubbers consist of minimum 0.25-inch-thick resilient pads to avoid metal-to-metal contact without compromising vibration isolating capabilities
 - e. Weather exposed components consist of corrosion resistant materials
- B. Seismic Type Non-Isolated Curb and Fabricated Equipment Piers:
 - 1. Location: Between structure and rooftop equipment
 - 2. Construction: Steel
 - 3. Weather exposed components consist of corrosion resistant materials

PART 3 - EXECUTION

3.1 INSTALLATION - SEISMIC

- A. Seismic Snubbers:
 - 1. Provide on all isolated equipment and piping.
- B. Floor and Base-Mounted Equipment, Vibration Isolated Equipment and associated Vibration and Seismic Controls for Connections:
 - 1. Provide isolators and restraints designed for amplified code forces per ASCE 7 and with demonstrated ability to resist required forces including gravity, operational, and seismic forces.
 - 2. Where timber/wood floor or other substrate is inadequate for installation of lag bolts, screws, or other mechanical fasteners, install supplemental framing or blocking to transfer loads to structural elements.
- C. Wall Mounted Mechanical Equipment:
 - 1. Anchoring to gypsum wallboard, plaster, or other wall finish that has not been engineered to resist imposed loads is not permitted.
- D. Piping:
 - 1. Pipes and Connections Constructed of Ductile Materials (copper; ductile iron, steel or aluminum; and brazed, welded or screwed connections) and is 2.5 inches and larger and all fuel piping 1 inch and larger:
 - a. Provide transverse bracing at spacing not more than 40.0 feet on center.

- b. For fuel liquid and gas piping, provide transverse bracing at spacing not more than 20.0 feet (6.1 m) on center.
 - c. For fuel liquid and gas piping, provide longitudinal bracing at spacing not more than 40.0 feet (12.2 m) on center.
 - d. Transverse bracing for one pipe section may also act as a longitudinal bracing for a pipe section connected perpendicular to it, if the bracing is installed within 2 feet of the elbow or tee of similar size.
 - e. Piping conveying fluids at 100°F. and higher shall have expansion devices provided in between longitudinal braces to allow for thermal expansion.
 - f. Bracing may be omitted when the top of the pipe is suspended 12 inches or less from the supporting structural member and the pipe is suspended by an individual hanger.
2. Pipes and Connections Constructed of Non-Ductile Materials (cast iron, no-hub, plastic or non-UL listed grooved coupling pipe) and is 2.5 inches and larger:
- a. Transverse bracing for one pipe section may also act as a longitudinal bracing for a pipe section connected perpendicular to it, if the bracing is installed within 2 feet of the elbow or tee of similar size.
 - b. Piping conveying fluids at 100°F. and higher shall have expansion devices provided in between longitudinal braces to allow for thermal expansion.
 - c. Bracing may be omitted when the top of the pipe is suspended 12 inches or less from the supporting structural member and the pipe is suspended by an individual hanger.
3. For equipment 400 lbs. or greater, provide lateral force calculations per ICC (IBC) if required by the building official.
4. Provide earthquake bumpers for all equipment that is supported on isolators and weighing over 300 lbs. including base. Provide a minimum of four bumpers for equipment weighing less than 2,000 lbs., and eight bumpers for heavier equipment.

E. Tanks:

- 1. Provide seismic bracing for hot water tanks.

END OF SECTION 220548

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Nameplates
- B. Tags
- C. Stencils
- D. Pipe markers

1.2 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting

1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Operation and Maintenance Data:
 - 1. Valve Diagram: Provide an unlaminated copy of the valve diagram.
 - 2. Valve Tag Schedule: Provide an unlaminated copy of the valve tag schedule.
 - 3. Concealed Items Legend: Provide a color legend listing the colors used to label equipment above the ceiling.
- D. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc

2. Kolbi Pipe Marker Co
3. Seton Identification Products

B. Description: Laminated three-layer plastic with engraved letters

1. Letter Color: White
2. Letter Height: 1/4 inch
3. Background Color: Black
4. Plastic: Conform to ASTM D709

2.2 TAGS

A. Manufacturers:

1. Advanced Graphic Engraving
2. Brady Corporation
3. Brimar Industries, Inc
4. Kolbi Pipe Marker Co
5. Seton Identification Products

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2-inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2-inch diameter with smooth edges.

D. Valve Tag Chart: Typewritten letter size list hard laminated.

2.3 STENCILS

A. Manufacturers:

1. Brady Corporation
2. Kolbi Pipe Marker Co
3. Seton Identification Products

B. Stencils: With clean cut symbols and letters of following size:

C. Stencil Paint: As specified in Section 099123, semi-gloss enamel, colors conforming to ASME A13.1.

2.4 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation
2. Brimar Industries, Inc
3. Kolbi Pipe Marker Co
4. Seton Identification Products

- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Identification Scheme, ASME A13.1:
 - 1. Primary: External Pipe Diameter, Uninsulated or Insulated
 - 2. Secondary: Color scheme per fluid service
 - a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background
- G. Color code assignments shall be verified with the Owner prior to ordering. Color code as follows:
 - 1. Potable Domestic Cold, Hot, and Hot Recirculation Water: Green with white letters
 - 2. Fire Quenching Fluids: Red with white letters
 - 3. Non-Potable Cold, Hot, and Hot Recirculation Water: Orange with black letters with added words stating "CAUTION: NON-POTABLE, DO NOT DRINK"
 - 4. Flammable Fluids: Yellow with black letters
 - 5. Compressed Air: Blue with white letters

2.5 VALVE TAG SCHEDULES

- A. Provide a Valve Tag Schedule for each piping system, typewritten, and reproduced on 8-1/2" x 11" bond paper, hard laminated. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shut-off and similar special uses, by special "flags", in margin of schedule.

2.6 VALVE DIAGRAM

- A. Provide a Valve Diagram showing the location of all valves relative to the floor plan of the building. Each Valve Diagram shall be 11x17, hard laminated sheets. Each piping system shall be in a unique color and a legend noting the system colors shall be placed on the first page.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive identification products.

3.2 INSTALLATION

- A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags in clear view and align with axis of piping.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

3.3 PIPE MARKERS AND COLOR BANDS

- A. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied space, machine rooms, accessible maintenance spaces and exterior non-concealed locations or in accessible ceiling spaces.
 - 1. Near each valve and control device
 - 2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch where there could be question of flow pattern
 - 3. Near locations where pipes pass through walls or floor/ceilings, or enter non-accessible enclosures
 - 4. At access doors, manholes, and similar access points which permit view of concealed piping
 - 5. Near major equipment items and other points of origination and termination

3.4 PLUMBING EQUIPMENT IDENTIFICATION

- A. Install engraved plastic laminate sign on or near each major item of plumbing equipment and each operation device. Provide signs for the following general categories of equipment and operational devices. Provide signs or suspended ceiling tile below mechanical equipment located above ceiling.
 - 1. Pumps and similar motor-driven units
 - 2. Tanks and pressure vessels

3.5 NON-POTABLE DOMESTIC SYSTEMS

- A. Furnish and install label reading "CAUTION: NON-POTABLE WATER, DO NOT DRINK" at each fixture served by a non-potable system.

3.6 CONCEALED ITEMS

- A. Items concealed above accessible ceilings requiring access, shall have the ceiling marked to indicate such item's location. The marking system shall consist of colored phenolic plates with ½" tall, engraved lettering specifying the item concealed; plate shall be applied to ceiling T-bar framing with rivets or other owner approved method below the concealed item. Colors used shall be verified with Owner, and unless directed otherwise, shall be:
 - 1. Fire Protection System Components: Red
 - 2. Domestic Plumbing System Components: Green

3.7 VALVE TAG SCHEDULE

- A. Provide the hard laminated Valve Tag Schedule in the mechanical/janitors room.

3.8 VALVE DIAGRAM

- A. Provide the hard laminated Valve Diagram in the mechanical/janitors room.

END OF SECTION 220553

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SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Cellular glass insulation
- B. Flexible elastomeric cellular insulation
- C. Flexible removable and reusable blanket insulation
- D. Glass fiber insulation
- E. Hydrous calcium silicate insulation
- F. Jacketing and accessories

1.2 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping

1.3 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar; 2015
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013
- C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013)
- D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013)
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017
- F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2013
- G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016
- H. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2017

- I. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2016a
- J. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013
- K. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013)
- L. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service; 2010 (Reapproved 2015)
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017
- N. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016
- O. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of documented experience

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723

2.2 GLASS FIBER INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation
 - 2. Johns Manville Corporation
 - 3. Knauf Insulation
 - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ
 - 5. Manson Insulation
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F
 - 2. Maximum Service Temperature: 850 degrees F
 - 3. Maximum Moisture Absorption: 0.2 percent by volume
 - 4. Maximum flame/smoke spread developed: 25/50
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches
- D. Vapor Barrier Lap Adhesive: Compatible with insulation
- E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool
- F. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color
- G. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color
- H. Insulating Cement: ASTM C449

2.3 FLEXIBLE REMOVABLE AND REUSABLE BLANKET INSULATION

- A. Insulation: ASTM C553 Type V; flexible, noncombustible
 - 1. Comply with ASTM C1695
 - 2. K Value: 0.37 at 100 degrees F, when tested in accordance with ASTM C177 or ASTM C518
 - 3. Minimum Service Temperature: 32 degrees F
 - 4. Maximum Service Temperature: 500 degrees F

5. Maximum Water Vapor Absorption: Less than 5.0 percent by weight

2.4 CELLULAR GLASS INSULATION

A. Manufacturers:

1. Pittsburgh Corning Corporation

B. Insulation: ASTM C552, Type II

1. K Value: 0.35 at 100 degrees F
2. Service Temperature Range: From 250 degrees F to 800 degrees F
3. Water Vapor Permeability: 0.005 perm-inch maximum per inch
4. Water Absorption: 0.5 percent by volume, maximum

2.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:

1. Aeroflex USA, Inc
2. Armacell LLC; AP Armaflex
3. K-Flex USA LLC; Insul-Tube
4. Durkflex

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.

1. Minimum Service Temperature: Minus 40 degrees F
2. Maximum Service Temperature: 220 degrees F
3. Connection: Waterproof vapor barrier adhesive
4. K" Value: 0.25 Btu-in per hour per square foot °F at 75 degrees F
5. Maximum flame/smoke spread developed: 25/50
6. Maximum water vapor permeability, wet cup, perm-in 0.10
7. Fiber free, formaldehyde-free, and low VOC's
8. Install with fitting covers or installers shall have training through Armacell Qualified Installer Program (AQIP) or equivalent.
9. Provide black color in all cases except provide white color if exposed to view or specifically called out on the plans.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation

2.6 JACKETING AND ACCESSORIES

A. PVC Plastic:

1. Manufacturers:
 - a. Johns Manville Corporation; Zeston 2000

2. Jacket: One-piece molded type fitting covers and sheet material, gloss white color.
 - a. Minimum Service Temperature: 0 degrees F
 - b. Maximum Service Temperature: 150 degrees F
 - c. Moisture Vapor Permeability: 0.002 perm-inch, maximum, when tested in accordance with ASTM E96/E96M
 - d. Thickness: 10 mil, 0.010 inch
 - e. Connections: Pressure sensitive color matching vinyl tape
- B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire-retardant lagging adhesive
 1. Lagging Adhesive: Compatible with insulation
- C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet
 1. Thickness: 0.016-inch sheet
 2. Finish: Embossed
 3. Joining: Longitudinal slip joints and 2-inch laps
 4. Fittings: 0.016-inch-thick die shaped fitting covers with factory attached protective liner
 5. Metal Jacket Bands: 3/8 inch wide; 0.015-inch-thick aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Neatly finish insulation at supports, protrusions, and interruptions.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- H. Insulated Pipe Supports and Shields:
 - 1. Install in place at each hanger and support as required by Section 221005 - Plumbing Piping, prior to insulating.
 - 2. Application: Piping 1-1/2 inches diameter or larger
 - 3. Shields: Galvanized steel or PVC as follows:
 - a. 20 gauge (18 gauge for pipes larger than 3 inches) galvanized steel between pipe hangers or pipe hanger rolls and insulated pipe supports. Shield shall cover a minimum of 40% of the insulation where the pipe is supported from the bottom and 100% of the insulation where the pipe is clamped.
 - b. PVC shield the full diameter of the pipe insulation with 20-gauge galvanized steel shield riveted to the PVC.
 - c. Utilize the Armacell Insulguard pipe shield system.
 - 4. Insulated Pipe Supports Location: Between support shield and piping and under the finish jacket
 - 5. Insulated Pipe Support Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation. Provide 9 inches (230 mm) long insulated pipe support and 18-gauge galvanized steel shield for pipes larger than 3 inches.
 - 6. Insert Material: See Section 221005 - Plumbing Piping.
- I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations except where prohibited by code. Finish at supports, protrusions, and interruptions. At fire separations, refer to Fire Stop Section 078400.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
- K. Exposed Work: Finish with PVC jacket and fitting covers applied after pipe insulation is installed. A pre-cut "Hi-Lo Temp" insulation insert, conforming to the UL 25/50 rating, shall be snugly tucked around the fitting making sure the fitting is covered with the full thickness of insulation.
 - 1. All others provide covering in pad form, constructed as follows: Use 1-inch-thick Owens-Corning Fiberglas TIW Glass Wool, Type I, non-oiled, fully enclosed on all sides and edges within tight-weave canvas jacket. Attach Bergen hooks around edges of pad. Fit pad to device with edges tightly butted and secure with copper wire laced between hooks. Provide vapor seal where vapor seal is required for adjacent insulation.

- L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- M. Installation of below ground domestic hot water piping insulation: All piping shall be insulated with cellular glass with heat sealed "pittwrap" or pre-insulated pipe system with Type K copper carrier (See Section 230719 - HVAC Piping Insulation) with schedule 80 PVC or HDPE jacket.
- N. Gauge Lines: Insulate to the gauge shutoff valve.
- O. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- P. Elastomeric Insulation Installation:
 - 1. For PEX piping installation, elastomeric insulation shall be installed continuous through stud framing and all penetration locations through walls, floors, and ceilings.
 - 2. Elastomeric insulation with wall thicknesses greater than 1" shall not be installed in air plenums unless specifically UL723 listed for use in a plenum.
 - 3. All elastomeric foam and sheet seams shall be sealed with adhesive per the insulation manufacturer's recommendations.
 - 4. Install elastomeric insulation on all PEX domestic hot water and recirculation water piping.

3.3 PIPE HANGERS

- A. Do not allow pipes to come in contact with hangers.

3.4 SCHEDULES

- A. Plumbing Systems:
 - 1. Domestic Hot Water Supply (including Recirculation):
 - a. Glass Fiber Insulation:
 - 1) For Pipe Size Range of 1/2 to 1-1/4 inch, provide insulation thickness of: 1 inch.
 - 2) For Pipe Size Range of 1-1/2 inch and greater, provide insulation thickness of: 1-1/2 inch.
 - b. Cellular Glass Insulation and Pre-insulated Piping Systems for underground applications: For all pipe sizes, provide insulation thickness of: 1-1/2 inch.
 - c. Flexible Elastomeric Cellular Insulation (PEX only): For all pipe sizes, provide insulation thickness of: 1 inch.

2. Domestic Cold Water:
 - a. Glass Fiber: For all pipe sizes on metal pipe, provide insulation thickness of: 1 inch.
 - b. Flexible Elastomeric Cellular Insulation (PEX pipe): Not Required.
 3. Roof Drainage Above Grade for the greater of 10 feet or through all horizontal pipe:
 - a. Flexible Elastomeric Cellular Insulation: For all pipe sizes, provide insulation thickness of: 1 inch.
- B. Other Systems:
1. Piping Exposed to Freezing or Semi-Heated Spaces (less than 50 degrees F.) with or without Heat Tracing:
 - a. Glass Fiber: For all pipe sizes, provide insulation thickness of: 1-1/2 inch.
 - b. Flexible Elastomeric Cellular Insulation: For all pipe sizes, provide insulation thickness of: 1-1/2 inch.
 2. Copper Condensate Piping:
 - a. Glass Fiber: For all pipe sizes, provide insulation thickness of: 1 inch.
 - b. Flexible Elastomeric Cellular Insulation: For all pipe sizes, provide insulation thickness of: 1 inch.

END OF SECTION 220719

SECTION 221005 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet of building
- B. Sanitary waste piping, above grade
- C. Domestic water piping, buried beyond 5 feet of building
- D. Domestic water piping, buried within 5 feet of building
- E. Domestic water piping, above grade
- F. Storm drainage piping, buried within 5 feet of building
 - 1. Storm drainage piping, above grade
 - 2. Natural gas piping, buried beyond 5 feet of building
 - 3. Natural gas piping, buried within 5 feet of building
 - 4. Natural gas piping, above grade
 - 5. Pipe flanges, unions, and couplings
 - 6. Pipe hangers and supports
 - 7. Pipe sleeve-seal systems
 - 8. Pressure reducing valves
 - 9. Pressure relief valves
 - 10. Strainers

1.2 RELATED REQUIREMENTS

- A. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment
- B. Section 220553 - Identification for Plumbing Piping and Equipment

1.3 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 2015
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013
- D. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; 2016

- E. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; 2012
- F. ASME B31.9 - Building Services Piping; 2014
- G. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2017
- H. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017
- I. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009
- J. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014
- K. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014)
- L. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017
- M. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless-Steel Tubing for General Service; 2015a
- N. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014)
- O. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a
- P. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016
- Q. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016
- R. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013
- S. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016
- T. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016
- U. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014
- V. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter; 2012a
- W. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems; 2012
- X. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe; 2015

- Y. ASTM D2657 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings; 2007 (Reapproved 2015)
- Z. ASTM D2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014
- AA. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015
- BB. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2016
- CC. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017
- DD. ASTM D4101 - Standard Specification for Polypropylene Injection and Extrusion Materials; 2014, with Editorial Revision (2016)
- EE. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2017
- FF. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems; 2011a
- GG. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing; 2015
- HH. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012)
- II. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2017
- JJ. AWWA C606 - Grooved and Shouldered Joints; 2015
- KK. AWWA C651 - Disinfecting Water Mains; 2014
- LL. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2016
- MM. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009 (Revised 2012)
- NN. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011 (Revised 2012)
- OO. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015
- PP. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015

- QQ. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015
- RR. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016
- SS. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009
- TT. NSF 61 - Drinking Water System Components - Health Effects; 2017
- UU. NSF 372 - Drinking Water System Components - Lead Content; 2016
- VV. PPI TR-4 - PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe; 2017
- WW. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions

1.4 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers with catalog information. Indicate valve data and ratings.
- B. Welder Certificate: Include welders' certification of compliance with ASME BPVC-IX.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements for additional provisions.
- E. Operation and Maintenance Data:
 - 1. Domestic water sterilization test
 - 2. Domestic water pressure tests

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- F. Domestic water fittings, joining materials, and all other appurtenances in contact with potable water shall be lead-free except those specifically exempted in Section 3874 of the Safe Water Drinking Act.
 - 1. Lead-free shall mean:
 - a. Not containing more than 0.2% lead when used with respect to solder and flux; and
 - b. Not more than a weighted average of 0.25% when used with respect to the vetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings. Maintain it in place until installation.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.2 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: Conform to CISPI 301, hubless pipe and fittings
 - 1. Manufacturers:
 - a. AB&I
 - b. Charlotte
 - c. Tyler

- B. Joints: CISPI 310, neoprene gasket and stainless-steel clamp and shield assemblies. Couplings shall be constructed of 300 Series type stainless steel with a minimum shield thickness equal to 0.007. There shall be a minimum of 2 bands for pipe sizes up to 4" and a minimum of 4 bands for pipe sizes 5" and larger. Coupling shall be capable of holding 15 psi of pressure. Sealing bands shall have a minimum thickness of 0.026 and require a minimum of 80-inch lbs. torque per band. Neoprene gasket shall meet ASTM C564.
1. Manufacturers:
 - a. Thermafit Heavy Duty
 - b. Clamp-All HI-TORQ 80
 - c. Husky 4000
 - d. Ideal Pow'r-Gear
 - e. MiFab MI-QXHUB
- C. PVC Pipe: ASTM D2665 and ASTM D3034, schedule 40, DWV, solid core pipe.
1. Fittings: PVC
 2. Joints: ASTM D2564
 - a. Mechanical Joints: Mechanical joints on drainage pipe shall be made with an elastomeric seal conforming to ASTM C 1173, ASTM D 3212 or CSA CAN/CSA-B602. Mechanical joints shall not be installed in above-ground systems, unless otherwise approved. Joints shall be installed in accordance with the manufacturer's instructions.
 - b. Plastic to Cast Iron Mechanical Joints: CISPI 310, neoprene gasket and stainless-steel clamp and shield assemblies. Couplings shall be constructed of 300 Series type stainless steel with a minimum shield thickness equal to 0.015. There shall be a minimum of 2 bands for pipe sizes up to 4" and a minimum of 4 bands for pipe sizes 5" and larger. Coupling shall be capable of holding 15 psi of pressure. Sealing bands shall have a minimum thickness of 0.026 and require a minimum of 80-inch lbs. torque per band. Neoprene gasket shall meet ASTM C564.
 - 1) Manufacturers:
 - a) Husky 4200
 - c. Solvent Cementing: Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F 656 shall be applied. Solvent cement not purple in color and conforming to ASTM D 2564, CSA CAN/CSA-B137.3, CSA CAN/CSA-B181.2 or CSA CAN/CSA-B182.1 shall be applied to all joint surfaces. The joint shall be made while the cement is wet and shall be in accordance with ASTM D 2855. Solvent-cement joints shall be permitted above or below ground.
 - d. Threaded Joints: Threads shall conform to ASME B1.20.1. Schedule 80 or heavier pipe shall be permitted to be threaded with dies specifically designed for plastic pipe. Approved thread lubricant or tape shall be applied on the male threads only.
 3. Manufacturers:
 - a. Charlotte
 - b. Mueller Industries
 - c. Cresline

2.3 SANITARY WASTE PIPING, ABOVE GRADE

A. Cast Iron Pipe: Conform to CISPI 301, hubless pipe and fittings.

1. Manufacturers:

- a. AB&I
- b. Charlotte
- c. Tyler

B. Joints: CISPI 310, neoprene gaskets and stainless-steel clamp-and-shield assemblies. Couplings shall be constructed of 300 Series type stainless steel. There shall be 2 bands for pipe sizes up to 4" and a minimum of 4 bands for pipe sizes 5" and larger. Sealing bands shall require a minimum of 60-inch lbs. torque per band. Neoprene gasket shall meet ASTM C 564.

1. Manufacturers:

- a. Thermafit Regular Duty
- b. Tyler Standard No-Hub
- c. Clamp-All HI-TORQ 80
- d. Husky 2000
- e. Anaco
- f. Ideal Pow'r Gear
- g. MiFab MI-QHUB

C. Flashing: Lead flashing, 4 lbs. per sq. ft. of sheet lead flashing. Flashing skirt radius from the inserted pipe of at least 8 inches or 2-foot square.

1. Manufacturers:

- a. Elmdor Stoneman

D. Vent Cap: Vandal Resistant. Cast Iron. Minimum of 2 to 1 open area compared to the cross-sectional area of the vent pipe

1. Manufacturers:

- a. Elmdor Stoneman

2.4 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. PE Pipe: ASTM D2239

- 1. Fittings: ASTM D2609, PE
- 2. Joints: Mechanical with stainless steel clamp

B. Schedule 80 PVC Pipe: AWWA C900

2.5 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Pipe: ASTM B42, hard drawn, type K (A)

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze
2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze, lead free conforming to UPC standards for solder and all local code requirements
 - a. Manufacturers:
 - 1) Canfield
 - 2) J.W. Harris
 - 3) Aqua-Clean

B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.

1. Manufacturers:
 - a. Uponor, Inc
 - b. Wirsbo
 - c. Zurn Industries, LLC
 - d. Viega
 - e. Rehau
 - f. Watts
 - g. Mr. PEX
 - h. Heat Link
2. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F
3. Fittings: Brass and copper
4. Fittings: Brass and engineered polymer (EP) ASTM F1960
5. Joints: Mechanical compression fittings
6. Joints: ASTM F1960 cold-expansion fittings

2.6 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), hard drawn

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze
2. Joints: ASTM B32, alloy Sn95 solder, lead free conforming to UPC standards for solder and all local code requirements.
 - a. Manufacturers:
 - 1) Canfield
 - 2) J.W. Harris
 - 3) Aqua-Clean

3. Mechanical Press Sealed Fittings: Double pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Grinnell Products, a Tyco Business
 - 2) Viega LLC
 - 3) Nibco
4. Mechanical Couplings on pipe 2.5" and larger: NSF 61
 - a. Manufacturers:
 - 1) Victaulic
 - 2) Gruvlok

B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877. Pipe shall be NSF 61 and NSF 14 certified.

1. Manufacturers:
 - a. Uponor, Inc
 - b. Viega LLC
 - c. Zurn Industries, LLC
 - d. Watts
 - e. Rehau
 - f. Mr. PEX
 - g. Heat Link
2. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F
3. Fittings: Brass and engineered polymer (EP) ASTM F1960
4. Joints: Mechanical compression fittings
5. Joints: ASTM F1960 cold-expansion fittings

2.7 CONDENSATE PIPING

- A. Schedule 40 PVC, solid core
- B. Type L copper for use in air plenum, penetrating a fire wall, or used with gas-fired equipment
- C. Insulate per Section 220719 - Plumbing Piping Insulation.

2.8 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 1. Ferrous pipe: Class 150 malleable iron threaded unions
 2. Copper tube and pipe: Class 150 bronze unions with soldered joints

B. Flanges for Pipe Size Over 1 Inch:

1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets
2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

1. Dimensions and Testing: In accordance with AWWA C606
2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
3. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 degrees F to 180 degrees F.
4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
5. When the pipe is field grooved, provide coupling manufacturer's grooving tools.
6. Manufacturers:
 - a. Grinnell Products, a Tyco Business
 - b. Victaulic
 - c. Gruvlok

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier

2.9 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
2. Hanger Rods: Threaded hot rolled steel, electro-galvanized or cadmium plated. Hanger rods shall be sized so that the total load (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:
 - a. 610 pounds for 3/8" diameter rods
 - b. 1130 pounds for 1/2" diameter rods
3. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - a. Cold and Hot Pipe Sizes 6 inch and Larger: Double hangers.
4. Trapeze Hangers: Welded steel channel frames attached to structure
5. Vertical Pipe Support: Steel riser clamp, epoxy coated
6. Steel: Provide structural steel per ASTM A36/A36M.
7. Wood: Shall be fire treated

8. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High-density polypropylene
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly
 - c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
 - f. Manufacturers:
 - 1) PDH
 - 2) Elcen
 - 3) Grinnel
 - 4) B-line
 - 5) Miro Industries, Inc
 - 6) Unistrut
 - 7) Caddy
 - 8) Tolco

B. Plumbing Piping - Drain, Waste, and Vent:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring
2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis
3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook
4. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp
5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated

C. Plumbing Piping - Water:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring
2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis
3. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp
7. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast-iron pipe roll
8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01

3. Concrete Screw Type Anchors: Complying with ICC-ES AC193
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308
6. Other Types: As required
7. Manufacturers:
 - a. Powers Fasteners, Inc
 - b. Rawplug
 - c. Phillips
 - d. Hilti
 - e. Caddy

E. Insulated Pipe Inserts and Insulation Shields:

1. Insulated pipe insert shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.38 Btu/hr./sq. ft./degree F/1-inch thick at 75°F.
2. Insulated pipe insert shall be same thickness as adjoining pipe insulation and sized to match pipe in which it is used on. See Section 220719 for insulation sizes.
3. Where elastomeric insulation is being used, pipe inserts may be omitted.
4. Provide shield per Section 220719 - Plumbing Piping Insulation.
5. Manufacturers:
 - a. TPS Thermal Pipe Shields
 - b. B-Line
 - c. Clement Support Services
 - d. Snappitz

F. PEX Pipe Hangers and Supports:

1. Provide continuous steel channel pipe supports at all horizontal PEX pipe runs greater than 6'-0" in length.
 - a. Steel Channel Pipe Supports:
 - 1) 23-gauge, galvanized steel channel with a copper tube size controlled outside diameter
 - 2) Steel channel pipe supports shall be available in lengths up to 9'-0" for pipe sizes 1/2" - 3 1/2".
 - 3) Secure pipe to channel support with stainless steel straps rated for 300-pound tensile strength.
2. Manufacturers:
 - a. Uponor PEX-a Pipe, or approved equivalent
3. All horizontal PEX pipe shall utilize steel brackets, clevis, J-hangers, or trapeze style hangers.

2.10 PIPE SLEEVE-SEAL SYSTEMS

A. Manufacturers:

1. The Metraflex Company; MetraSeal
2. Link Seal

B. Modular/Mechanical Seal:

1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
3. Size and select seal component materials in accordance with service requirements.
4. Glass reinforced plastic pressure end plates.

2.11 PRESSURE REDUCING VALVES

A. Manufacturers:

1. Amtrol Inc
2. Cla-Val Company
3. Flomatic Valves
4. Watts Regulator Company
5. Wilkins
6. Apollo Conbraco

B. Up to 2 Inches:

1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

C. Over 2 Inches:

1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.12 PRESSURE RELIEF VALVES

A. ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Pressure:

1. Manufacturers:

- a. Cla-Val Co
- b. Watts Regulator Company

C. Temperature and Pressure:

1. Manufacturers:

- a. Cla-Val Co
- b. Watts Regulator Company

2.13 STRAINERS

A. Manufacturers:

- 1. Armstrong International, Inc
- 2. Bell and Gossett
- 3. Apollo Conbraco
- 4. Hoffman
- 5. Wheatley
- 6. Nibco

B. Size 2 inch and Under:

- 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32-inch stainless steel perforated screen
- 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32-inch stainless steel perforated screen

C. Size 1-1/2 inch to 4 inch:

- 1. Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen

D. Size 5 inch and Larger:

- 1. Class 125, flanged iron body, basket pattern with 1/8-inch stainless steel perforated screen

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 GENERAL INSTALLATION

- A. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Consult all drawings for location of pipe spaces, ducts, electrical equipment, ceiling heights, door openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.
- E. Allow sufficient clearances for installation of pipe insulation in thickness specified. If interferences occur, reroute piping to accommodate insulation.
- F. Install piping to maintain headroom, conserve space, and not interfere with use of space, removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
- G. Group piping whenever practical at common elevations.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not exposed.
- K. Establish elevations of buried piping outside the building to ensure not less than 3.3 ft (1 m) of cover.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- M. Provide support for utility meters in accordance with requirements of utility companies.
- N. Install valves with stems upright or horizontal, not inverted. Refer to Section 220523.
- O. Install water piping to ASME B31.9.
- P. Sleeve pipes passing through partitions, walls and floors.
- Q. Do not use reducing bushings, street elbows, or close nipples.
- R. T-drill procedure for connecting pipes will not be allowed.
- S. All piping in finished areas shall be installed concealed unless specifically noted otherwise.

- T. Provide escutcheons where pipe passes through walls, floors, or ceilings.
- U. Install all exposed piping parallel to the closest wall and in a neat, workmanlike manner.
- V. Bury water piping 6 inches minimum below bottom of slab and encase in 2 inches minimum of sand.
- W. Strainers: Install strainers as indicated. Provide plugged gate or ball valve in blow-off connection on strainers, valve shall be same size as blow-off tapping. Final blow-off shall have a hose connection fitting.
- X. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- Y. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- Z. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- AA. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Section 220548.
 - 10. Support cast iron drainage piping at every joint.
- BB. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 - 3. Locate piping in the center of sleeve or penetration.

4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a watertight seal.
6. Install in accordance with manufacturer's recommendations.

CC. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.4 SOIL, WASTE, VENT, AND STORM DRAIN SYSTEMS

A. Place cleanouts as follows:

1. Where shown on plans and near bottom of each stack and riser.
2. At every 90 degrees change of direction for horizontal lines.
3. Every 100 feet of horizontal run.
4. Extend cleanout to accessible surface. Do not place cleanouts on carpeted floors. In such locations, use wall type cleanouts.

B. Vent entire waste system to atmosphere. Discharge vent pipe minimum 14 inches above roof. Join lines together in least practicable number before projecting above roof. Set back vent lines so they will not pierce the roof near edge or valley. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

C. Use torque wrench to obtain proper tension in cinch bands on above ground hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

D. Flash pipes passing through roof (or as shown on the plan) fitted snugly around pipes and caulk between flashing and pipe with flexible waterproof compound. Provide counterflashing fitting with vandal resistant screws. Extend lead up and turn in a minimum of 1" into the pipe. Flashing base shall be at least 24 inches square (or 8-inch radius).

E. Install an expansion joint in each vertical straight run of PVC or polypropylene soil, waste, vent, and drain pipe at intervals in excess of 30 feet. Install and anchor pipe per expansion joint manufacturer's instructions. Provide access panel as required for servicing the expansion joint.

F. Install vertical waste pipe to comply with standard installation practices for suds control.

G. Provide hubless cast iron for the first 20 feet downstream of drains located in the kitchen and boiler room.

H. Reducing the size of pipe in the direction of flow is prohibited.

I. Install drainage piping at the following minimum slopes unless otherwise indicated:

1. Building soil and waste drain: 2 percent downward in the direction of flow unless indicated otherwise on the plans

J. Field Quality Control:

1. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - a. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - b. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - c. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - d. Prepare reports for tests and the required corrective action.

- K. Protect drains during the remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

3.5 CROSS-LINKED POLYETHYLENE (PEX) PIPE

- A. Provide stainless steel inserts at compression stop valves.
- B. All couplings, elbows, tees, reducing tees, adapters, and any other connecting devices shall be of the same manufacturer as the PEX piping.
- C. Kinked tubing shall be reformed in accordance with manufacturer's recommendation or cut out and replaced.
- D. 90-degree direction turns, and wall penetrations shall be provided with a bend support or elbow fitting.
- E. Copper sweated and threaded connections are to be made prior to PEX connections.
- F. Transition PEX to copper at fire walls. Provide fire stop sealants at fire rated walls.
- G. PEX tubing shall be fully seated against the shoulder of fitting.
- H. Horizontal piping shall be supported every 32".
- I. Vertical piping shall be supported every 4'.
- J. Allow 1/8" to 3/16" of slack per foot of run for expansion and contraction.
- K. PEX tubing shall be installed to allow for expansion and contraction. Do not rigidly attach to structure.
- L. Provide sleeves where PEX piping passes through masonry walls.
- M. Protect tubing from nail/screw damage with suitable steel plate protectors.

- N. The minimum bend radius of PEX tubing is six times its diameter. Smaller radius turns shall be provided with an elbow.
- O. Provide insulators where PEX piping passes through metal studs.
- P. Supply stops shall be provided with a pipe bracket support from adjacent structure, a pipe clamp, tube talon, and a plastic or metal bend support. (Sioux Chief Universal Slider Bracket or approved equal).
- Q. Insulation does not have to be continuous at hanging brackets and clamps.
- R. Plastic speed clips may be used for connection to structure. Speed clips shall be listed for use on PEX piping.

3.6 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Provide flow controls in water recirculating systems where indicated.

3.7 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.8 DOMESTIC WATER PIPING TESTS

- A. Tests: As the work progresses each section of the water system shall be tested under a 100psi hydrostatic test held for 2 hours without reduction of pressure (a pressure fluctuation of +/- 1 psi is acceptable). If any leaks occur or piping or valves are found to be defective, the same shall be removed and new material installed, and the test made on that section again until all material is found to be satisfactory. Such test shall be made in the presence of the Owner's Representative.
- B. Provide written test documentation in the operation and maintenance manual.

3.9 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed, and clean.
- B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.

- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.
- I. Provide test results in the operation and maintenance manual.

3.10 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
 - 1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

3.11 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inch to 1-1/4 inch:
 - 1) Maximum Hanger Spacing: 6.5 ft
 - 2) Hanger Rod Diameter: 3/8 inches
 - b. Pipe Size: 1-1/2 inch to 2 inch:
 - 1) Maximum Hanger Spacing: 10 ft
 - 2) Hanger Rod Diameter: 3/8 inch
 - c. Pipe Size: 2-1/2 inch to 3 inch:
 - 1) Maximum Hanger Spacing: 10 ft
 - 2) Hanger Rod Diameter: 1/2 inch
 - d. Pipe Size: 4 inch to 6 inch:
 - 1) Maximum Hanger Spacing: 10 ft
 - 2) Hanger Rod Diameter: 5/8 inch

- e. Pipe Size: 8 inch to 12 inch:
 - 1) Maximum hanger spacing: 14 ft
 - 2) Hanger Rod Diameter: 7/8 inch
 - f. Pipe Size: 14 inch and Over:
 - 1) Maximum Hanger Spacing: 20 ft
 - 2) Hanger Rod Diameter: 1 inch
2. Plastic Piping:
- a. All Sizes:
 - 1) Maximum Hanger Spacing: 6 ft
 - 2) Hanger Rod Diameter: 3/8 inch

END OF SECTION 221005

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SECTION 221006 - PLUMBING PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Thermometers
- B. Pressure Gauges
- C. Unions
- D. Flexible Connectors
- E. Trap Primers
- F. Aquastats
- G. Drains
- H. Cleanouts
- I. Washing machine boxes and valves
- J. Refrigerator valve and recessed box
- K. Backwater valves
- L. Backflow preventers
- M. Double check valve assemblies
- N. Water hammer arrestors
- O. Mixing valves

1.2 REFERENCE STANDARDS

- A. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2008 (Reaffirmed 2012)
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2004, with Errata
- C. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent; 2009
- D. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011

- E. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011 (Reaffirmed 2016)
- F. NSF 61 - Drinking Water System Components - Health Effects; 2017
- G. NSF 372 - Drinking Water System Components - Lead Content; 2016
- H. PDI-WH 201 - Water Hammer Arresters; 2010

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions. Indicate assembly and support requirements.
- D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views, etc. for the following:
 - 1. Trap primers
 - 2. Thermostatic mixing valves
 - 3. Backflow prevention devices
 - 4. Aquastats

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 THERMOMETERS

- A. Adjustable angle type, 304 stainless steel stem, 5" reading dial type, true anti-parallax-dial black numerals, markings in degrees F., stainless steel, double-strength glass viewing window. Provide sockets with extension necks where installed on insulated piping.
- B. Thermometer Temperature Ranges:
 - 1. Domestic Cold Water, range of 0 - 100 degrees F with 1 degree F increments
 - 2. Domestic Hot Water, range of 30 - 180 degrees F with 2 degrees F increments
- C. Manufacturers:
 - 1. Ashcroft
 - 2. March
 - 3. Weiss
 - 4. Tel-Tru
 - 5. Winters
 - 6. Taylor

2.3 PRESSURE GAUGES

- A. Glycerin filled type, 2.5" reading dial with aluminum face and black numerals, markings in English units, 304 stainless steel case and acrylic lens. Provide each gauge with snubber and needle valve. Provide sockets with extension necks where installed on insulated piping.
- B. Pressure Gauge Ranges:
 - 1. Domestic Hot Water, range 0 - 160 PSI with numeral intervals of 20 PSI and 2 PSI inter-graduations
 - 2. Domestic Cold Water, range 0 - 160 PSI with numeral intervals of 20 PSI and 2 PSI inter-graduations
 - 3. Compressed Air, range 0 - 160 PSI with numeral intervals of 20 PSI and 2 PSI inter-graduations
- C. Manufacturers:
 - 1. Ashcroft
 - 2. Marsh
 - 3. Weiss
 - 4. Tel-Tru
 - 5. Winters
 - 6. Taylor

2.4 UNIONS

- A. Dielectric Waterways: Inert, non-corrosive thermoplastic lining with zinc electroplated casing, rated at 300 psi at 225 deg. F., conforming to NSF 61. Type and size to match piping.
 - 1. Manufacturers:
 - a. Walter Vallett Company V-line
 - b. Clear Flow
- B. Unions on Copper Pipe:
 - 1. In 2" Pipe and Smaller: Wrought copper solder joint copper to copper union.
 - 2. In 2.5" Pipe and Larger: Brass flange unions.
 - 3. Manufacturers:
 - a. Watts
 - b. Nibco
 - c. Mueller

2.5 FLEXIBLE CONNECTORS

- A. Water Pump Flexible Connectors: Flexible bronze braid, bronze hose, and copper ends rated to a working pressure of 470 psi at 70°F for a 1" flexible connector.
 - 1. Manufacturers:
 - a. Metraflex
 - b. Flex Hose
 - c. Minnesota Flex
 - d. Resistoflex

2.6 TRAP PRIMERS

- A. Provide an approved trap primer at each floor drain, funnel drain, shower drain, janitor mop sink, and floor sink.
 - 1. Automatic Trap Primers (Water Pressure Drop Activated): Up to 4 traps may be served by a single trap primer and trap primer distribution system. Automatic primers shall be concealed in every case, located in pipe spaces or wall cavities; and where not accessible in a pipe space, provide an access panel. Elevate trap primer at increments of 12" per 20 linear foot of pipe run to trap.
 - a. Manufacturers:
 - 1) JR Smith
 - 2) Sioux Chief Manufacturing
 - 3) Mifab
 - 4) Precision Plumbing Products

2. Automatic Trap Primers (Electronically Activated): Up to 30 trap primers may be served by a single electronic trap primer assembly. Electronic trap primer assemblies shall be provided preassembled with an atmospheric vacuum breaker, preset 24-hour clock, manual override switch/test button, calibrated manifold providing equal water distribution, and a recessed wall box with a locking stainless steel access panel. MC to coordinate electrical connections with EC.
 - a. Manufacturers:
 - 1) JR Smith
 - 2) Precision Plumbing Products
3. Trap primer Tailpieces: 17 GA chrome plated. To be installed on lavatories and hand sinks only. One trap may be served by a single tailpiece trap primer. Provide with stainless steel braided primer hose and escutcheon.
 - a. Manufacturers:
 - 1) JR Smith
 - 2) Watts
 - 3) Zurn

2.7 AQUASTATS

A. Automatic Timer Kit:

1. The timer kit shall be UL approved.
2. The timer kit shall be installed on the connection box of the pump.
3. The timer kit will be suitable for 115/120V, 60 HZ operation.
4. The timer shall provide automatic ON-OFF. It shall also have the option of providing manual ON-OFF control.

B. Aquastats:

1. The aquastat shall be UL approved.
2. The aquastat shall be connected to the lead wires in the connection box of the pump.
3. The aquastat will be suitable for 115/120V, 60 HZ operation.
4. The aquastat shall provide thermostat control to the circulator. It will turn OFF (open) at 120°F (48.9°C) water temperature and ON (closed) at 100°F (37.8°C) water temperature.

C. Automatic Timer Kit and Aquastat Combination:

1. The automatic timer kit and aquastat shall be combined to provide automatic time and temperature control to the pump.
2. When the automatic timer and the aquastat are used together, the pump will only circulate water when the ON time conditions are met and when the water temperature is low enough to cause the aquastat to switch ON.

D. Manufacturers:

1. Bell & Gossett
2. Honeywell

2.8 CLEANOUTS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company
2. Josam Company
3. MIFAB, Inc: www.mifab.com/#sle
4. Watts
5. Zurn Industries, LLC

B. Cleanouts at Exterior Surfaced Areas:

1. Round cast nickel bronze access frame and non-skid cover.

C. Cleanouts at Interior Finished Floor Areas:

1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

D. Cleanouts at Interior Finished Wall Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless-steel access cover secured with machine screw.

2.9 REFRIGERATOR VALVE AND RECESSED BOX

A. Box Manufacturers:

1. Guy Gray
2. Oatey Supply Chain Services, Inc

2.10 BACKFLOW PREVENTERS

A. Provide letter of certification to Owner.

B. Type and configuration shall conform to local authority requirements.

C. REDUCED PRESSURE BACKFLOW PREVENTORS

1. Manufacturers:

- a. Conbraco Industries, Inc
- b. Watts Regulator Company, a part of Watts Water Technologies
- c. Zurn Industries, LLC

2. Reduced Pressure Backflow Preventers:

- a. ASSE 1013; cast bronze body and stainless-steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure, and non-threaded vent outlet.

D. DOUBLE CHECK-VALVE ASSEMBLIES

1. Manufacturers:

- a. Conbraco Industries, Inc
- b. Watts Regulator Company, a part of Watts Water Technologies
- c. Zurn Industries, LLC

2. Double Check Valve Assemblies:

- a. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless-steel springs; two independently operating check valves with intermediate atmospheric vent.

2.11 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company
2. Sioux Chief; 650 Series
3. Watts Regulator Company, a part of Watts Water Technologies:
www.wattsregulator.com/#sle
4. Wade; WP5-100
5. Zurn Industries, LLC; 1250 XL

B. Water Hammer Arrestors:

1. Piston-type with sized in accordance with PDI-WH 201, sufficient volume of air to dissipate the calculated kinetic energy generated in the piping system
2. Arrestors shall be effective when installed at any angle.
3. Provide isolation valve for service.
4. Maximum working temperature of 250 degrees F
5. Maximum working pressure 350 PSIG
6. Performance per ANSI/ASSE 1010-2004 Standard

2.12 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:
 - a. Leonard Valve Company

- b. Bradley
 - c. Apollo Conbraco
 - d. Lawler
 - e. Powers
 - f. Acorn
 - g. Armstrong
 2. Recirculation Station: Recirculation station shall consist of thermostatic mixing valve in combination with piping assembly, inlet/outlet shutoff valves, pressure/temperature gauges, circulation pump (see pump schedule), circuit setter balancing valve, etc. All components pre-assembled to enamel coated strut and tested by manufacturer.
 3. Thermostatic Mixing Valves: The thermostatic water mixing valve (TMV) shall consist of a liquid-filled thermal motor control mechanism with a positive shut-off of hot water when cold water supply is lost. The TMV shall allow a restricted cold flow in the event of loss or interruption of the hot water supply. All flow is shut off in the event of thermostat failure. The TMV shall be constructed of bronze bodies with corrosion resistant components and shall be equipped with integral checkstops, thermometer, outlet temperature gauge, and removable strainers. The TMV shall control the temperature to within +/- 3 degrees from low flow to the maximum flow rate scheduled.
 4. Electronic Mixing Valves: The mixing valve shall consist of an electronic actuated mixing valve. Self-balancing, daily self-cleaning maintenance sweep feature, holds +/- 2°F temperature accuracy, standard serviceable integral check valves on all models. Self-Diagnostic Digital electronic control box with LCD display, programmable temperature setpoints, simple setup/simple error coding and upon power failure, holds last set temperature to avoid thermal shock. Provide a 2-hour battery backup if called for on the equipment schedule.
 5. Cabinet: 16-gauge, 0.0598 inch prime-coated steel, for recessed mounting with keyed lock.
- B. Thermostatic Mixing Valves for Emergency Eyewashes, Showers, and Combination Eyewash/Showers:
1. Manufacturers:
 - a. Bradley
 - b. Apollo Conbraco
 - c. Acorn
 2. The mixing valve shall be manufactured specifically for emergency fixture applications and be compliant with ANSI 358-1.
 3. The mixing valve shall have solid bimetal thermostat directly linked to valve porting to control the intake of hot and cold water and compensate for supply temperature and pressure fluctuations.
 4. Provide a locking type temperature regulator to prevent accidental movement, set temperature at 80 degrees F.
 5. The mixing valve shall close down on failure of cold-water supply.
 6. Shall have internal cold-water bypass capable full flow upon failure of hot water supply.
 7. Provide outlet dial thermometer, integral wall support, union angle check stops on inlets, and recessed or surface mounted cabinet with locking access panel.

8. Mixing valves for eyewashes shall be capable of 4 gpm, including cold water bypass. Mixing valves for showers and combination eyewash showers shall be capable of 20 gpm, including cold water bypass.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Thermometers: Install thermometers and thermal wells in piping at locations indicated, and to be easily read.
- C. Pressure Gauges: Install pressure gauges at each side of pressure reducing valves; and as indicated.
- D. Unions: Install unions in pipe connections to control valves, coils, regulators, reducers, all equipment, and where it may be necessary to disconnect the equipment or piping for repairs or maintenance; and as indicated.
- E. Install (1) piston type water hammer arrestor at each quick acting valve for branch supply lines up to 20' in length serving plumbing fixture groups. Install water hammer arrestor between last two fixtures, for branch supply lines exceeding 20' in length, serving plumbing fixture groups. Size per manufacturer's instructions.
- F. Thermostatic Mixing Valves: Install in accordance with installation detail and the manufacturer's recommendations.
- G. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- H. Encase exterior cleanouts in concrete flush with grade.
- I. Install floor cleanouts at elevation to accommodate finished floor.
- J. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, and interior and exterior hose bibbs.
- K. Pipe relief from backflow preventer to nearest drain.
- L. Install water hammer arrestors complete with accessible isolation valve on hot and cold-water supply piping to fast acting valves such as water closet flush valves, washer machines, etc.
- M. Install an approved trap primer at each floor drain, funnel drain, shower drain, janitor mop sink, and floor sink.

- N. For plumbing systems without flush valves, provide electronically activated trap primer or tailpiece trap primer.

END OF SECTION 221006

SECTION 223000 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Water Heaters
- B. Diaphragm-type compression tanks
- C. In-line circulator pumps
- D. Condensate removal pumps

1.2 RELATED REQUIREMENTS

- A. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment
- B. Section 230513 - Common Motor Requirements for HVAC Equipment
- C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections

1.3 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015
- B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014
- C. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2014
- D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2017
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014
- F. NSF 372 - Drinking Water System Components - Lead Content; 2016
- G. NSF 61 - Drinking Water System Components - Health Effects; 2017
- H. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions
- I. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions

1.4 SUBMITTALS

A. Product Data:

1. Provide dimensional drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, and power requirements.
3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.

B. Project Record Documents: Record actual locations of components.

C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number. Include pump performance curves with pump.

D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Certifications:

1. Water Heaters: NSF approved
2. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1, as applicable, in addition to requirements specified elsewhere
3. Electric Water Heaters: UL listed and labeled to UL 174
4. Water Tanks: UL listed units, for units with a storage tank of less than 120 gallons and gas input of less than 200,000 Btu per hour. All others to be ASME labeled to ASME BPVC-VIII-1
5. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated

B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.7 WARRANTY

- A. Provide five-year manufacturer warranty for domestic water storage tanks. Provide a one-year manufacturer warranty for domestic water heater parts.

PART 2 - PRODUCTS

2.1 WATER HEATERS

A. Manufacturers:

1. A.O. Smith Water Products Co
2. Bock Water Heaters, Inc
3. Rheem
4. State
5. Lochinvar
6. Bradford White
7. PVI
8. Heat Transfer Products

- B. Heat Pump Water Heater: Type: Factory-assembled and wired, electric with integrated heat pump, vertical storage.

1. Performance:

- a. Maximum Working Pressure: 150 psig
- b. Minimum COP: 4.2
- c. Shall comply with U.S. Department of Energy and current edition of ASHRAE 118.1.

2. Controls:

- a. Heat Pump shall cycle on/off with electric resistance elements in three modes Efficiency, Hybrid or Electric only. Each mode shall be activated upon the manufacturer's built-in controls.
- b. Automatic immersion water high temperature limit thermostat: LCD with adjustable temperature range from 60 to 180 degrees F, and diagnostic information.

3. Accessories:

- a. Water Connections: Brass
- b. Dip Tube: Brass
- c. Drain valve
- d. Anode: Magnesium
- e. Temperature and Pressure Relief Valve: ASME labeled.

- C. Tank: Welded steel ASME labeled pressure vessel: glass lining, mounted on steel channel base with lifting lugs, insulated with 2-inch glass fiber; enclosed with 16-gage, 0.0598-inch steel jacket; baked enamel finish.
- D. Controls: Ventilated control cabinet, factory-wired with solid state progressive sequencing step controller, fuses, magnetic contactors, control transformer, pilot lights indicating main power and heating steps, control circuit toggle switch, electronic low-water (probe-type) cut-off, high temperature limit thermostat, flush-mounted temperature and pressure gauges.
- E. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.
- F. Heat Pump: Complete factory assembled compressor with refrigerant vessel, inverter valve, filter, starter, integrated controls, and refrigerant.
- G. Commercial Electric:
 - 1. Type: Factory-assembled and wired, electric, vertical storage
 - 2. Performance:
 - a. Maximum Working Pressure: 150 psig
 - 3. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
 - 4. Accessories:
 - a. Water Connections: Brass
 - b. Dip Tube: Brass
 - c. Drain valve
 - d. Anode: Magnesium
 - e. Temperature and Pressure Relief Valve: ASME labeled.
 - 5. Tank: Welded steel ASME labeled pressure vessel; glass lining, mounted on steel channel base with lifting lugs, insulated with 2-inch glass fiber; enclosed with 16-gage, 0.0598-inch steel jacket; baked enamel finish.
 - 6. Controls: Ventilated control cabinet, factory-wired with solid state progressive sequencing step controller, fuses, magnetic contactors, control transformer, pilot lights indicating main power and heating steps, control circuit toggle switch, electronic low-water (probe-type) cut-off, high temperature limit thermostat, flush-mounted temperature and pressure gauges.
 - 7. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.

2.2 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Manufacturers:
 - 1. Amtrol Inc
 - 2. Bell & Gossett, a xylem brand

3. Taco, Inc
4. Wilkins
5. Armstrong

- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles
- C. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 55 psig

2.3 IN-LINE CIRCULATOR PUMPS, BRONZE

- A. Manufacturers:
1. Armstrong Fluid Technology
 2. Bell & Gossett, a xylem brand
 3. Taco
 4. Grundfos
- B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly
- C. Impeller: Bronze
- D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings
- E. Seal: Carbon rotating against a stationary ceramic seat suitable for continuous operation at 225 degrees F
- F. Drive: Flexible coupling
- G. Pump must be capable of being serviced without disturbing piping connections.
- H. Pump shall be water lubricated type for horizontal or vertical installation.
- I. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high-grade machinery enamel prior to shipment.
- J. Entire pump to be NSF 372 certified
- K. See Section 230513 - Common Motor Requirements for HVAC Equipment, if equipment schedule calls out for any variable drive or ECM requirements.

2.4 IN-LINE CIRCULATOR PUMPS, STAINLESS STEEL

- A. Manufacturers:
1. Armstrong Fluid Technology
 2. Bell & Gossett, a xylem brand
 3. Taco
 4. Grundfos

- B. Casing: Stainless steel, rated for 125 psig working pressure
- C. Impeller: Polyphenylene ether/high impact polystyrene blend or stainless steel
- D. Shaft and Bearings: Ceramic or stainless steel
- E. Seal: Carbon rotating against a stationary ceramic seat suitable for continuous operation at 225 degrees F
- F. Pump must be capable of being serviced without disturbing piping connections.
- G. Pump shall be water lubricated type for horizontal or vertical installation.
- H. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high-grade machinery enamel prior to shipment.
- I. Entire pump to be NSF 372 certified
- J. See Section 230513 - Common Motor Requirements for HVAC Equipment, if equipment schedule calls out for any variable drive or ECM requirements

2.5 CONDENSATE REMOVAL PUMPS

- A. Manufacturers:
 - 1. Franklin Electric Company
 - 2. Liberty Pumps Inc
 - 3. Little Giant
 - 4. Hartell
 - 5. Saniflo
- B. Construction: Commercial grade, nonferrous pump with stainless steel shaft, integral discharge check valve, integral float switch, safety switch, thermoplastic reservoir, motor assembly, and power cord with ground.
- C. Safety: UL 778

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.

C. Domestic Water Heaters:

1. Water heaters shall each have a relief valve sized to match heat input and set to relieve at 120 psi.
2. Install temperature-pressure relief valve on hot water heater and pipe discharge directly above funnel of floor drain or as shown on plans.
3. If the system has a hot water recirculating line and/or check valve in the cold-water supply to tank, provide a pre-charged, type expansion tank. Size per schedule or Hot Water Tank Piping Diagram. Provide ASME rated expansion tank on water heaters that are ASME rated.
4. Electric water heaters installed in unconditioned space or on a concrete floor shall be placed on incompressible insulation having a minimum insulation value of R-10.
5. On all water heaters, provide and install seismic bracing per SMACNA zone 3.
6. For water heaters larger than 199 MBH and water heater boilers of any size, contact boiler inspector for preliminary layout approval prior to final piping. Ensure installation meets all manufacturers required clearances as well as local code (WAC and L&I).
7. Provide and install brass fittings between water heater and piping connections. Dielectric fitting connections are not acceptable.
8. Install condensate drain to nearest floor sink, floor drain, or mop sink or as indicated on the plans.
9. Install flue and combustion air intake per manufacturer's recommendations and not to exceed water heater listed equivalent lengths.
10. High efficiency, gas-fired water heaters shall have the start-up provided by a factory authorized representative.

D. Pumps:

1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
2. For domestic booster pumps: Provide field start-up service and training by pump manufacturer's trained representative.
3. For elevator sump pumps: Coordinate installation and sump depth with the supplied elevator vendor for compliance with L&I requirements prior to installation of underground waste piping and ordering or equipment.

END OF SECTION 223000

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SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Flush valve water closets
- B. Lavatories
- C. Sinks
- D. Under-lavatory pipe supply covers
- E. Eye wash fountains
- F. Electric water coolers
- G. Service sinks
- H. Floor Drains
- I. Floor Sinks
- J. Hot Water Dispenser
- K. Hydrants
- L. Hose Bibbs

1.2 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010
- B. ASTM D3222 - Standard Specification for Unmodified Poly (Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials; 2005 (Reapproved 2015)
- C. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2013
- D. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017)
- E. ASME A112.18.1 - Plumbing Supply Fittings; 2012
- F. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013
- G. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; 1994 (R2009)

- H. ASME A112.19.14 - Six Liter Water Closets Equipped with Dual Flushing Device; 2013
- I. ASSE 1014 - Performance Requirements for Backflow Prevention Devices for Hand-Held Showers; 2005
- J. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2015
- K. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013
- L. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017
- N. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015
- O. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013
- P. NEMA LD 3 - High-Pressure Decorative Laminates; 2005
- Q. NSF 61 - Drinking Water System Components - Health Effects; 2017
- R. NSF 372 - Drinking Water System Components - Lead Content; 2016

1.3 SUBMITTALS

- A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- B. Manufacturer's Instructions: Indicate installation methods and procedures.
- C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with a minimum of three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.

- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.6 WARRANTY

- A. Provide five-year manufacturer warranty for electric water coolers.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, Wall hung or floor mounted as noted on Equipment Schedule, siphon jet flush action, china bolt caps.
 - 1. Bowl: ASME A112.19.2; As noted on Architectural elevations high with elongated rim
 - 2. Flush Valve: Exposed (top spud)
 - 3. Handle Height: 44 inches or less
 - 4. Outlet Size: 2 inches
 - 5. Color: White
 - 6. Assemblies need to have a current Maximum performance (MaP) rating of 800 or more and be listed as a WaterSense approved fixture.
 - 7. Manufacturers:
 - a. American Standard, Inc
 - b. Kohler Company
 - c. Zurn Industries, Inc
 - d. Mansfield
 - e. Sloan
 - f. Toto
- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories
 - 1. Provide manual or sensor flush valve as indicated on the equipment schedule.
 - 2. Sensor-Operated Type: Solenoid operator, hard wired or battery powered as noted on Equipment Schedule, infrared sensor and over-ride push button.
 - 3. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop
 - 4. Handle placed on turn-around side for ADA applications.
 - 5. Manufacturers:
 - a. Basis of Design: Sloan Valve Company

C. Seats:

1. Manufacturers:

- a. American Standard, Inc: www.americanstandard-us.com/#sle
- b. Bemis Manufacturing Company
- c. Church Seat Company
- d. Zurn Industries, Inc

2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover

D. Water Closet Carriers:

1. Manufacturers:

- a. JOSAM Company
- b. Zurn Industries, Inc
- c. J.R. Smith
- d. Wade
- e. Watts

2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers. Provide heavy duty carriers (500 pound rated) as a minimum unless specifically called out as light duty carriers on the plans. Provide extra heavy-duty carriers (750 pound rated or greater) as noted on the plans.

2.3 LAVATORIES

A. Lavatory Manufacturers:

- 1. American Standard, Inc
- 2. Kohler Company
- 3. Zurn Industries, Inc
- 4. Mansfield
- 5. Sloan
- 6. Toto

- B. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory, Size as indicated on Equipment Schedule minimum, with 4-inch-high back, rectangular basin with splash lip, front overflow, and soap depression.

1. Drilling Centers: 4 inches

- C. Steel Counter Top Basin: ASME A112.19.4M; porcelain on steel self-rimming counter top lavatory, Size as indicated on Equipment Schedule with drillings on 4 inch centers, front overflow, soap depression, seal of putty, caulking, or concealed vinyl gasket

- D. Vitreous China Counter Top Basin: ASME A112.19.2; vitreous china self-rimming counter top lavatory, Size as indicated on Equipment Schedule with drillings on 4 inch centers, front overflow, soap depression, seal of putty, caulking, or concealed vinyl gasket
- E. Vitreous China Under-Mount Basin: ASME A112.19.2; vitreous china under-mount lavatory, front overflow, mounting kit and template by manufacturer
 - 1. Bowl size: Size as indicated on Equipment Schedule
- F. Supply Faucet Manufacturers:
 - 1. Basis of Design: Chicago Faucets
- G. Supply Faucet: ASME A112.18.1; chrome plated supply fitting with open grid strainer, water economy aerator with maximum flow of 0.5 gallon per minute (low-flow), handles or sensor as indicated on Equipment Schedule
- H. Sensor Operated Faucet: Cast brass, chrome plated, wall mounted with sensor located on neck of spout
 - 1. Power Supply: Battery, easily replaceable, alkaline or lithium, minimum 200,000 cycles
 - 2. The sensor faucet shall have access to controls and battery through spout. Provide with vandal resistant aerator, cover plate to match hole pattern of lavatory, and supply hose(s).
 - 3. Water Supply: 1/2-inch compression connections
 - 4. Aerator: Vandal resistant, 0.5 GPM, laminar flow device
 - 5. Automatic Shut-off: 30 seconds
 - 6. Sensor range: Factory set at a minimum of 3 inch adjustable up to 24 inches
 - 7. Finish: Polished chrome
 - 8. Accessory: 4-inch deck plate
 - 9. Lead Content: Extra low; maximum 0.25 percent by weighed average
 - 10. Sensor Operated Faucet Manufacturers:
 - a. American Standard, Inc
 - b. The Chicago Faucet Company
 - c. Moen Incorporated
 - d. Sloan Valve Company
 - e. Toto USA
 - f. Zurn Industries, Inc; AquaSense Z6913
 - g. Symmons
 - h. Speakman
 - i. Mac Faucets
 - j. Delany
- 11. P-Trap:
 - a. 17-gauge seamless chrome plated brass
 - b. Adjustable, ground joint swivel
 - c. 2" water seal
 - d. Provide cleanout
 - e. Manufacturers
 - 1) Just Manufacturing

- 2) Engineered Brass Company
- 3) McGuire Manufacturing

2.4 SINKS

A. Sink Manufacturers:

1. Just
2. Elkay

B. Single Compartment Bowl: ASME A112.19.3; 18 gage, 0.0359 inch (0.91 mm) thick, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim

1. Drain: 3-1/2-inch crumb cup and tailpiece
2. Verify amount of hole punches required for each sink prior to ordering.

C. Double Compartment Bowl: ASME A112.19.3; 18 gage, 0.0359 inch (0.91 mm) thick, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim

1. Drain: 3-1/2-inch crumb cup and tailpiece
2. Verify amount of hole punches required for each sink prior to ordering.

2.5 UNDER-LAVATORY PIPE SUPPLY COVERS

A. Manufacturers:

1. Plumberex Specialty Products, Inc
2. ProWrap

B. General:

1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
2. Adhesives, sewing threads and two-ply laminated materials are prohibited.
3. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
4. Construction: 1/8-inch PVC with antimicrobial, antifungal and UV resistant properties.
 - a. Provide one piece injected molded design with internal bridge at top of J-bend to prevent separating.
 - b. Comply with ASTM C1822 Type III for covers on accessible lavatory piping.
 - c. Thermal Resistance: R value of 0.504 or lower when tested by ASTM C177
 - d. Microbial and Fungal Resistance for Interior and Exterior: Comply with ASTM G21

C. Under-Lavatory Covers with Snap-Lock Fasteners:

1. Manufacturers:
 - a. Plumberex Specialty Products, Inc: Plumberex Pro-Extreme

2. Construction: PVC with antimicrobial, antifungal, and UV-resistant properties, one piece injected molded design with internal bridge at top of J-bend to prevent separating.
3. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.
4. Maintenance: Valve and supply cover shall be accessible for maintenance without removal and with removable, reusable access cap.
5. Provide with weep hole for condensation drainage and ventilation.
6. Vandal Resistance: Internal line grooves for trimming not easily torn by hand. All trim line grooves shall require tool cutting only.
7. Color: High gloss white

2.6 ELECTRIC WATER COOLERS

A. Electric Water Cooler Manufacturers:

1. Elkay Manufacturing Company
2. Haws Corporation
3. Oasis, a Lynn Tilton Company
4. Murdock Manufacturing

B. Water Cooler: Electric, mechanically refrigerated; surface ADA mounted; stainless steel top, stainless steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air-cooled condenser and stainless-steel grille.

1. Capacity: Provide a minimum of 8 gallons per hour of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
2. Electrical: 115 V, 60 Hertz compressor, 6-foot cord and plug for connection to electric wiring system including grounding connector. Coordinate receptacle location with EC

C. Bottle Filler: Materials to match fountain. See below for specifications.

D. If labeled 'Vandal Resistant' on Equipment Schedule, provide heavy duty, 14-gauge stainless steel cabinet with vandal resistant screw hardware. Provide stainless steel louver screening to prevent objects from being inserted into cabinet.

2.7 BOTTLE FILLER (WALL MOUNTED)

A. See Plumbing Fixture Schedule for manufacturer and model number.

B. Bottle filler shall be electronic sensor operated for touch free operation. Provide antimicrobial protection of water stream parts.

C. Provide water filter to meet NSF/ANSI 42 and 53 for taste and odor, particulate and lead reduction.

D. Waterway to be certified to meet lead-free as defined by the Safe Drinking Water Act.

E. Provide each bottle filler with a water supply, stop, p-trap waste and electrical connection.

- F. Approved manufacturers: Same as drinking fountains and electric water coolers

2.8 SERVICE SINKS

- A. Service Sink Manufacturers:

1. Florestone
2. Fiat
3. Acorn

- B. Bowl: 36 by 24 by 10 inch high unless otherwise stated in the plumbing fixture schedule, white molded stone, floor mounted, with one-inch-wide shoulders, vinyl bumper guard, stainless steel strainer

- C. Accessories:

1. 4 feet of 1/2 inch diameter plain end reinforced plastic hose
2. Hose clamp hanger
3. Mop hanger

2.9 EMERGENCY EYE WASH

- A. Emergency Wash Manufacturers:

1. Haws Corporation
2. Stingray Systems
3. Guardian
4. Bradley
5. Speakman
6. Acorn

- B. Emergency Wash: ANSI Z358.1; wall-mounted, self-cleaning, non-clogging eye wash with quick opening, full-flow valves, ABS eye wash receptor, twin eye wash heads, ABS dust caps, copper alloy control valve and fittings, stainless steel push handle activator.

- C. 4.9 gpm @ 30psi flow

2.10 FLOOR DRAINS (F.D.)

- A. Cast iron body, heavy duty floor drain, with 5" nickel bronze adjustable strainer head, vandal proof screws, and trap primer connections. Size outlet to match pipe size shown on drawings. Where used for shower drain, provide with chrome plated strainer. Furnish with a 6" diameter strainer and funnel where indicated.

- B. Cast iron body, heavy duty floor drain, with Type 'N' 7" diameter, nickel bronze grate, vandal proof screws, and trap primer connections. Size outlet to match pipe size shown on drawings. Use in mechanical rooms and utility spaces.

C. Floor drains labeled medium duty, light duty, or commercial duty are not allowed.

D. Manufacturers:

1. J.R. Smith
2. Josam
3. Zurn
4. Wade
5. MIFAB
6. Watts

2.11 FLOOR SINKS (FS)

A. 12x12x6 deep cast iron body and square slotted medium duty grate, with white acid resisting porcelain enamel interior and top, complete with white ABS anti-splash interior bottom dome strainer.

B. Manufacturers:

1. J.R. Smith
2. Josam
3. Zurn
4. Wade
5. MIFAB
6. Watts

2.12 HOT WATER DISPENSER

A. Hot water dispenser shall be U.L. listed, 750 watts, 6.5 amps, 115 volts, factory mounted 3 wire cord and 3 prong plug, adjustable thermostat with range of 140°F to 200°F. ½ gallon storage capacity with faucet having chrome plated finish. Refer to manufacturer's installation manual for proper installation. Provide shut-off valve in supply line to unit, install in back left or back right corner of sink.

B. Manufacturers:

1. In-sink-erator (ISE)
2. Other manufacturers will be allowed by prior approval only. To request approval, the manufacturer must provide an equipment layout showing how the proposed equipment will fit in the space and meet all access requirements. This manufacturer must include in it the cost of the proposed equipment, at bid time, the difference in piping, electrical, etc.

2.13 HYDRANTS

A. Wall Hydrants: Approved freeze-proof type with integral anti-siphon vacuum breaker, self-draining, 3/4 hose connection, loose key operated:

1. Manufacturers:

- a. Zurn: Z-1310
 - b. Wade: W-8620 with union elbow
 - c. Smith: 5609
 - d. Josam: 71050
 - e. Woodford: 65
 - f. Acorn: 8161
- B. Wall Box Hydrants: Freezeproof type with integral anti-siphon vacuum breaker, 3/4" hose connection, loose key operated, enclosed in a bronze or stainless-steel box for flush wall installation with hinged door and key lock:
 - 1. Manufacturers:
 - a. Jay R. Smith: 5509QT
 - b. Zurn: Z-1300
 - c. Woodford: B 65
 - d. Acorn: 8160

2.14 HOSE BIBBS

- A. Surface Mounted: Approved types with integral vacuum breaker, 3/4" hose connection, chrome plated face and loose key:
 - 1. Manufacturers:
 - a. J.R. Smith: 5618
 - b. Woodford: Model 75
 - c. Chicago Faucet: Model 387-E27CP
 - d. Acorn: 8141
- B. Surface Mounted in a Box: Approved type with integral vacuum breaker, 3/4" hose connection, enclosed in box for flush wall installation with hinged door and operating key lock.
 - 1. Manufacturers:
 - a. Woodford: Model B75
 - b. Zurn: Z1350-VB
 - c. J.R. Smith: 5518
 - d. Acorn: 8151

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.

- C. Confirm that millwork is constructed with adequate provision for the installation of countertop lavatories and sinks.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with a removable trap to be easily removable for servicing and cleaning.
- B. Provide chrome plated rigid supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Make fixture floor connections with approved brand of cast iron floor flange, soldered or caulked securely to waste pipe.
- E. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets.
- F. Caulk between fixtures and wall and floor with white butyl rubber non-absorbent caulking compound. Point edges.
- G. Install and connect all Kitchen Fixtures. Provide chrome plated brass waste, "Just" or equal.
- H. Provide concealed arm supports for wall mounted china lavatories.
- I. All exposed metal shall be chrome-plated brass.
- J. Provide floor-mount fixture support with concealed heavy steel stanchion and supporting plate for lavatories and urinals.
- K. Provide floor-mount fixture support for wall-hung water closets, and with 2" no-hub auxiliary inlet at each location of back-to-back water closet and urinal.
- L. Provide flush valve supply support on all WC and urinal carriers.
- M. Provide rear anchor support for all heavy-duty WC carriers.
- N. Provide trap primer and connection to p-trap of showers, floor sinks, floor drains, and service sinks.
- O. ADA showers shall be installed with entrance lip flush with finish floor.
- P. For ADA water closets, provide flush valve handle or tank handle on side facing wheelchair turn around.

- Q. All ADA lavatory P-trap and angle stop assemblies shall be insulated with an institutional A.D.A. insulator kit as manufactured by E.B.C. or equal. Abrasion resistant exterior cover shall be smooth and have 1/8" wall minimum over cushioned foam insert. Fasteners shall remain substantially out of sight. Use part 500RHS on offset P-trap if required.
- R. Sensor Type Fixtures: Mechanical contractor to coordinate with electrical contractor for installation of all infra-red sensor type fixtures. Transformer kit provided and installed by mechanical contractor, all electrical connectors, wire connections, and testing by electrical contractor.
- S. Hose Bibb: Install one (1) hose bibb in each toilet room with 2 or more water closets, urinals or a combination thereof, mount at 18" under one lavatory.
- T. Wall Hydrant: Install at 18" above finished grade, unless otherwise indicated.

3.4 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

- A. Clean plumbing fixtures and equipment.
- B. Polish chrome finish at completion of Project.
- C. Remove all manufacturers' labels tags, and protective plastic.
- D. Polish floor drain covers.

3.7 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace damaged products before Date of Substantial Completion.

3.8 MOUNTING HEIGHTS

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated on the architectural elevation drawings. Architectural elevation dimensions take precedent over the following heights:
 - 1. Water Closet:

- a. Standard: 16-17 inches to top of seat
 - b. ADA: 17-19 inches to top of seat
 - c. Pre-school and Kindergarten: 13 inches to top of seat (Upon approval by District)
- 2. Urinal:
 - a. Standard: 24 inches from floor to bottom lip
 - b. ADA: 16 inches from floor to bottom lip
 - c. Pre-school and Kindergarten: 16 inches from floor to bottom lip
- 3. Lavatory:
 - a. Standard: 29 inches from floor to top of apron
 - b. ADA: 33 inches from floor to top of apron with 29 inches clearance under fixture
- 4. Drinking Fountain:
 - a. Standard: 40 inches from floor to bubbler height
 - b. ADA: 36 inches from floor to bubbler height with 27 inches clearance under fixture
- 5. Emergency Eye Wash:
 - a. See installation detail on plans for combination eyewash/shower.

END OF SECTION 224000

SECTION 230513 - MOTORS AND VARIABLE DRIVES

PART 1 - GENERAL

1.1 GENERAL

- A. Includes, but not limited to, motors 1/12 HP or larger used in Division 23.

1.2 RELATED SECTIONS

- A. General Conditions, Division 1
- B. Section 200000 – General Mechanical Requirements

1.3 SUBMITTALS REQUIREMENTS OF THIS SECTION

- A. All variable drives.
- B. Total harmonic voltage distortion calculation.

1.4 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

- A. Check out sheet for each variable drive showing all programmed parameters. Date of check out, and name and company address of employee responsible for checkout.
- B. Programming manual explaining how to access and change all programmable points.
- C. International wiring diagram for each different unit.
- D. Parts diagram with replacement parts listed.
- E. Trouble shooting guide.

PART 2 - PRODUCTS

2.1 MOTORS

- A. Motors located indoors shall be open frame, drip-proof type, unless indicated otherwise. Motors located outdoors exposed to weather shall have corrosion resistant finish and shall be totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) type, unless indicated otherwise. Motors used in fans serving dishwashing hoods shall be TEFC type.
- B. All motors shall be UL listed.

- C. All motors used with variable frequency drives shall be premium efficiency inverter ready and shall be capable of running at least 85 Hz.
- D. All motors 1 HP and larger shall be energy efficient type and shall meet the 2015 Washington State Energy Code requirements.
- E. All fan motors 1/12 HP or greater and less than 1 HP shall be Electronically Commutated Motors (ECM) or shall have a minimum motor efficiency of 70 percent when rated in accordance with DOE 10 C.F.R. 431. These motor speeds shall be adjustable.
- F. Motors shall not be smaller than indicated on drawings; however, motors shall be of adequate size to drive the respective equipment when handling the quantities specified without exceeding the nameplate full load current at any conditions encountered in actual operation. If it becomes evident that a motor furnished is too small to meet these requirements as a result of the Contractor using substituted equipment or having revised the system arrangement, the Contractor shall replace it with a motor of adequate size at no additional cost to the Owner. This Contractor shall also arrange with the Electrical Contractor to increase the size of the wiring, motor starter and other accessories as required to serve the larger motor at no additional cost to the Owner.
- G. ECM (Electrically Commutated Motors) shall conform to the motor requirements listed above. In addition, the Contractor purchasing the HVAC equipment that includes the ECM is responsible for ensuring the ECM motor control speed control is set to match the required component operation. The ECM motor control speed control may be pre-set by the HVAC equipment manufacturer. The Contractor purchasing the HVAC equipment shall provide documentation showing the appropriate ECM motor control board jumper pins, dip switches and/or multi-pin plugs settings for correct HVAC equipment component operation.
- H. Approved Manufacturers:
 - 1. General Electric
 - 2. Westinghouse
 - 3. Reliance
 - 4. Allis-Chalmers
 - 5. Gould
 - 6. Century
 - 7. Wagner
 - 8. Baldor
 - 9. U.S. Motors Marathon

2.2 VARIABLE FREQUENCY DRIVES (VFD UNDER 5 HP)

- A. Variable Frequency Drives (VFD):
 - 1. Description:
 - a. Provide enclosed adjustable speed drives suitable for operating at the current, voltage, and horsepower indicated on the equipment schedule. Conform to requirements of NEMA ICS 3.1.

- b. VFD shall not increase the voltage distortion above 5% at the input terminals of the VFD or line filters. The manufacturer shall make all modifications to the drive necessary to meet this requirement.

B. Ratings:

1. VFD must operate, without fault or failure, when voltage varies plus or minus 10 percent from rating and frequency varies plus or minus 5 percent from rating.
2. VFD shall be voltage as shown on schedule.
3. Operating Ambient Temperature: 14 degrees F to 104 degrees F.
4. Humidity: non-condensing to 95%.
5. Altitude: to 3300 feet, higher altitudes achieved by derating.
6. Starting Torque: 100% starting torque shall be available from 0.5 Hz to 60 Hz.
7. Overload capability: 110% of rated F.L.A. (full load amps) for 60 seconds; 150% of rated F.L.A., instantaneously.
8. The VFD must meet the requirements for Radio Frequency Interface (RFI) above 7 MHz as specified by FCC regulations, part 15, subpart J, Class A devices.
9. In compliance with IEEE 519, the Total Harmonic Voltage Distortion for the VFD shall be no greater than 5%, the supplier of the VFD shall provide a dc bus choke or line reactors to ensure compliance. To estimate THVD the following is needed: Point of Common Coupling (PCC) and the KVA, and secondary voltage of the supply transformer. Assume 5.00% transformer impedance. If no transformer is present assume 50% of service demand.
10. VFDs must have a minimum short circuit rating of 65 Kamps RMS without additional input fusing.

C. Design:

1. VFD shall employ microprocessor-based inverter logic, isolated from all power circuits.
2. VFD shall include surface mount technology, with conformal coating.
3. VFD shall employ a PWM (pulse width modulated) inverter system, consisting of:
 - a. Input Section:
 - 1) VFD input power stage shall convert three-phase AC line power into a fixed DC voltage via a solid-state full wave diode rectifier, with MOV (metal oxide varistor) protection.
 - b. Intermediate Section:
 - 1) DC bus as a supply to the VFD Output Section shall maintain a fixed voltage with filtering and short circuit protection.
 - 2) DC Bus shall be interfaced with the VFD diagnostic logic circuit, for continuous monitoring and protection of the power components.
 - c. Output Section:
 - 1) Insulated gate bipolar transistors (IGBT's) shall convert DC bus voltage to variable frequency and voltage.
 - 2) PWM sine coded output to the motor.
4. The VFD must be selected for operation at carrier frequencies at or above 5 kHz without derating to satisfy the conditions for current, voltage and horsepower as indicated on the equipment schedule.

5. VFD shall include one independent remote reference input. The input shall be 0 - 10 VDC or 4 – 20mA. Input shall respond to a programmable bias and gain.
6. VFD shall include a minimum of two digital input terminals:
 - a. Reverse rotation direction
 - b. Remote Reset
7. VFD shall provide terminals for remote contacts, to allow starting in the automatic mode.
8. VFD shall include one fully rated form “A” contact and one fully rated form “C” contact. The contact purpose is selectable and shall provide one of two functions:
 - a. Drive Running
 - b. Drive Faulted
9. VFD shall include a power loss ride of 2 seconds.
10. VFD shall include front mounted control operators that set the motor overheat drive shutdown, set the acceleration and deceleration, and set the output frequency limits. Operating mode (auto or manual) and speed setting functions shall also be provided.
11. VFD shall include electronic thermal overload protection for both drive and motor. The electronic thermal motor overload shall be approved by UL. If the electronic thermal motor overload is not approved by UL, a separate UL approved thermal overload relay shall be provided in the VFD enclosure.
12. VFD shall include the following program functions:
 - a. Auto restart capability.
 - b. Stall prevention capability.
 - c. Ability to close fault contact after the completion of all fault restart attempts.
13. VFD shall include factory settings for all parameters, and the capability for those settings to be reset.
14. VFD shall include the capability to adjust the following functions, while the VFD is running:
 - a. Forward/Reverse direction.
 - b. Acceleration adjustment from 0 to 3600 seconds.
 - c. Deceleration adjustment from 0 to 3600 seconds.
 - d. One preset speed.
15. All units to be provided with fused disconnect integral to the VFD. Fuse sized for the equipment per NEC.

D. Product Options:

1. Provide the following:
 - a. RFI (radio frequency interference) filters to attenuate possible VFD generated noise. The addition of these filters should reduce the line conducted noise levels within the limits of FCC regulations, part 15, subpart J, for Class A devices.
 - b. Current limiting input fusing for the protection of VFD semiconductor devices.
 - c. Line reactors reduce the effect of the load and line side transients on the drive. May be used on either the input side or output side of the drive.

- d. "DC bus reactor", to attenuate harmonic distortion.
- e. DV/DT Filtering: When inverter duty type motors are not provided, maximum allowed VFD output rise is 1000 volts in 2 microseconds.

E. Fabrication:

- 1. Enclosure: NEMA Type 1 unless otherwise specified on drawings.

F. Source Quality Control:

- 1. In-circuit testing of all printed circuit boards shall be conducted, to insure the proper mounting and correct value of all components.
- 2. All printed circuit boards shall be burned in for 96 hours, at 85 degrees C.
- 3. Final printed circuit board assemblies shall be functionally tested, via computerized test equipment. All tests and acceptance criteria shall be preprogrammed. All tests' results shall be stored as detailed quality assurance data.
- 4. All fully assembled controls shall be functionally tested, with fully loaded induction motors. The combined test data shall then be analyzed, to insure adherence to quality assurance specifications.
- 5. Inspect and production test, under load each completed VFD assembly.

G. Acceptable Manufacturers:

- 1. Square D
- 2. ABB
- 3. Yaskawa
- 4. Danfoss

PART 3 - EXECUTION

Not Applicable

END OF SECTION 230513

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SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL

A. Includes:

1. Pipe Hangers and Supports
2. Duct Hangers and Supports
3. Mechanical Equipment Anchors and Supports

1.2 RELATED SECTIONS

- A. General Conditions, Division 1
- B. Section 200000 – General Mechanical Requirements
- C. Section 222000 – Excavation & Backfill for Mechanical Underground Utilities
- D. Section 230548 – Vibration and Seismic Control
- E. Section 230719 – HVAC Piping Insulations
- F. Section 231119 – HVAC Piping Specialties
- G. Section 232300 – Refrigerant Piping

1.3 QUALITY ASSURANCE

- A. Pipe Hanger Standards: (MSS) Manufacturers Standardization Society Standards SP-58-2002, SP-89-2003, and SP-69-2003.
- B. All methods, materials, and workmanship shall conform to the International Building Code (IBC) and International Mechanical Code (IMC), as amended and adopted by the authority having jurisdiction.

1.4 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Hangers
- B. Struts
- C. Anchors
- D. Shop drawings are required for all equipment supports and fabricated supports or assemblies.

1.5 OPERATION AND MAINTENANCE OF THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Hangers and Supports: Elcen, Grinnell, B-Line Systems, Unistrut, Caddy, Tolco, PHD
- B. Anchors: Rawplug, Phillips, Hilti, Caddy, Powers
- C. Rooftop Support Systems: Miro Industries, Inc

2.2 GENERAL HANGERS AND SUPPORTS

- A. Hanger Rods: Threaded hot rolled steel, electro-galvanized or cadmium plated. Hanger rods shall be sized so that the total load (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

Nominal Rod Diameter	Maximum Load
3/8 Inch	610 Pounds
1/2 Inch	1130 Pounds

- B. Hanger Straps: Galvanized steel. Straps shall be sized so that the total load does not exceed the following:

Strap Size	Maximum Load
1" x 22 Gauge	230 Pounds
1" x 20 Gauge	290 Pounds
1" x 18 Gauge	380 Pounds
1" x 16 Gauge	630 Pounds

- C. Beam Attachments: Shall be of the following type:

MSS Type	Elcen Figure No.	Grinnel Figure No.
21	33, 34	131
22	67	66
23	29A	87
28	95	292, 228
30	95	229

- D. Anchors: Masonry anchors shall be Phillips wedge anchors, Phillips "Red Head" or Rawl "Saber-Tooth".
- E. Steel: Structural steel, per ASTM A36.
- F. Wood: Shall be fire treated.

2.3 PIPE HANGERS AND SUPPORTS

- A. All hangers used directly on copper pipe shall be copper plated or have a factory applied 1/16-inch thick (minimum) plastic coating on all contact surfaces.
- B. Riser clamps shall be epoxy coated.
- C. All other hangers, supports, and hardware shall be cadmium plated or galvanized.
- D. Fire sprinkler supports shall comply with NFPA-13.
- E. Pipe Hangers and Supports: Shall be of the following type (numbers are 'MSS'):

Maximum System Temperature	Insulated Pipe Type
120 to 450 Degrees	1, 3, 7, 9, 10, 41, 42, 43, 44, 45, 46, E
60 to 120 Degrees	1, 3, 7, 9, 10
33 to 59 Degrees	1, 3, 5, 7, 9, 10, 41, 42, 43, 44, 45, 46, E

- F. Vertical Pipe Supports: MSS Type 8 riser clamp (Elcen Fig. 39 and 339; Grinnel Fig. 261 and 261C).
- G. Trapeze Hangers: Shall be constructed of carbon steel angles, channels, or other structural shapes with flat surface for point of support. Trapeze hangers shall be supported with hanger rods suspended from concrete inserts or approved structural clips. Provide a steel washer plate (Elcen Fig. 84 or equal) where hanger rod nuts bear on trapeze hanger.
- H. Insulated Pipe Inserts and Insulation Shields:
 - 1. Insulation material at pipe insert shall be calcium silicate with jacket of nylon reinforced kraft paper bonded to aluminum foil cover on insulation. Insulated pipe insert shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.38 Btu/hr./sq. ft./degree F/1-inch thick at 75°F.
 - 2. Insulated pipe insert shall be same thickness as adjoining pipe insulation and sized to match pipe in which it is used on. See Section 230719 for insulation sizes.
 - 3. Provide shield per Section 231119 - HVAC Piping Specialties.
 - 4. Manufacturers:
 - a. TPS Thermal Pipe Shields
 - b. B-Line
 - c. Clement Support Services

2.4 REFRIGERANT PIPE HANGERS AND SUPPORTS

- A. All horizontal refrigerant pipe shall utilize clevis, strut-mounted, or trapeze style supports.
- B. All hangers, supports, and hardware shall be cadmium-plated or galvanized where used indoors, and galvanized where used outdoors.

C. Secure refrigerant pipe to strut channel using either of the following:

1. Snap in Shield Supports:

- a. Polypropylene Copolymer construction.
- b. Rated for an operating temperature of -40°F to 178°F.
- c. Material shall be paintable.
- d. UL 723 (ASTM E 84) listed.
- e. Meets UL 94 HB flammability standards.
- f. Approved Manufacturers:
 - 1) Eaton Snap 'N Shield
 - 2) TB Concept, Inc. Insuguard

2. Insulated Pipe Inserts and Insulation Shields:

- a. Insulation material at pipe insert shall be calcium silicate with jacket of nylon reinforced Kraft paper bonded to aluminum foil cover on insulation. Insulated pipe insert shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.38 Btu/hr./sq. ft./degree F/1-inch thick at 75°F.
- b. Insulated pipe insert shall be same thickness as adjoining pipe insulation and sized to match pipe in which it is used on. See Section 230719 for insulation sizes.
- c. Provide shield per Section 231119 - HVAC Piping Specialties.
- d. Manufacturers:
 - 1) TPS Thermal Pipe Shields
 - 2) B-Line
 - 3) Clement Support Services

D. Trapeze Hangers: Shall be constructed of carbon steel strut supports. Trapeze hangers shall be supported with hanger rods suspended from approved structural clips. Provide a steel washer plate (Elcen Fig. 84 or equal) where hanger rod nuts bear on trapeze hanger.

E. Clevis Hangers:

1. ANSI/SP-69 and SP-58 (Type 1).
2. Provide with electro-galvanized finish.
3. Install snap-in shield, or insulated pipe inserts, and insulation shields at each clevis hanger support.
4. Snap in shields shall comply with the following requirements:
 - a. Material: Polypropylene
 - b. UL-723 (ASTM E 84) and UL-2043
 - c. Service Temperature: -40°F to 178°F
 - d. Approved Manufacturers:
 - 1) Eaton Snap 'N Shield
 - 2) TB Concept Inc. Insuguard

5. Insulated Pipe Inserts and Insulation Shields:

- a. Insulation material at pipe insert shall be calcium silicate with jacket of nylon reinforced Kraft paper bonded to aluminum foil cover on insulation. Insulated pipe insert shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.38 Btu/hr./sq. ft./degree F/1-inch thick at 75°F.
- b. Insulated pipe insert shall be same thickness as adjoining pipe insulation and sized to match pipe in which it is used on. See Section 230719 for insulation sizes.
- c. Provide shield per Section 231119 - HVAC Piping Specialties.
- d. Manufacturers:
 - 1) TPS Thermal Pipe Shields
 - 2) B-Line
 - 3) Clement Support Services

6. Approved Manufacturers:

- a. Caddy
- b. PHD, Inc.
- c. B-Line

F. Vertical refrigerant pipe supports shall utilize struts with cushion clamps.

1. Cushion Clamps:

- a. Temperature: -65°F to 275°F
- b. Yellow trivalent plated mild steel
- c. Provide with nylon locknut washer
- d. Approved Manufacturers:
 - 1) Holdrite
 - 2) BlueRidge
 - 3) Caddy
 - 4) PHD, Inc.

2.5 DUCT HANGERS AND SUPPORTS

- A. Hangers: As shown in SMACNA HVAC Duct Construction Standards.
- B. Vertical Duct Supports at Floor: 1-1/2" x 1-1/2" x 1/8" (minimum) galvanized steel angle and to support ducts, as shown in SMACNA HVAC Duct Construction Standards Figure 4-6. For ducts over 30 inches wide, provide riser reinforcing with hanger rods between the riser support and riser reinforcing.
- C. Vertical Duct Supports at Wall: 1-1/2" x 1/8" (minimum) strap or 1-1/2" x 1-1/2" x 1/8" (minimum) angle bracket and as shown in SMACNA HVAC Duct Construction Standards Figure 4-7.
- D. Hanger Attachments to Structure: As shown in SMACNA HVAC Duct Construction Standard Figures 4-1, 4-2, 4-3 to suit building construction and as allowed on structural drawings. Where C-clamps are provided, retainer clips shall be used. Friction beam clamps shall not be used.

- E. Hanger Attachments to Ducts: As shown in SMACNA HVAC Duct Construction Standards Figure 4-4.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Provide all necessary bolts, nuts, washers, turnbuckles, rod connectors, and any other miscellaneous accessories required for the support and anchoring of all pipes, ducts, and mechanical equipment.
- B. Install steel or wood backing in walls (anchored to studs) as required to provide support for items hung from walls.
- C. Install concrete inserts and anchors in accordance with manufacturer's instructions.
- D. All welded steel support assemblies shall have a power wire brush and primer paint finish.
- E. Maximum spans between piping supports may be significantly less than the maximum spans allowed herein due to structural limitations of allowable loads on hangers. The most restrictive criteria shall govern. Reference structural drawings.

3.2 INSTALLATION OF PIPE HANGERS AND SUPPORTS

- A. Use of zip ties or plastic straps is strictly prohibited.
- B. Insulation shall be continuous at pipe hangers and supports. Insulation may only be broken at vertical pipe supports where insulated cushion clamps are utilized.
- C. Above ground pipe shall be adequately anchored to the structure to prevent sagging and to keep pipe in alignment.
- D. All pipe supports shall be provided with a means of adjustment for the aligning and leveling of the pipe after installation.
- E. Installation and sizing of pipe supports and accessories shall be in accordance with the manufacturer's recommendations and standard MSS SP-89 and MSS SP-69, NFPA #13 for fire protection piping, UPC, and IMC.
- F. Provide supports at each change in direction of piping.

- G. Where mechanically coupled piping is used, a hanger shall be placed within 2 feet on each side of couplings, with hanger spacing in no case to exceed the following:

Nominal Pipe Diameter	Maximum Span Mechanically Coupled Piping
3/4 to 1 Inch	7 Feet
1 ¼ to 1 ½ Inch	7 Feet
2 Inches	10 Feet
2 ½ Inches	10 Feet
3 Inches and Larger	12 Feet

NOTE: Manufacturer's support instructions shall be used where it is more restrictive than the above. Above is for rigid coupled piping systems. Follow manufacturer's requirements for a flexible piping system, except that, in no case is the spacing to be more than the above.

- H. Steel Pipe: Maximum spacing between supports:

Nominal Pipe Diameter	Maximum Span Steel Pipe
1/2 Inch	6 Feet
3/4 to 1 Inch (¾ Inch to 1 Inch*)	8 Feet
1 ¼ to 2 ½ Inch (1 ¼ Inch or Larger*)	10 Feet
3 Inches and Larger	12 Feet

*Gas piping.

- I. Copper Tubing: Maximum spacing between supports:

Nominal Tubing Diameter	Maximum Span Copper
1/2 Inch	5 Feet
3/4 to 1 ¼ Inch	6 Feet
1 ½ to 2 ½ Inch	8 Feet
3 Inches and Larger	10 Feet

- J. Soft Copper Pipe: Maximum spacing between supports:

Nominal Tubing Diameter	Maximum Span of Soft Copper
All Sizes	5 Feet

- K. Vertical Piping Supports: Support piping at each floor line with pipe clamps and at intermediate points as required to prevent excessive pipe movement and so as to comply with the maximum spacings cited above. Support all pipe stacks at their bases with a concrete pier or suitable hanger. For vertical pipe drops which occur away from a wall or similar anchoring surface, provide angled bracing from nearest structure to provide rigid anchoring of pipe drop. Any pipe requiring insulation shall use an insulated pipe insert at pipe clamp with 360° shield.

- L. Insulated Pipe Insert and Insulation Shields: Protect insulated pipe at point of support with pipe insert and shield as required by the following table:

Nominal Pipe Diameter in Inches	Insert Length in Inches**	Shield Length in Inches	Minimum Shield Gauge
1/2 to 1½*	6	6	20
2 to 3 ½	6	6	20
4 to 5	9	9	18
6 to 10	9	9	18

*Insulated pipe inserts and shields may be omitted for pipe supported from the bottom.

**Inserts shall be in place at the time of installing pipe.

- M. Underground Pipe: Shall be evenly supported on approved bedding materials, as specified for the type of piping being used. Such bedding and backfilling shall be as specified in Section 222000.

3.3 INSTALLATION OF DUCT HANGERS AND SUPPORTS

- A. Provide anchors and supports for all ductwork.
- B. Rectangular Duct: Supports and hangers shall be of size and spacing as shown in SMACNA HVAC Duct Construction Standards for the appropriate class of duct. (Hangers maximum allowable loads shall not be as shown in SMACNA Tables but shall be as specified in these specifications.)
- C. Round Duct: Supports and hangers shall be of size and spacing as shown in SMACNA HVAC Duct Construction Standards for the appropriate class of duct.
- D. Maximum Hanger Spacing (provided duct gauge and reinforcement comply with SMACNA Standards for such spacing):

Duct Area	Maximum Spacing
Up to 4 sq. ft. (27" Diameter)	8 Feet
4.1 to 10 sq. ft. (28" to 42" Diameter)	6 Feet
10.1 sq. ft. and up (43" Diameter and up)	4 Feet

- E. Provide supports at each change in direction of duct. Locate hangers at inside and outside corners of elbows, or at each end of fitting, on each side.
- F. Provide additional supports at each side concentrated loads (such as modulating dampers, duct heaters, sound attenuators, etc.)
- G. Provide supports for exterior ductwork per SMACNA HVAC Duct Construction Standards or as detailed on the drawings.

3.4 CEILING AIR TERMINALS/SERVICES

- A. Ceiling mounted air terminals or services weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.

- B. Terminals or services weighing 20 pounds but not more than 56 pounds in addition to the above shall have two No. 12 gauge hangers connected from the terminal or service to the ceiling system hangers or to the structure above. These wires may be slack.
- C. Terminals or services weighing more than 56 pounds shall be supported directly from the structure above by approved hangers.
- D. All air terminals that use side inlet "plenums" or have fire dampers shall be supported directly from the structure with approved hangers (regardless of total weight).

3.5 INSTALLATION OF MECHANICAL EQUIPMENT ANCHORS AND SUPPORTS

- A. Provide anchoring and supports for all mechanical equipment.
- B. Heating, Ventilating and Air Conditioning equipment where suspended from structure shall be supported per SMACNA HVAC Duct Construction Standards or as shown on the drawings.
- C. Roof mounted equipment shall be installed on roof curbs provided with the equipment (unless indicated otherwise). Such equipment shall be anchored to the curb, with the curb anchored to the building structure.
- D. Equipment shall be supported and anchored in such a way so that no equipment vibration is transmitted to the building structure.
- E. Added supports and bracing shall be provided per Section 230548.
- F. Provide curbing as shown in drawings and as required to support all mechanical equipment.

END OF SECTION 230529

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SECTION 230548 - VIBRATION AND SEISMIC CONTROL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. This section includes, but is not limited to vibration isolation and seismic restraint installation for all equipment, ductwork, and piping as described here-in.
- B. Seismic Restraints shall be bidder-designed. Seismic Design Criteria are to be established per the International Building Code and ASCE along with Project Structural drawings.
- C. Items not included in this specification shall not relieve the contractor of the responsibility of providing seismic bracing that meets all the criteria required by the referenced codes and in accordance with the seismic design guidelines and the project structural drawings.

1.2 REFERENCED CODE AND STANDARDS

- A. The latest adopted versions of the following codes and standards apply to this section.
 - 1. International Building Code (IBC)
 - 2. National Fire Protection Association (NFPA-13)
 - 3. Seismic Restraint Manual – Guidelines for Mechanical Systems (SMACNA)
 - 4. ASCE 7-10, American Society of Civil Engineers “Minimum Design Loads for Buildings and Other Structures”
 - 5. Applicable Project Structural Drawings for Seismic Design Criteria
 - 6. Applicable Manufacturer’s Seismic Design Guides for proprietary listed seismic bracing and mounting hardware
 - 7. Where there is a conflict in requirements between these guidelines and the above-mentioned codes the more stringent parameters shall prevail.

1.3 RELATED SECTIONS

- A. General Conditions, Division 1 and Division 23
- B. Section 200000 – General Mechanical Requirements

1.4 DESIGN CRITERIA

- A. Occupancy Category of Structure (I-IV) per IBC or ASCE
- B. Component Importance Factor (I_p) per ASCE
- C. Mapped Acceleration Parameters (S_1 and S_s) per IBC and Project Structural Drawings
- D. Site Class (A – F) per IBC and Project Structural Drawings

- E. Site Coefficient (F_a) per IBC and Project Structural Drawings
- F. Site Coefficient (F_v) per IBC and Project Structural Drawings
- G. Seismic Design Category (A – D) based on Short Period Response Accelerations per IBC and Project Structural Drawings
- H. Seismic Design Category (A – D) based on 1-Second Period Response Acceleration per IBC and Project Structural Drawings
- I. Amplification Factor a_p per ASCE
- J. Response Modification Factor R_p per ASCE

1.5 SUBMITTAL REQUIREMENTS

- A. Isolation Pads
- B. Spring Isolators
- C. Seismic Control:
 - 1. Include design calculations and details for selecting seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Design Calculations: Calculate static and dynamic loading due to equipment weight, operation, seismic, and wind forces required to select vibration isolators, seismic and wind restraints.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other sections for equipment mounted outdoors.
 - 3. Seismic and Wind Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraint to the restrained items and to the structure. Show attachment locations, methods, and spacing's. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors.
 - 4. Periodic Special Inspections: The mechanical contractor shall provide a list of components/systems requiring periodic special inspections per IBC.

5. Special Certification Requirements: Each contractor responsible for the construction of a "Designated Seismic System" for active mechanical equipment that must remain operable following the design earthquake, or components with hazardous contents certified by the manufacturer to maintain containment following the design earthquake shall submit a Manufacturer's Certificate of Compliance for review and approval by the Registered Design Professional responsible for the design of the system. This information shall then be submitted to the AHJ.
6. All brace or restraint components, mounting devices, snubbers and anchors.

1.6 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 NEOPRENE ISOLATORS

- a. Isolation Pads: Oil resistant neoprene pads, minimum 1/4-inch thick, with cross-ribbed or waffle design. Size pads for not more than 50 psi or as recommended by vibration isolator manufacturer.
- b. Floor Mounted Isolators: Double deflection type neoprene mounts, having minimum deflection of 0.35 inch. All metal surfaces shall be neoprene covered, base plate shall have mounting holes, and top shall have threaded steel plate or threaded steel insert. Elements shall be color coded or labeled with molded symbols to identify capacity. Mason Series ND, Amber Booth "RV" or approved.
- c. Suspension Isolators: Shall be double deflection neoprene type, with isolator encased in open steel bracket and minimum 3/8-inch deflection. Hanger rod shall be isolated from steel bracket with neoprene grommets. Mason Series HD, Amber Booth "BRD" or approved.

2.2 SPRING ISOLATORS

- a. General: The load carried by each isolator shall be calculated carefully and isolators selected so that the static deflection will be the same and the supported equipment will remain level. Isolators shall be so designed that the ends of the springs will remain parallel during and after deflection to operating height. At operating height, springs shall have additional travel to complete (solid) compression equal to at least 50 percent of the operating deflection. Suspension isolator springs shall have a static deflection (as shown on drawings) not less than 1-1/2", except that for units with components rotating at 1000 rpm and less, the static deflection shall be not less than 2 inches. Floor isolator springs shall have deflection of not less than 1 inch. All isolators shall provide at least 96% isolation efficiency. Note: Deflections other than these may be used where circumstances warrant, and more optimum isolation results can be achieved.

- b. Floor Type Spring Isolators: Shall be open spring type with approximate ratio between horizontal and vertical spring constant of 1.0. A ribbed neoprene acoustical friction pad shall be bonded to the underside of the isolator. Provide with height saving bracket.
- 2. Approved Manufacturers:
 - a. Mason Series SLF
 - b. Amber Booth "SW" or approved
 - c. Floor Housed Type: Housed spring isolator with ductile iron housing, steel base plate with mounting holes, spring inspection ports, neoprene cushion, leveling screws.
- 3. Approved Manufacturers:
 - a. Mason Series SSLFH
 - b. Amber Booth "XLS" or approved
- B. Suspension Type Spring Isolators: Shall consist of a rigid steel frame, a stable steel spring in the bottom part of the frame, and double deflection neoprene isolating pad at the top of the frame. Where supporting rods pass through the frame, a clearance of not less than one half rod diameter shall be provided all around the rod.
 - 1. Approved Manufacturers:
 - a. Mason Series DNHS
 - b. Amber Booth "BSSR" or approved

2.3 SEISMIC RESTRAINTS

- A. General:
 - 1. All seismic hangers and components shall be domestically made. Products designed domestically and fabricated in a foreign country are prohibited.
 - 2. Products not permitted include powder actuated anchors, gas actuated anchors, or anchors requiring epoxy.
 - 3. Only Steel or Ductile Iron components shall be provided. No Cast Iron or Cast Aluminum components are allowed.
 - 4. Steel shall be per ASTM A36; hangers and other devices shall be as shown in "SMACNA Seismic Restraint Manual" or approved manufacturers seismic design guidelines.
- B. Seismic Bracing (rigid and cable):
 - 1. Approved Manufacturers:
 - a. Tolco
 - b. International Seismic Application Technology (ISAT)
 - c. Mason Industries
 - d. Cooper B-Line

- e. Kinetics Noise Control
- f. AFCON
- g. Gripple
- h. PHD
- i. Unistrut
- j. Anvil or prior approved equal

C. Seismic Anchorages (for wood, steel and concrete):

1. Approved Manufacturers:

- a. Hilti
- b. ITW Ramset/Red Head
- c. ITW Buildex
- d. Mason Industries
- e. Tolco, AFCON
- f. Simpson Strong-Tie
- g. Powers Fasteners, Inc. or prior approved equal

D. Flexible Connectors:

1. Approved Manufacturers:

- a. Mason Industries
- b. Metraflex
- c. Victaulic
- d. Kinetics Noise
- e. International Seismic Application Technology (ISAT) or prior approved equal

E. Pipe Hanger Components:

1. Approved Manufacturers:

- a. Tolco
- b. International Seismic Application Technology (ISAT)
- c. Mason Industries
- d. Cooper B-Line
- e. Kinetics Noise Control
- f. AFCON
- g. Gripple
- h. PHD
- i. Unistrut
- j. Anvil or prior approved equal

PART 3 - EXECUTION

3.1 VIBRATION ISOLATION

- A. Motorized equipment shall be mounted on or suspended from spring vibration isolators either integral or external to the equipment. Floor mounted or suspended isolators.
- B. Unless otherwise indicated, resilient mounts for motorized equipment shall be of the type and size to provide maximum ten percent transmissibility. Use unhoused, free-standing stable steel springs which are preferred over housed spring assemblies. The horizontal stiffness of the spring shall be approximately equal to its vertical stiffness. The spring deflection shall be selected based on the equipment power range (HP), speed range (RPM), and static deflection of the supporting structural floor. It is a specific recommendation that whenever a steel spring is used, two pads of ribbed waffle-pattern neoprene be used in series with the spring.
- C. The design of vibration dampening shall consider lateral load as well as vertical load and be suitably snubbed against earthquake forces.
- D. A list of isolators accompanied by certified transmissibility ratings for the required duty shall be submitted for each item of equipment.
- E. Unless noted otherwise, all vibration isolating equipment shall be of the same make and shall be submitted as one group.
- F. All piping in the mechanical equipment rooms connected to vibrating equipment shall be supported from resilient ceiling hangers or from floor mounted resilient supports.
- G. Special equipment, such as boilers, etc., shall be selected on an individual basis.
- H. Inertia bases shall be provided for all equipment with rotating or reciprocating parts when such equipment is located above occupied spaces and for equipment where the motor is separate from equipment. Bases shall be constructed of welded steel angles and channel frame filled solid with structural concrete with #4 rebar at 6 inches on center spanning short dimensions.

3.2 SEISMIC BRACING GENERAL REQUIREMENTS

- A. Support and bracing from the structure to pipes, ducts and mechanical equipment shall conform to ASCE and the plumbing & HVAC industry standard SMACNA "Seismic Restraint Manual, Guidelines for Mechanical Systems" or approved manufacturer's listed seismic assemblies.
- B. Provide snubbers for all equipment that is supported on isolators and weighing over 400 lbs. including base. Provide a minimum of four snubbers for equipment weighing less than 2,000 lbs., and eight snubbers for heavier equipment.
- C. Curb-mounted rooftop units shall be provided with suitable bracing on four sides connecting unit with curb to prevent excessive movement in a seismic event. The contractor is responsible for proper seismic attachment of the rooftop curb to the building structure.
- D. Housekeeping pads shall be properly anchored to the roof deck or floor per ASCE.

3.3 SEISMIC BRACING GENERAL REQUIREMENTS - PIPING

- A. When determining horizontal load requirements, consider all pipes full of water and maximum equipment heights unless calculated for other substances and equipment.
- B. Seismic bracing shall not limit the expansion and contraction of the piping system. When thermal expansion or contraction is involved, longitudinal bracing shall be designed at the anchor point of the piping system. The longitudinal bracing and the connections must be capable of resisting the additional force induced by expansion and contraction.
- C. Seismic bracing for fire sprinkler system piping and riser components shall be as specified per Division 21.

3.4 INSTALLATION

- A. Installation of seismic restraints shall be as follows:
 - 1. Upon completion of installation of all seismic restraint materials and before start-up of restrained equipment, all debris shall be cleaned from beneath all protected equipment, leaving equipment free to contact snubbers.
 - 2. All external utility connections to restrained equipment shall be designed to allow differential seismic motion without damage to the equipment or utility connections.
 - 3. Adjust isolators and restraints after piping systems have been filled and equipment is at its operating weight, following manufacturer's written instructions.
 - 4. After equipment installation is completed, adjust limit stops following manufacturer's written instructions so they are out of contact during normal operation.
 - 5. Adjust snubbers according to manufacturer's written instructions.
 - 6. Torque anchor bolts according to anchor manufacturer's written instructions to resist seismic forces.
 - 7. Attach piping to the trapeze per seismic restraint manufacturer's design. Install cables so they do not bend across sharp edges of adjacent equipment or building structure.
 - 8. Install vertical braces to stiffen hanger rods and prevent buckling per seismic restraint manufacturer's design. Clamp vertical brace to hanger rods. Requirements apply equally to hanging equipment. Do not weld vertical braces to rods.
 - 9. Housekeeping Pads must be adequately reinforced and adequately sized for proper installation of equipment anchors. Refer to seismic restraint manufacturer's written instructions

3.5 SPECIAL INSPECTIONS

- A. When required continuous or periodic special inspections of the equipment and systems designated on the list provided by the mechanical contractor shall be performed in accordance with the IBC and ASCE. The owner shall reserve the right to employ an approved special inspector.

- B. Per the IBC, the registered design professional in responsible charge may designate members of the A&E team to act as special inspectors provided those personnel meet the qualification requirements of the IBC to the satisfaction of the building official.

END OF SECTION 230548

SECTION 230553 - MECHANICAL IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General Requirements: Drawings and general provisions of the Contract, including General and other Conditions and Division 1 - General Requirements sections, apply to the work specified in this Section.

1.2 STANDARDS

- A. ANSI Compliance: Comply with ANSI A13.1 for lettering size, colors, and installed viewing angles of identification devices.

1.3 SCHEDULES

- A. Submit Valve Schedule for each piping system, typewritten, and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shut-off and similar special uses, by special "flags", in margin of schedule. Provide a framed copy of Valve Tag Schedule in the mechanical/janitors room.

1.4 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

Not Applicable

2.2 PLASTIC PIPE MARKERS

- A. Provide manufacturer's standard preprinted, flexible or semi-rigid, permanent, color-coded, plastic sheet pipe markers.
 - 1. Insulation: Furnish 1" thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subjected to fluid temperatures of 125° F (52° C) or greater. Cut length to extend 2" beyond each end of plastic pipe marker.

2. Small Pipes: For external diameters less than 6" (including insulation if any), provide full band pipe markers, extending 360° around pipe and minimum 12" long at each location, fastened by one of the following methods:
 - a. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
 - b. Adhesive lap joint in pipe marker overlap. Laminate or bonded application of pipe marker to pipe (or insulation).
 - c. Strapped to pipe with nylon strap.
3. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with names as shown or specified.
 - a. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.3 PLASTIC TAPE

- A. Manufacturer's standard color-coded pressure-sensitive (self-adhesive) vinyl tape, not less than 3-mils. thick.
 1. Width: Provide 1-1/2" wide tape markers on pipes with outside diameters (including insulation, if any) of less than 6".

2.4 PLASTIC VALVE TAGS

- A. Provide manufacturer's standard plastic valve tags with printed enamel lettering, with piping system abbreviation in approximately 3/16" high letters and sequenced valve numbers approximately 3/8" high, and with 5/32" hole for fastener.

2.5 VALVE TAG FASTENERS

- A. Manufacturer's standard solid brass (wire link or beaded type), or solid brass S-hooks of sizes required for proper attachment of tags to valves and manufactured specifically for that purpose.

2.6 VALVE SCHEDULE FRAMES

- A. For each page of Valve Schedule, provide glazed display frame, with screws for removable mounting on masonry walls. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

2.7 ENGRAVED PLASTIC-LAMINATE SIGNS

- A. Provide engraved stock phenolic plastic laminate, complying with FS L-P-387, engraved with engraver's standard letter style of sizes and wording, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
 - 1. Thickness: 1/16" for units up to 20 sq in or 8" length; 1/8" for larger units.
 - 2. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.
 - 3. Letter Size: No less than 1/2" tall. (Use unit# as noted on the equipment schedules)
- B. Provide for all items on equipment schedules.
- C. Provide for all emergency shut-offs.
- D. Provide for all pressure vessels, storage tanks, air separators, etc.

2.8 PAINT

- A. Behr Urethane Alkyd Satin Enamel.
- B. Use appropriate primer.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Where identification is to be applied to surfaces which require insulation, painting or other covering or finish including valve tags in finished mechanical spaces, install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 PIPING IDENTIFICATION

- A. Install pipe markers on each system and include arrows to show the normal direction of flow.

3.3 PIPE MARKERS AND COLOR BANDS

- A. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied space, machine rooms, accessible maintenance spaces and exterior non-concealed locations or in accessible ceiling spaces.
 - 1. Near each valve and control device.
 - 2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch where there could be question of flow pattern.
 - 3. Near locations where pipes pass through walls or floor/ceilings or enter non-accessible enclosures.

4. At access doors, manholes, and similar access points which permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
7. On piping above removable acoustical ceilings omit intermediately spaced markers.
8. Color assignments and stencil for piping identification shall be as is listed below (colors used shall be verified with Owner prior to ordering).

<u>Service</u>	<u>Color</u>	<u>Stencil</u>
Heating Water Supply	Green	White
Heating Water Return	Green	White
Chilled Water Supply	Green	White
Chilled Water Return	Green	White
Refrigerant Liquid	Yellow	White
Gas Piping	Yellow	Black
Sprinkler Work	Red	White
Condensate Piping	Green	White

9. Identification stenciling and flow arrows shall be following colors for proper contrast:

<u>Arrows & ID Stenciling</u>	<u>Color Shade of Pipe</u>
White	Red, Gray, Black and Green
Black	Yellows, Oranges and White

3.4 VALVE IDENTIFICATION

- A. Provide valve tag on every valve, cock, and control devices in each piping system; exclude check valves, valves within factory-fabricated equipment units, convenience and lawn watering hose bibbs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in Valve Schedule for each piping system.

3.5 SCHEDULES

- A. Mount Valve Schedule frames and schedules in riser rooms or as directed by Engineer.

3.6 MECHANICAL EQUIPMENT IDENTIFICATION

- A. Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operation device. Provide signs for the following general categories of equipment and operational devices. Provide signs on suspended ceiling tile below mechanical equipment located above ceiling.
 1. Pumps and similar motor-driven units.
 2. Fans, exhaust, and air handling units.
 3. Tanks and pressure vessels.

3.7 FIRE AND FIRE/SMOKE DAMPER IDENTIFICATION

- A. Furnish and install label reading "FIRE DAMPER" or "FIRE/SMOKE DAMPER" on each fire damper duct access door. Provide additional labels at locations where external duct insulation covers the access door. Install on the outside of insulation.

3.8 CONCEALED ITEMS

- A. Items concealed above accessible ceilings requiring access, shall have the ceiling marked to indicate such item's location. The marking system shall consist of colored phenolic plates with 1/2" tall, engraved lettering specifying the item concealed; plate shall be applied to ceiling T-bar framing with rivets or other owner approved method below the concealed item. Colors used shall be verified with Owner, and unless directed otherwise, shall be:

<u>Item</u>	<u>Color</u>
Heating System Equipment Component	Green
Fire Protection System Component	Red

- B. Provide three (3) color legends (hard laminate) listing the above colors. Locate as directed by Owner.

END OF SECTION 230553

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SECTION 230593 - AIR SYSTEM TESTING AND BALANCING

PART 1 - GENERAL

1.1 GENERAL

- A. Includes, but not limited to, testing, balancing and adjusting of air heating, cooling and exhaust systems.

1.2 RELATED SECTION(S)

- A. General Conditions and Division 1 apply to this section.
- B. Division 23 shall make changes in pulley, belts, and dampers as required for correct balance as recommended by Air Testing & Balancing Agency at no additional cost to Owner.
- C. Division 23 shall repair leaks in ductwork at no additional cost to the Owner.

1.3 SYSTEM DESCRIPTION (PERFORMANCE REQUIREMENTS)

- A. Perform testing and balancing in complete accordance with the Associated Air Balancing Council (AABC), National Environmental Balancing Bureau (NEBB), or National Balancing Council (NBC) standards and procedures.
- B. Air Testing & Balance Agency shall perform tests specified, compile test data, and submit copies of complete test data to Contractor for forwarding to Architect/Engineer for evaluation and approval.

1.4 SUBMITTALS REQUIRED BY THIS SECTION

- A. Company information including Washington State Contractors' license
- B. Key personnel and resumes
- C. AABC, NEBB, or NBC certifications
- D. Provide reference of five (5) completed jobs of similar size and complexity.

1.5 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

- A. Final air balance report shall be bound in the O & M Manual or provided under a separate volume.
- B. Preliminary air balance report shall be submitted to the Architect/Engineer for approval. Preliminary report shall note all finished measured data.

C. Final Test Data:

1. Provide project name, name and telephone number of balancing firm, GC, MC, Architect, and Engineer in the cover (or first page) of report.
2. Provide a summary of air balance findings regarding airtightness of each ducted systems, deficiencies of equipment to meet design requirements, deficiencies of space pressure relationships, etc.
3. Cover-sheet shall have a statement from the site project manager that reads, "The air system testing and balancing report contained herein is true and factual based on actual field measurements and adjustments. I have personally performed or witnessed a minimum of 5% of the airflow tests."
4. Each page of test report to have a unique page number.
5. Provide fan curve or chart of each fan in system.
6. Provide final approved test report in PDF format on CD. Provide one more CD than hard copies of test report.
7. Obtain and provide a copy of the air barrier test (building tightness) whether or not the Air Balance Contractor produced the test.

1.6 QUALITY ASSURANCE (QUALIFICATIONS)

- A. Mechanical Contractor shall procure services of an independent Air Testing & Balance Agency, which specializes in testing, and balancing of heating, ventilating, and cooling systems to balance, adjust, test air-moving equipment, air distribution, and exhaust systems.
- B. Agency shall be approved in writing by the Consultant.
- C. Instruments used by the Agency shall be accurately calibrated and maintained good working order.
- D. If requested, conduct tests in presence of Architect/Owner/Engineer.

1.7 SEQUENCING & SCHEDULING

- A. Mechanical Contractor shall award test and balance contract to approved agency upon receipt of his contract to proceed to allow Agency to schedule this work in cooperation with other Sections involved and comply with completion date.
- B. Begin air testing and balancing upon completion of air cooling, heating, and exhaust systems including installation of all specialties and devices.
- C. Mechanical Contractor shall put heating, ventilating, and cooling systems and equipment into full operation and continue their operation during each working day of testing and balancing.

PART 2 - PRODUCT

Not applicable

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Testing Procedure: Air Testing & Balancing Agency shall perform the following tests and balance system in accordance with following requirements at design conditions of supply and a minimum outside air CFM (not 100% return or 100% economizer).
1. Test, adjust, and record fan rpm to design requirements.
 2. Test and record motor amperes at design conditions.
 3. Make pitot tube traverse of main supply duct and obtain design cfm at fans. (systems of 1000 CFM or greater).
 4. Test and record system static pressures: suction, discharge, and clean filters (if applicable; for systems of 2000 CFM or greater).
 5. Test, adjust, and record system for design cfm air.
 6. Test, adjust, and record system for design cfm outside air.
 7. Test, adjust, and record each diffuser, grille, and register to within 10% of design requirements.
 8. On a floor plan, identify each diffuser, grille, and register to location and area using a designation symbol unique to that page.
 9. Identify and list size, type, and manufacturer of diffusers, grilles, registers, and testing equipment. Use manufacturer's rating on equipment to make required calculations.
 10. In readings and tests of diffusers, grilles, and registers, include required cfm and test cfm after adjustments.
 11. In cooperation with Division 23; set adjustments of automatically operated dampers to operate as specified, indicated, or noted.
 12. Adjust diffusers, grilles, and registers to minimize drafts.
 13. Identify at each volume damper with permanent mark, the position of actuator handle once final balance has been achieved.
 14. Measure and record all pressure differential relationships as identified by the control's diagrams (i.e. labs, kitchen, pharmacy, art rooms, building pressure, etc.). These measurements are to be taken when all HVAC is running after full balance has been completed. Note the measured reference points to determine the pressure differential.
 15. For any spaces with exhaust and supply to them where design airflows cannot be obtained, the systems shall be adjusted to produce a negative pressure to the adjacent space (i.e. workrooms, restrooms, labs, nurse rooms, etc.).
 16. When reconciling supply, return, outside, and exhaust air quantities, priority shall be placed on outside air quantities (typically, return air quantities noted on plans are for duct sizing only).
 17. Where duct pressure sensors are noted in controls diagrams (i.e. variable volume systems) adjust system to its minimum pressure point that still achieves full airflow to all terminals. Record this setpoint in test report and provide data to controls contractor.
 18. For variable volume systems, adjust sheave package to produce maximum airflow (or diversity as applicable) at 60 Hz with simulated filter loading. If maximum airflow cannot be obtained at 60 Hz, increase frequency until maximum airflow is obtained as allowed by the equipment manufacturer and maximum motor amperes. Record final values.
 19. Verify that all gravity backdraft dampers are moving freely, open in proper direction, and are unbound.

20. After balancing system, measure terminal CFM when system is in 100% economizer. If supply is greater than design, coordinate with controls contractor or MC to provide damper stops to provide design CFM during 100% economizer.
21. On All Motors with Variable Drives: Set maximum amperage safety to protect motor from over loading.

B. Final Inspection & Adjustments:

1. Balancing agency shall be represented at final inspection meeting by qualified testing personnel with balancing equipment and two copies of air balancing test report.
 - a. Architect may choose and direct spot balancing of one zone. Differences between the spot balance and test report will be justification for requiring repeat of testing and balancing for entire building.
 - b. Rebalancing shall be done in the presence of Architect and subject to his approval.
 - c. Spot balance and rebalance shall be performed at no additional cost to Owner.
2. System shall be completely balanced, and all reports submitted to Architect prior to prefinal inspection.
3. Where equipment supplied to job site provides over 5% more air than schedule requirements, rooms supplied by that equipment shall have their supply air quantities increased by the ratio of actual total air quantity supplied to minimum air quantity required by schedule.

3.2 BALANCING FIRMS (APPROVED)

- A. Hardin and Sons
- B. MTW Design
- C. Airtest Company, Inc.
- D. American Air Balance Company
- E. Advanced Mechanical Services, Inc.
- F. Testing & Commissioning Services
- G. Precision Test and Balance, Inc.

END OF SECTION 230593

SECTION 230713 - EQUIPMENT/DUCTWORK INSULATION

PART 1 - GENERAL

1.1 GENERAL

- A. This section describes the insulation requirement to meet or exceed the 2018 Washington State Energy Code. Lining installation is per 233113.

1.2 RELATED SECTION(S)

- A. General Conditions, Division 1
- B. Section 200000 - General Mechanical Conditions
- C. Section 233113 - Steel Ductwork

1.3 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Wrap Insulation

1.4 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

Not Applicable

2.2 DUCTWORK INSULATION

- A. Manufacturers: Manville Corporation Owens Corning, Knauf Insulation, Manson Insulation, or approved equal.
- B. Flexible Fiber Glass Blanket (Wrap Insulation): Manville, Microlite Type 75 meeting ASTM C553, Type 1, Class B-2; flexible blanket.
 - 1. 'K' ('ksi') Value: 0.27 at 75°F (0.040 at 24°C) installed.
 - 2. Density and R-value:
 - a. R-3.3: 1.0" inch of 1.5 to 3.0 lb/cu. Ft. glass fiber blanket.

- b. R-5.3: 2.0" inches of 0.75 lb/cu. Ft. or 1.5 inches of 1.5 to 3.0 lb/cu. Ft. glass fiber blanket.
 - c. R-7: 3.0 inches of 0.75 lb/cu. Ft. or 2.0 inches of 1.5 to 3.0 lb/cu. Ft. glass fiber blanket.
 - 3. Vapor Barrier Jacket: FSK, aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant kraft, secured with UL listed pressure sensitive tape and/or outward cinched expanded staples and vapor barrier mastic as needed.
- C. Rigid Fiber Glass Board: Insulation Board meeting ASTM C 612 Type IA and IB; rigid.
 - 1. 'K' ('ksi') Value: ASTM C 177, 0.22 at 75°F mean temperature.
 - 2. Maximum Service Temperature: 450°F.
 - 3. Vapor Retarder Jacket: ASJ conforming to ASTM C 1136 Type I, or FSK or PSK conforming to ASTM C 1136 Type II.
 - 4. Securement: Secured in place using adhesive and mechanical fasteners spaced a minimum of 12" on center with a minimum of 2 rows per side of duct. Insulation shall be secured with speed washers and all joints, breaks and punctures sealed with appropriate pressure-sensitive foil tape, or glass fabric and vapor retarder mastic.
 - 5. Density and R-value:
 - a. R-4.5: 1.0" of 6.0 lb./cu.ft.
 - b. R-6.8: 1.5" of 6.0 lb./cu.ft.
 - c. R-9.1: 2.0" of 6.0 lb./cu.ft.
- D. Duct Insulation Protection:
 - 1. Aluminum Jacket: 0.016-inch (.045 mm) thick sheet, smooth/embossed finish, with longitudinal slip joints and 2-inch (50 mm) laps.
 - 2. Manville Insulkote ET, a non-water-vapor retarder, non-burning, weatherproof coating for use over insulation where "breathing" is required.
 - 3. Manville Zeston 2000 jacketing, UV resistant polyvinyl chloride covering, with joints secured and sealed with Manville Perma-Weld Adhesive.
 - 4. Canvas Jacket: UL listed fabric, 6 oz/sq. yd. (220 g/sq. m.), plain weave cotton treated with dilute fire-retardant lagging adhesive.
 - 5. Self-Adhering Jacketing: Material to be VentureClad [1579CW] with a white finish. Jacketing material is to have a maximum flame spread/smoke developed index of 25/20 per UL 723, 1 0.0000 water vapor permeance rating per ASTM E-96, mold inhibitors incorporated and be UV stable.

2.3 DUCTWORK LINING

- A. See Section 233113 - Steel Ductwork.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that ductwork has been tested for leakage in accordance with SMACNA standards before applying insulation materials.
- B. Verify that all surfaces are clean, dry, and free of foreign material.
- C. External Ductwork Insulation:
 - 1. Provide insulated ductwork conveying air below ambient temperature with vapor retardant jacket. Seal all vapor retardant jacket seams and penetrations with UL listed tapes or vapor retardant adhesive.
 - 2. Provide insulated ductwork conveying air above ambient temperature with or without vapor retardant jacket. Where service access is required, bevel and seal ends of insulation.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations except where prohibited by code.
 - 4. The underside of ductwork 24 inches or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18 inches on center. The protruding ends of the fasteners should be cut off flush after the speed clips are installed, and then, when required, sealed with the same tape as specified above.
 - 5. For ductwork exposed to physical abuse in unfinished and exposed spaces, finish with duct insulation protection.
 - 6. For outdoor applications, provide insulation with a weather protection jacket. Manville Zeston 2000, VentureClad self-adhering or approved equal. Install per manufacturer's instructions.
- D. For installation of lining insulation, see Section 233113.

3.2 INSULATION SCHEDULE

- A. Provide wrap insulation and duct liner for the duct systems indicated per the following table (R-value indicates the thickness to be provided as defined in Section 230713 for wrap insulation and Section 233113 for liner):

DUCT TYPE AND LOCATION	LINER	WRAP
<i>Within the Building Envelope:</i>		
- Supply Air	R - 3.3	Not Allowed
- Return Air	R - 3.3	Not Allowed
- Primary Supply Air	Not Allowed	R - 3.3 ¹
- Primary Return Air	Not Allowed	R - 3.3 ¹
- Relief Air	Not Allowed	R - 3.3 ^{1,2}
- Transfer Air	R-3.3	Not Allowed
- Exhaust Air	R-3.3	Not Allowed ²
- HRU/ERU Exhaust Air	Not Allowed	R - 7 ^{1,2}
- HRU/ERU Return Air	R-3.3	Not Allowed
- Outside Air	Not Allowed	R - 7 ^{1,2}
<i>In cold attic, in cold ceiling space, in cold wall, in cold garage, in cold crawl space:</i>		

DUCT TYPE AND LOCATION	LINER	WRAP
- Supply Air	R – 6 ³	R – 6 ³
- Return Air	R – 6 ³	R – 6 ³
- Relief Air	Not Allowed	Not Allowed
- Transfer Air	Not Allowed	Not Allowed
- Exhaust Air	Not Allowed	Not Allowed
- Outside Air	Not Allowed	Not Allowed
<i>On exterior of building, on roof:</i>		
- Supply Air	R – 8 ³	R – 8 ³
- Return Air	R – 8 ³	R – 8 ³
- Relief Air	Not Allowed	Not Allowed
- Transfer Air	Not Allowed	Not Allowed
- Exhaust Air	Not Allowed	Not Allowed
- Outside Air	Not Allowed	Not Allowed
<i>In concrete, in ground:</i>		
- Supply Air	R - 5.3	Not Allowed
- Return Air	R - 5.3	Not Allowed
- Relief Air	Not Allowed	Not Allowed
- Transfer Air	Not Allowed	Not Allowed
- Exhaust Air	Not Allowed	Not Allowed
- Outside Air	Not Allowed	Not Allowed

Table Footnotes:

- Where duct is exposed to view, provide wrap with paintable duct insulation protection.
- Building level insulation is required from backdraft/motorized damper to louver or roof hood. See plans for additional details. Coordinate with GC for insulation.
- Use liner or rigid fiberglass board.

B. For purposes of the Insulation Schedule above, the following defines the duct systems:

- Supply Air: Air that has passed through mechanical conditioning device, such as a furnace, coil, evaporative section, heat recovery device, etc. that is distributed to the conditioned space.
- Return Air: Air from the conditioned space to an air handler.
- Primary Supply and/or Return Air: Any duct between an air handler and a terminal unit (capable of throttling the air with a motorized damper, capable of heating the air, and/or capable of cooling the air). Example of terminal unit is a variable air volume terminal (fan or throttle damper) or an induction/chilled beam terminal.
- Relief Air: Air from the conditioned space to the outdoors or to a large semi-conditioned or non-conditioned space.
- Transfer Air: Air from one conditioned space to another conditioned space.
- Exhaust air: Air from a space that is moved by a fan to directly outside. Also, air downstream of an energy recovery device to directly outside.
- HRU/ERU Return Air: Return air from a grille to a heat recovery device. or motorized damper.
- HRU/ERU Exhaust Air: Exhaust air from heat recovery device to directly outside.

9. Outside Air: Air from the outside to a mechanical conditioning device such as a furnace, coil, evaporative section, heat recovery device, etc.

END OF SECTION 230713

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SECTION 230719 - HVAC PIPING INSULATIONS

PART 1 - GENERAL

1.1 GENERAL

- A. Includes, but not limited to, insulating of piping and fittings per schedule in Part 3 of this section.
- B. Insulation at Hangers: Insulation shall be continuous through hangers on all insulated systems. Inserts at hangers are specified in Section 230529 and are considered as part of the hanger and support system. Inserts are required to be installed at the time of pipe installation and are intended to be installed by the Contractor installing the pipe hangers/supports. See Section 230529.
- C. The intent of this section is to meet or exceed the requirements of the most current version of the Washington State Energy Code (WSEC). The stricter of this section and WSEC shall be met.

1.2 RELATED SECTIONS

- A. General Conditions, Division 01
- B. Section 200000 – General Mechanical Requirements
- C. Section 230529 – Hangers and Supports for HVAC Piping & Equipment
- D. Section 232300 – Refrigerant Piping System

1.3 SECTION INCLUDES

- A. Piping insulation, jackets, and accessories
- B. Engine exhaust insulation

1.4 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. All insulation
- B. Field Applied Jackets

1.5 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

Not Applicable

2.2 PIPE INSULATIONS

- A. Flexible Unicellular Polyolefin: In tubular form complies with the property requirements of the following specifications: ASTM C534, MIL-P-15280, MIL-HHI-573, ASTM E84 (25/50), UL-723 (25/50), NFPA 255 (25/50), Uniform Building Code (UBC) 42-1, Class I, UL-94HBF, FMVSS-302, CAN-ULC-S102.2-M88 (25/50) Flammability Classification, MEA #267-92-M, New York.

- | | | |
|----|---|--|
| 1. | 'K' Factor: ASTM C177 | .24 @ 75°F (24°C)
.26 @ 90°F (32°C) |
| 2. | Moisture Vapor Transmission: | ASTM E96
(0.0) Zero perm-inch |
| 3. | Minimum Service Temperature: | -165°F |
| 4. | Maximum Service Temperature: | +210°F (99°C) |
| 5. | Maximum Flame Spread: | ASTM E84
25 or less |
| 6. | Maximum Smoke Developed: | ASTM E84
50 or less |
| 7. | Contains NO constituents associated with stress corrosion failure of copper tubing. | |
| 8. | Connection Method | Piping System |
| 9. | Temperature Range: | |
| | a. Fuse-Seal Hot Melt Method | -110°F (-79°C) |
| | (contact manufacturer for more details) | +210°F (99°C) |
| | b. Contact Adhesive | -110°F (-79°C) |
| | (Mfg. Approval) | +210°F (99°C) |
| | c. Lap seal end joint tape | 32°F (0°C) |
| | recommended by insulation manufacturer. | +210°F (99°C) |

- B. Cellular Glass: ASTM C552; 'k' value of 0.35 at 75 degrees F ('ksi' value of 0.047 at 24 degrees C); 8.0 lb/cu ft. (128 Kg/cu m) density.

1. Glass cell insulation, Pittsburgh Corning "Foamglas", with water-vapor permeability of 0.00 perm-inch as tested per ASTM and "pittwrap" heat sealed water-proof membrane.

C. Pre-insulated Pipe:

- Carrier pipe to be schedule 40 steel for heating water and HDPE for chilled water.
- Jacket material to be HPDE.
- Insulation to be polyurethane foam. Insulation shall completely fill the annular space between the carrier pipe and jacket. Insulating rated temperature to be -40°F to 250°F. Minimum thermal conductivity to be 0.16 Btu-hr/sq. ft./°F/inch at 73°F.
- Install pipes and accessories per manufacturer's recommendations.

5. Approved Manufacturers:

- a. Perma-Pipe
- b. Thermacor
- c. Rovanco

D. Field Applied Jackets:

- 1. PVC Plastic: One-piece molded type fitting covers and jacketing material, gloss white.
 - a. Connections: Tacks; Pressure sensitive color matching vinyl tape.
- 2. Canvas Jacket: UL listed fabric, 6 oz/sq yd (220 g/sq m), plain weave cotton treated with dilute fire-retardant lagging adhesive.
- 3. Aluminum Jacket: 0.016-inch (0.045 mm) thick sheet, (smooth/embossed) finish, with longitudinal slip joints and 2-inch (50 mm) laps, die shaped fitting covers with factory attached protective liner.
- 4. Approved Manufacturer: Manville Zeston 2000.

E. Approved Manufacturers (Cellular Glass Excluded):

- 1. Manville
- 2. Armstrong
- 3. Knauf
- 4. Owens Corning
- 5. IMCOA (for Flexible Unicellular Polyolefin only)

2.3 PIPE SHIELDS (SADDLES)

- A. Saddles shall be minimum, 20 gauge dimpled galvanized sheet steel covering 40% of the circumference of the insulation. Length shall be a minimum of 6". See Section 220529 - Hangers and Supports, for longer shields.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that piping has been tested for leakage in accordance with IMC standards before applying insulation materials.
- B. Verify that all surfaces are clean, dry, and free of foreign material.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's recommendations, building codes, and industry standards.
- B. Continue insulating vapor barrier through penetrations except where prohibited by code.

C. Piping Insulation:

1. Locate insulation and cover seams in least visible locations.
2. Neatly finish insulation at supports, protrusions, and interruptions.
3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor retardant jacket with self-sealing laps. Insulate complete system.
4. For insulated pipes conveying fluids above ambient temperature, secure jackets with self-sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions.
5. Insulated pipe supports and insulation shield shall be in place at each hanger and support as required by Section 230529, prior to insulating.
6. For pipe exposed in mechanical equipment rooms or exposed in finished spaces up to 10 feet above finished floor, finish with Manville Zeston 2000 PVC jacket and fitting covers or aluminum jacket.
7. For exterior applications, provide weather protection jacket or coating. Insulated pipe, fittings, joints, and valves shall be covered with Manville Zeston 2000 PVC or aluminum jacket. Jacket seams shall be located on the bottom side of horizontal piping.
8. Installation of below ground chilled water and heating water, and water piping insulation: All piping shall be insulated with "Foamglass" type with heat sealed "pittwrap" or pre-insulated pipe system.
9. Refrigeration Piping:
 - a. Install insulation in snug contact with pipe and in accordance with manufacturer's recommendations.
 - b. Stagger joints on layered insulation.
 - c. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
 - d. Seal joints in insulation.
 - e. Insulate flexible pipe connectors.
 - f. Insulation exposed outside building shall have "slit" joint seams placed on bottom of pipe and given two coats of gray adhesive finish.
 - g. Insulate fittings with sheet insulation and as recommended by the manufacturer.
10. Flexible Polyolefin Cellular Pipe Installation:
 - a. Slip insulation on the pipe before making connections wherever possible or install pre-slit, pre-glued over pipe sealing longitudinal joint as per manufacturer's recommendations. Fabricate fittings from polyolefin insulation. Seal all butt joints and fittings using factory recommended fuse seal joining system as per manufacturer's instructions.
 - b. At pipe hanger locations, see Section 220529 for insulated pipe supports.
 - c. For direct burial applications, material to be sized per manufacturer's recommendations to allow for compression. Fuse seal all butt joints and fittings using factory recommended fuse seal joining system as per manufacturer's instructions. Back fill with medium grade sand to a minimum of 6 inches in thickness.

- D. Equipment Insulation Installation: Install sheets of polyolefin in largest manageable sizes. Apply full coverage of manufacturer's recommended adhesive to both equipment and the insulation or use pre-glued flat sheets of insulation. Butt all joints firmly together and apply factory adhesive or fuse seal system into joint as per manufacturer's instructions.

3.3 PIPING INSULATION SCHEDULE

Insulation Type	Pipe Size Inch	Thickness Inch
<i>Elastomeric Insulation (Type 1):</i>		
Condenser Water Supply and Return	Up to 2" 2 ½" And Above	1" 1½"
Refrigerant Suction/Discharge and Hot Gas Bypass (Non-VRF)	All Sizes	1½"
Refrigerant Liquid (Non-VRF)	All Sizes	½"
Humidifier Piping	All Sizes	1½"
<i>Elastomeric Insulation (Type 2):</i>		
VRF Refrigerant High/Low Pressure Gas	All Sizes	1½"
VRF Refrigerant Suction Gas Pipe	All Sizes	1"
VRF Refrigerant Liquid Pipe	All Sizes	1"

3.4 FITTINGS, VALVES, STRAINERS, FLANGES, HEADERS, EXPANSION TANKS, HEAT EXCHANGERS, AIR CONTROL EQUIPMENT, PUMP SUCTION AND DISCHARGE INSULATION COVERS

- A. General: Provide all fitting insulation covers for pipe fittings, grooved end couplings, and for pipe flanges.
- B. Exposed Work: Provide "Zeston PVC" insulated fitting covers applied after pipe insulation is installed. A pre-cut "Hi-Lo Temp" insulation insert, conforming to the UL 25/50 rating, shall be snugly tucked around the fitting making sure the fitting is covered with the full thickness of insulation.
 - 1. All others, provide covering in pad form, constructed as follows: Use 1-inch-thick Owens-Corning Fiberglas TIW Glass Wool, Type I, non-oiled, fully enclosed on all sides and edges within tight-weave canvas jacket. Attach Bergen hooks around edges of pad. Fit pad to device with edges tightly butted and secure with copper wire laced between hooks. Provide vapor seal where vapor seal is required for adjacent insulation.
- C. The one-piece UL 25/50 rated PVC fitting cover shall be snapped over the insulated fitting and secured with tack fasteners, staples, or tape.
- D. Concealed Piping: Build up insulation with asbestos-free insulation cement for hydrous calcium silicate pipe insulation; Owens-Corning T1W glass fiber wool-type wrap or "Hi-Lo Temp" insert, to full thickness of adjacent pipe insulation; cover with Zeston fitting covers stapled to adjacent insulation jacket or use 3" wide canvas and lagging adhesive.
- E. Gauge Lines: Insulate to the gauge shutoff valve.

3.5 PIPE HANGERS

- A. Do not allow pipes to come in contact with hangers.

END OF SECTION 230719

SECTION 230900 - ENERGY MANAGEMENT & CONTROLS (DDC)

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Conform to General Conditions and Supplemental Conditions for Washington State Facilities Construction.
- B. The general Provisions of the Contract, including General, Supplementary, and Special Conditions, and Division 1- General Requirements, apply to work specified in this section. Subcontractor must familiarize himself with the terms of the above documents.
- C. EMCS shall monitor electric power, water and natural gas usage as shown in the mechanical and electrical drawings. Control's contractor shall provide meters not provided by the associated utility. Control's contractor shall coordinate with power, water and natural gas utilities.

1.2 BASE AND ALTERNATE BIDS

- A. Scope of Work:
 - 1. Furnish and install a direct digital control and energy management system per Section 230900 and related sections as required for control of all equipment indicated on the mechanical drawings and in the specifications, being furnished under this scope of work. The server platform (Niagara or approved equal) shall have Connection Points and at least two extra Connection points.
- B. Base Bids: No Controls
- C. Alternate Bids: Under the base bids, the Controls as by the scope of work will be added as a separate bid line item on the bid form. The following manufacturers and systems are approved for use on this project. No substitutions of systems other than those listed will be considered. Systems approved for bidding are:
 - 1. Approved Controls Contractors:
 - a. Alerton by ATS
 - b. Johnson Controls by JCI
 - c. Siemens by Siemens
 - d. Honeywell by TRS Mechanical
 - e. Reliable by Johnson Barrow Controls

1.3 RELATED DOCUMENTS

- A. All work of this Division shall be coordinated and provided by the single Energy Management and Controls System (EMCS) Contractor.

- B. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the Division 23 Section for details.
- C. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.
- D. If the EMCS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.4 DEFINITIONS

- A. Analog: A continuously variable system or value not having discrete levels. Typically exists within a defined range of limiting values.
- B. Binary: A two-state system where an “ON” condition is represented by one discrete signal level and an “OFF” condition is represented by a second discrete signal level each separated by a defined deadband. Digital Inputs and Digital Outputs are examples.
- C. Energy Management and Controls System (EMCS): The total integrated system of fully operational and functional elements, including equipment, software, programming, and associated materials, to be provided by this Division EMCS Contractor and to be interfaced to the associated work of other related trades.
- D. EMCS Contractor: The single Contractor to provide the work of this Division. This Contractor shall be the primary installer, commissioner and ongoing service provider for the EMCS work.
- E. Control Sequence: An EMCS pre-programmed arrangement of software algorithms, logical computation, target values and limits as required to attain the defined operational control objectives.
- F. Direct Digital Control: The digital algorithms and pre-defined arrangements included in the EMCS software to provide direct closed-loop control for the designated equipment and controlled variables. Inclusive of Proportional, Derivative and Integral control algorithms together with target values, limits, logical functions, arithmetic functions, constant values, timing considerations and the like.
- G. EMCS Network: The total digital on-line real-time interconnected configuration of EMCS digital processing units, workstations, panels, sub-panels, controllers, devices and associated elements individually known as network nodes. May exist as one or more fully interfaced and integrated sub-networks, LAN, WAN or the like.
- H. Node: A digitally programmable entity existing on the EMCS network.
- I. EMCS Integration: The complete functional and operational interconnection and interfacing of all EMCS work elements and nodes in compliance with all applicable codes, standards and ordinances so as to provide a single coherent EMCS as required by this Division.

- J. PC: Personal Computer from a recognized major manufacturer. PC “clones” assembled by a third-party Subcontractor is not acceptable. The PC must also have documentation verifying that it has been tested and is completely compatible with all installed software and communicates with any peripherals such as modems, NEC cards, printers, hubs, zip drives, etc. that may be attached.
- K. Wiring: The term “Wiring” and its derivatives when used in this Division shall mean provide the EMCS wiring and terminations.
- L. Install: The term “Install” and its derivatives when used in this Division shall mean receive at the jobsite and mount.
- M. Protocol: The term “protocol” and its derivatives when used in this Division shall mean a defined set of rules and standards governing the on-line exchange of data between EMCS network nodes.
- N. Software: The term “software” and its derivatives when used in this Division shall mean all of programmed digital processor software, preprogrammed firmware and project specific digital process programming and database entries and definitions as generally understood in the EMCS industry for real-time, on-line, integrated EMCS configurations.
- O. Operator Workstation: Personal Computer from a recognized major manufacturer installed with the software and hardware required to permit multiple, simultaneous (at least three) user access to the EMCS, either remotely or on site.
- P. Floor Plans: CAD drawings showing the location of equipment, EMCS controllers, EMCS, remote devices and wiring including room temperature sensors and duct and building pressure sensors, and communications wiring. Controllers, equipment, remote devices and wiring, and communications wiring shall appear on the same drawing.
- Q. The following abbreviations and acronyms may be used in describing the work of this Division:
- | | | |
|--------|---|---|
| ADC | - | Analog to Digital Converter |
| AI | - | Analog Input |
| ANSI | - | American National Standards Institute |
| AO | - | Analog Output |
| ASCII | - | American Standard Code for Information Interchange |
| ASP | - | Microsoft Active Server Page |
| AWG | - | American Wire Gauge |
| CFM | - | Cubic Feet Per Minute |
| CPU | - | Central Processing Unit |
| CRT | - | Cathode Ray Tube |
| DAC | - | Digital to Analog Converter |
| DDC | - | Direct Digital Control |
| DI | - | (Binary) Digital Input |
| DO | - | (Binary) Digital Output |
| EEPROM | - | Electronically Erasable Programmable Read Only Memory |
| EMCS | - | Energy Management Control System |
| EMI | - | Electromagnetic Interference |
| FAS | - | Fire Alarm Detection and Annunciation System |
| GUI | - | Graphical User Interface |
| HOA | - | Hand-Off-Auto |
| HTML | - | Hypertext Markup Language |
| HTTP | - | HyperText Transfer Protocol |

ID	-	Identification
IEEE	-	Institute of Electrical and Electronics Engineers
I/O	-	Input/Output
IP	-	Internet Protocol
IT	-	Information Technology
LAN	-	Local Area Network
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MCC	-	Motor Control Center
NC	-	Normally Closed
NIC	-	Not in Contract
NO	-	Normally Open
OWS	-	Operator Workstation
OAH	-	Outdoor Air Humidity
OAT	-	Outdoor Air Temperature
PC	-	Personal Computer
RAM	-	Random Access Memory
RF	-	Radio Frequency
RFI	-	Radio Frequency Interference
RH	-	Relative Humidity
ROM	-	Read Only Memory
SMTP	-	Simple Mail Transfer Protocol
SNMP	-	Simple Network Management Protocol
SNTP	-	Simple Network Time Protocol
SPDT	-	Single Pole Double Throw
SPST	-	Single Pole Single Throw
XVGA	-	Extended Video Graphics Adapter
TBA	-	To Be Advised
TCP/IP	-	Transmission Control Protocol/Internet Protocol
UPS	-	Uninterruptible Power Supply
VAC	-	Volts, Alternating Current
VAV	-	Variable Air Volume
VDC	-	Volts, Direct Current
WAN	-	Wide Area Network
XML	-	Extensible Markup Language

1.5 QUALITY ASSURANCE

A. General:

1. The EMCS Contractor shall have a branch facility within a 100-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis. This branch facility shall provide the work for this project. This support facility shall have spare parts, and all necessary test and diagnostic equipment required to install commission and service the specified EMCS.
2. As evidence and assurance of the Contractor's ability to support the Owner's system with service and parts, the Contractor must have been in the EMCS business for at least the last ten (10) years and have successfully completed three projects comparable to the value of this contract in the preceding five years

3. The EMCS architecture shall consist of products manufactured by companies regularly engaged in the production of EMCS and shall be the manufacturer's latest standard of design at the time of bid.
4. The EMCS software residing in Nodes and servers shall be updated to the latest currently available revision at the start of Warranty. If updating any node affects an existing EMCS's ability to communicate to any other existing node on any part of the EMCS, then the contractor shall update any or all existing nodes and workstations to provide seamless communications throughout the entire existing and new system.

B. Quality Management Program:

1. Provide a competent and experienced EMCS Project Manager employed by the EMCS Contractor. The Project Manager shall be supported as necessary by other EMCS Contractor employees in order to provide professional management services for the work. The Project Manager shall attend scheduled Project Meetings as required and shall be empowered to make technical, scheduling and related decisions on behalf of the EMCS Contractor

1.6 REFERENCES

A. All work shall conform to the following Codes and Standards, as applicable:

1. National Fire Protection Association (NFPA) Standards.
2. National Electric Code (NEC) and applicable local Electric Code.
3. Underwriters Laboratories (UL) listing and labels.
4. UL 916 Energy Management
5. NFPA 70 - National Electrical Code.
6. NFPA 90A - Standard for The Installation of Air Conditioning and Ventilating Systems.
7. NFPA 92A and 92B Smoke Purge/Control Equipment.
8. Factory Mutual (FM).
9. American National Standards Institute (ANSI).
10. National Electric Manufacturer's Association (NEMA).
11. American Society of Mechanical Engineers (ASME).
12. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
13. Air Movement and Control Association (AMCA).
14. Institute of Electrical and Electronic Engineers (IEEE).
15. American Standard Code for Information Interchange (ASCII).
16. Electronics Industries Association (EIA).
17. Occupational Safety and Health Administration (OSHA).
18. American Society for Testing and Materials (ASTM).
19. Federal Communications Commission (FCC) including Part 15, Radio Frequency Devices.
20. Americans Disability Act (ADA)

B. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

C. All work shall meet the approval of the Authorities Having Jurisdiction at the project site.

1.7 SUBMITTALS

A. Control Drawings, Product Data, and Samples:

1. The EMCS Contractor shall submit a complete controls package divided into two sections. The first section shall be delivered within 30 days after the contract has been awarded and the second section shall be delivered within 60 days after the contract has been awarded.
2. Allow at least 15 working days for the review of each package by the Engineer.
3. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the EMCS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.

B. Submittal Section 1:

1. Site Specific EMCS network architecture diagrams including all nodes and interconnections including controllers, Operator Workstations, modems and gateways.
2. Product data sheets for all products including software.

C. Submittal Section 2:

1. Drawing Index, floor plans, schematics, controller wiring diagrams and sequences. Control drawings shall be created on AUTOCAD software, version 14 or newer.
2. Points schedule for each real point in the EMCS, including Tag, Point Type, System Name, Display Units, Scale Range, Unique Address, and Reference Drawing.
3. Samples of Graphic Display screen types and associated menu penetrations to show hierarchy and functional interrelationships.
4. Detailed Bill of Material, identifying part number, quantity, description, and optional features.
5. Room Schedule, including a separate line for each terminal unit showing system name, minimum/maximum cfm, box area, and number of reheat stages.
6. Details of all EMCS interfaces and connections to the work of other trades.
7. Tier 1 Ethernet TCP/IP BACnet network criteria, including controller IP addressing capabilities, PICS, BIBBS and BTL listings.

1.8 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals:

1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the EMCS provided:
 - a. Table of contents
 - b. As-built Control Drawings using AutoCAD Version 14 or newer. Drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal. Include as-built floor plans.
 - c. Manufacturer's product data sheets for all products including software.
 - d. System Operator's manuals.
 - e. Archive copy via a read/write CD-ROM all site-specific databases and sequences.

- f. EMCS network diagrams (use AutoCAD version 14 or newer).
 - g. Wiring termination diagrams (use AutoCAD version 14 or newer).
 - h. Interfaces to all third-party products and work by other trades.
 - i. Points list
 - j. Room Schedules
 - k. Point to point checkout sheets with dates and checkout signatures
 - l. Repair contact name and phone number.
2. An Operation and Maintenance Manual CD that shall be a self-contained read/write CD-ROM that includes all of the information listed above and all the necessary viewer software required for access. Include a logically organized table of contents. Viewer software shall provide the ability to display, zoom, and search all documents.

1.9 WARRANTY

A. Standard Material and Labor Warranty:

1. Provide a one-year labor warranty on the EMCS.
2. The EMCS components shall be free from defects in material and workmanship under normal use and service. If within one (1) year from the date of the awarding of the Certificate of Occupancy any EMCS equipment is found to be defective, it will be replaced, repaired or adjusted by EMCS Contractor free of charge. The EMCS Contractor is not responsible for the removal or reinstallation of any components that were originally installed by others, such as valves, dampers, wells, air flow stations, etc.
3. Maintain an adequate supply of materials within 100 miles of the Project site such as replacement of key parts and labor support, including programming. Warranty work shall be done during EMCS Contractor's normal business hours unless there is an emergency.
4. Maintain an on-site record of all work done, all items removed from site, all items returned to site, all new replacement items installed, and all remedial programming and database entry work undertaken including software revisions installed. Maintain a record of all re-calibrations required as a result of Warranty service.

1.10 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

Not Applicable

2.2 EMCS DESCRIPTION

- A. EMCS shall include a graphical interface that shall allow users to access the EMCS data via a remote Operator Workstation. Remote Operator Workstation access shall take place through a WAN IP address access program, WEB based internet access, or modem dial-up. The WEB graphical user interface shall be set up as described in WEB BASED USER INTERFACE of this specification.
- B. The EMCS shall be a complete system designed for use on a Tier 1 Ethernet TCP/IP BACnet network. This functionality shall extend into the equipment rooms. Application nodes located in equipment rooms and similar shall be fully IT compatible devices that mount and are capable of communicating directly on the IT infrastructure existing in the facility. If the Owner's LAN is used, Contractor shall be responsible for coordination with the Owner's IT staff to ensure that the EMCS will perform in the Owner's environment without disruption to any of the other activities taking place on that LAN. Where necessary and as dictated elsewhere in these Specifications, Servers shall be used for the purpose of providing a location for archiving system configuration data, and historical data such as trend data and operator transactions.
- C. The work of the single EMCS Contractor shall be as defined individually and collectively in all Sections of this Division specifications together with the associated Point Sheets and Drawings and the associated interfacing work as referenced in the related documents as are listed in Part 1 of this Section.
- D. The EMCS work shall consist of the provision of all labor, materials, etc. as Specified in these Division documents which are required for the complete, fully functional and commissioned EMCS.
- E. Provide a complete, neat and workmanlike installation. Use only employees who are skilled, experienced, trained, and familiar with the specific equipment, software and configurations to be provided for this Project.
- F. Manage and coordinate the EMCS work in a timely manner in consideration of the Project schedules. Coordinate cooperatively with the associated work of other trades so as to assist the progress and not impede or delay the work of associated trades.
- G. The EMCS as provided shall incorporate, at minimum, the following integrated features, functions and services:
 - 1. Operator information, alarm management and control functions at any Operator's Workstation without the need to purchase special software from the EMCS manufacturer for those consoles.
 - 2. Software and hardware that allows third party access for the purpose of creating a combined graphical interface. The combined graphical interface shall have the ability to read, write and acknowledge actual hardware inputs and outputs, setpoints, off/on switches, schedules, alarms and trend logs.
 - 3. Information management, including monitoring, transmission, archiving, retrieval, and reporting functions.
 - 4. Diagnostic monitoring and reporting of EMCS functions.
 - 5. Offsite monitoring and management.
 - 6. Energy management.
 - 7. Fire Alarm System secondary monitoring.

8. Lighting Control System monitoring and control.
9. Irrigation System monitoring and control.

H. Graphic Displays:

1. Provide color graphics for each system with all points as indicated on the point list. All graphics shall be available for viewing on any Operator Workstation directly or remotely connected to the Tier 1 TCP/IP BACnet network.
2. Provide a color graphic display for each floor in the facility. Indicate each HVAC zone and temperature, Lighting Control System zone status, and zone occupancy status.
3. User shall access the various system schematics and floor plans via a graphical penetration scheme and menu selection.

2.3 EMCS ARCHITECTURE

A. Overall Conceptual Description:

1. The EMCS shall be designed entirely for use on intranets and internets. All networking technology used at the Tier 1 Ethernet TCP/IP level shall be off the shelf, industry standard technology fully compatible with other Owner provided networks in the facility.
2. The primary components of the system will be the Operator Workstations, Application Nodes and Servers located at the highest level of the network architecture. All will use the same graphical user interface and provide the same level of accessibility via the network. The only distinction between the user interface used on servers as compared to Application Nodes or Operator Workstations shall be select menu items used for accessing long term storage features on the servers or on their respective archive devices (CD/RW, etc.)

B. General:

1. The EMCS shall consist of a number of Nodes and associated equipment connected by industry standard network practices. All communication between Nodes shall be by digital means only.
2. The EMCS network shall at minimum comprise of the following:
 - a. Operator Workstations– fixed or portable.
 - b. Network processing, data storage and communication equipment.
 - c. Routers, bridges, switches, hubs, modems and like communications equipment.
 - d. Active processing Nodes including field panels.
 - e. Intelligent and addressable elements and end devices.
 - f. Third-party equipment interfaces.
 - g. Modem attached to EMCS so that dial-up communication from a remote Operator Workstation is available.
 - h. Other components required for a complete and working EMCS.
 - i. All EMCS features shall be accessible via graphical interface. All programming shall be accessible by intranet Operator Workstations. Intranet access and Internet browser shall have equivalent EMCS access control for user access.
 - j. The EMCS shall support auto-dial/auto-answer communications to allow EMCS Nodes to communicate with other remote EMCS Nodes via standard analog telephone lines.

- k. The Operator Workstations, File servers and principal network equipment shall be standard products of recognized major manufacturers and shall have documentation stating that have been tested and are fully functional using the EMCS software.
- l. Provide licenses for all software residing in the EMCS system and transfer these licenses to the Owner prior to completion.

C. Network:

1. The EMCS shall incorporate a primary Tier 1 Ethernet TCP/IP network. At the Contractor's option, the EMCS may also incorporate integrated secondary Tier 2 and tertiary Tier 3 networks.
2. The EMCS Network shall utilize an open architecture capable of all of the following:
 - a. Utilizing standard Ethernet communications and operate at a minimum speed of 10/100 Mb/sec
 - b. Connecting via BACnet at the Tier 1 level in accordance with ANSI/ASHRAE Standard 135-2001.
 - c. All Tier 2 (subnet) level communications shall be via BACnet in accordance with ANSI/ASHRAE Standard 135-2001. Gateways may be employed to communicate with existing or third-party system controllers.
3. The EMCS network shall support both copper and optical fiber communication media.

D. Third-Party Equipment Interfaces:

1. EMCS Contractor shall integrate real-time data from systems supplied by other trades as required in Part 3.03 THIRD PART EQUIPMENT INTERFACE.
2. The EMCS system shall include the necessary EMCS hardware equipment and software to allow data communication between the EMCS system and systems supplied by other trades.
3. The trade Contractor supplying other systems will provide their necessary hardware and software and will cooperate fully with the EMCS Contractor in a timely manner to ensure complete data integration.

E. Uninterruptible Power Supply (UPS):

1. Provide UPS for non-remote intranet Operator Workstations and servers, and any other equipment as indicated in the drawings.
2. UPS shall be sized to last 30 minutes.

F. Power Fail/Auto Restart:

1. Provide for the automatic orderly and predefined startup of parts or all of the EMCS following total loss of power to those parts or all of the EMCS. Archive and annunciate time and details of restoration.
2. Provide for the orderly and predefined scheduling of controlled return to normal, automatically time scheduled, operation of controlled equipment as a result of the auto restart processes.
3. Maintain the EMCS real-time clock operation during periods of power outage for a minimum of 72 hours.

G. Downloading and Uploading:

1. Provide the capability to generate EMCS software-based sequences, database items and associated operational definition information and user-required revisions at any intranet Operator Workstation and provide the means to download any of the items listed above to its associated Application Node or Terminal Unit Node.
2. Provide the capability to upload EMCS operating software information, database items, sequences and alarms to the designated server.

H. All networking technology used at the Tier 1 level shall be off the shelf, industry standard technology fully compatible with other Owner provided networks in the facility. The Operator Workstations, File servers and principal network equipment shall be standard products of recognized major manufacturers available through normal vendor channels. "Clones" are not acceptable. All aspects of the user interface shall be via graphical interfaces. All other hardware, software, servers, firewalls, etc. shall be provided by the EMCS Contractor. The EMCS Contractor shall coordinate with the Owner and have approval from the Owner for all additions or modifications to the existing IT infrastructure.

2.4 OPERATOR WORKSTATIONS

- A. The Operator Workstations shall provide the primary means of communication with the EMCS and shall be used for operations, engineering, management, audit, reporting and other related functions.
- B. The Operator Workstations shall consist of fixed and portable units. The fixed units shall consist of installed PC-based configurations. The portable units shall consist of PC Laptops. Both units shall display the same graphics and data.
- C. Each Operator Workstation shall, at minimum, consist of:
1. PC processor with minimum 64-bit word structure.
 2. Hard drive sized to store several months of trend data for the entire EMCS.
 3. Removable high-speed data storage and export device(s) such as Read/Write CD ROM or equal.
 4. Full ASCII keyboard and digital Mouse or equal pointing device.
 5. Full color, flat screen VDU display unit, minimum 17 inches diagonal screen, minimum 1280 x 1024 resolution, 0.26 or better dot pitch and minimum 72 Hz refresh rate.
 6. RAM large enough to provide graphics data updated in 2 seconds or less.
 7. Network card capable of providing graphics updates in 2 seconds or less.
- D. Printers shall be full color and designed for the functional requirements and duty of the application.
- E. All software and hardware required to access the EMCS from the Tier 1 Ethernet TCP/IP BACnet network. Read and write functions for hardware inputs and outputs, alarms, schedules and trend logs along with application programming abilities shall be included. Also include hardware/software access for at least three simultaneous users.
- F. Operator Workstations shall operate independently and concurrently without interference and under individual user password protection.

- G. Operator Workstations shall have software that shall provide functional access level defined individual operator access.

2.5 OPERATOR WORKSTATION SOFTWARE

A. General:

1. The EMCS Operator Workstation software shall be user friendly, readily understood and shall make maximum use of colors, graphics, icons, embedded images, animation, text-based information and data visualization techniques to enhance and simplify the use and understanding of the EMCS by authorized users at the OWS.
2. User access to the Operator Workstation shall be protected by a flexible and Owner redefinable software-based password access protection. Password protection shall be multi-level and partitionable to accommodate the varied access requirements of the different user groups. Provide the means to define unique access privileges for each individual authorized user. Also provide the means to establish general password groups to which an individual will then be assigned. Once assigned to the group each individual will assume all the capabilities and restrictions of that group. Provide the means to on-line manage password access control under the control of a Master Password.
3. The Operator Workstation software shall be able to combine data from any and all of the system components in a single graphic window. This shall include historical data stored on a server.
4. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:
 - a. User access for selective information retrieval and control command execution
 - b. Monitoring and reporting
 - c. Alarm, non-normal, and return to normal condition annunciation
 - d. Selective operator override and other control actions
 - e. Information archiving, manipulation, formatting, display and reporting
 - f. EMCS internal performance supervision and diagnostics
 - g. On-line access to user HELP menus
 - h. On-line access to current EMCS as-built records and documentation
 - i. Ability to re-program and re-configure all Application and Terminal Unit Nodes
5. Provide EMCS reports and displays making maximized use of simple English language descriptions and readily understood acronyms, abbreviations and the like to assist user understanding and interpretation. All text naming conventions shall be consistent in their use and application throughout the EMCS.
6. Shall operate on latest operating system.
7. Each fixed and portable Operator Workstation shall be online configurable for specific applications, functions and groups of EMCS points.
8. Any existing workstation software must be upgraded to most current manufacturers control software platform.

B. Navigation Trees:

1. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.

2. The navigation trees shall appear as part of the display but can be detached and then minimized to the Windows task bar or closed altogether. A simple keystroke will reattach the navigation to the primary display of the user interface.

C. Dividable Display Panels:

1. It shall be possible for the operator to divide the display area within a single window into multiple display panels. The content of each display panel can be any of the standard summaries and graphics provided by the system.
2. Provide each display panel with minimize, maximize, and close icons.

D. Alarms:

1. Alarms shall be routed directly from Application Nodes to Operator Workstations and servers. It shall be possible for specific alarms from specific points to be routed to specific Operator Workstations and servers. The alarm management portion of the EMCS software shall, at the minimum, provide the following functions
 - a. Log date and time of alarm occurrence.
 - b. Generate a "Pop-Up" window, with audible alarm, informing a user that an alarm has been received.
 - c. Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
 - d. Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
 - e. Provide the ability to direct alarms to an e-mail address or alpha-numeric pager. This must be provided in addition to the pop-up window described above. Systems which use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
 - f. Any object in the system may be designated to report an alarm.
2. The EMCS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions

E. Reports:

1. Reports shall be generated and directed to one or more of the following: User interface displays, printers, or archive at the user's option. As a minimum, the system shall provide the following reports:
 - a. All points in the EMCS, especially those points connected to any metering equipment
 - b. All points in each EMCS application
 - c. All points in a specific Application or HVAC Node
 - d. All points in a user-defined group of points
 - e. All points currently in alarm in an EMCS application
 - f. All points locked out in an EMCS application
 - g. All EMCS schedules
 - h. All user defined and adjustable variables, schedules, interlocks and the like
 - i. EMCS diagnostic and system status reports

2. Provide for the generation by the user of custom reports.

F. Dynamic Color Graphics:

1. An unlimited number of graphic displays shall be able to be generated and executed.
2. The values of real time attributes displayed on the graphics shall be dynamic and updated on the displays.
3. The graphic displays shall be able to display and provide animation based on real-time EMCS data that is acquired, derived, or entered.
4. The user shall be able to change values (setpoints) and states that affect the system-controlled equipment directly from the graphic display.
5. Provide a graphic editing tool that allows for the creation and editing of graphic files. It shall be possible to edit the graphics directly while they are online, or at an off-line location for later downloading.
6. The EMCS system shall be provided with a complete user expandable symbol library containing all of the basic symbols used to represent components of a typical EMCS system. Implementing these symbols in a graphic shall involve dragging and dropping them from the library to the graphic.
7. All points on graphics shall be identified by their unique point addresses. Addresses may appear in “pop-up” screens associated with the point on the graphic.

G. Schedules:

1. The system shall provide multiple schedule input forms for automatic EMCS time-of-day scheduling and override scheduling of EMCS operations. At a minimum, the following spreadsheet types shall be accommodated:
 - a. Weekly schedules.
 - b. Temporary override schedules.
 - c. Special “Only Active If Today Is a Holiday” schedules.
 - d. Monthly schedules.
2. Schedules shall be provided for each system or sub-system in the EMCS. Each piece of equipment in each system may have a unique schedule of operation relative to the system use schedule, allowing for sequential starting and control of equipment within the system. Scheduling and rescheduling of points shall be accomplished easily via the system schedule graphics.
3. Monthly calendars for a 12-month period shall be provided that allow for simplified scheduling of holidays and special days in advance. Holidays and special days shall be user-selected via schedule graphics and shall automatically reschedule equipment operation as previously defined on the weekly schedules.

H. Historical Trending and Data Collection:

1. Trend and store point history data for all EMCS points and values as selected by the user for five (5) years.
2. The trend data shall be stored in a manner that allows custom queries and reports using industry-standard software tools.

3. At a minimum, provide the capability to perform statistical functions on the historical database:
 - a. Average
 - b. Arithmetic mean
 - c. Maximum/minimum values
 - d. Range – difference between minimum and maximum values
 - e. Standard deviation
 - f. Sum of all values
 - g. Variance

I. Paging:

1. Provide the means of automatic e-mail and/or telephone type paging of personnel for user-defined EMCS events.
 - a. Users shall have the ability to modify the address identifier or message to be displayed on the e-mail or telephone type pager through the system software.
 - b. The Contractor shall be responsible for providing connection to the e-mail or telephone type paging service.

2.6 WEB BASED USER INTERFACE

- A. The EMCS shall have the ability to provide a web based graphical interface that allows users to access the EMCS data, configure data, commission, archive data, monitor, command, edit and perform system diagnostics via the Internet. The interface shall use HTML based ASP pages or HTTP, IP, SMTP, SNMP, and XML to send and receive data from the EMCS system to a web browser.
- B. All information exchanged over the Internet shall be encrypted and secure (all hardware and software provided by EMCS Contractor).
- C. The Owner shall be able to access data in the EMCS, intranet or internet with any type of computer (desktop or laptop) that runs standard Web browser software. The Web browser shall be set up to access the EMCS system directly over the IP network or via the Internet or Public telephone service for remote operation and system fault diagnosis.
- D. The EMCS system shall recognize legitimate users through the entry of a user ID and a password at the Web browser user interface. User access data shall be encrypted in the transmission and in the EMCS system database and user profiles and accounts are managed at a site or system level by the user's security administrator. The authorization levels range from configuring the complete system to only viewing one section of the system or site. The system administrator shall assign a user ID, password, and specific data access privileges in each user account.
- E. Access to the Web interface shall be password protected. A user's rights and privileges to points and graphics will be the same as those assigned at the EMCS workstation. An option will exist to only allow users "read" access via the Web browser, while maintaining "command" privileges via the EMCS workstation.

- F. The Web-based interface shall provide the following functionality to users, based on their access and privilege rights:
1. Logon Screen: allows user to enter their username, password and Domain name for logging into the web server.
 2. Alarm Display: a display of current EMCS alarms to which the user has access will be displayed. Users will be able to acknowledge and erase active alarms, and link to additional alarm information including alarm messages, and informational and memo text. Any alarm acknowledgements initiated through the Web interface will be written to the EMCS central workstation activity log.
 3. Graphic Display: displays of system graphics available in the EMCS workstation will be available for viewing over the web browser. A graphic selector list will allow users to select any graphics to which they have access. Graphic displays will automatically refresh with the latest change of values. Users will have the ability to command and override points from the graphic display as determined by their user accounts rights.
 4. Point Details: users will have access to point detail information including operational status, operational priority, physical address, and alarm limits, for point objects to which they have access rights.
 5. Point Commanding: users will be able to override, and command points they have access to via the web browser interface. Any commands or overrides initiated via the web browser interface will be written to the EMCS central workstation activity log.
 6. Programming Capabilities: shall be excluded for web browser application.
- G. EMCS Contractor shall provide licenses for all software residing in the EMCS system. Provide EMCS software and web server site licenses allowing concurrent access by three (3) browser connections. Transfer these licenses to the Owner prior to completion.
- H. Internet connections and ISP services shall be provided by the Owner as required to support the web access feature.

2.7 WEB BASED SERVER

- A. Web access software shall be installed as described below shall support browser access via the most current version of Microsoft Internet Explorer, or Navigator Netscape. Include Server software using standard Client Access Licenses (CALs) with enabled Terminal Services software. Server software can be installed on an Operator's Workstation.
- B. Provide standard Client Access Licenses (CALs) for every concurrent user that may access the server (minimum of 3 concurrent users). In addition to the standard CALs for the operating system, every remote computer that accesses the server shall be provided with a reciprocating operating system (minimum of 3 concurrent users). All licenses shall be purchased by the Contractor.
- C. Equip servers with the same EMCS tool set for graphic and system configuration and custom logic definition. Access to all information on the server will be through the same graphical user interface software used to access the EMCS system. When logged onto a server the operator will be able to also interact with any of the controllers in the facility.

D. The hardware platform for the server will, at minimum, consist of

1. Processor capable of supporting graphic data updates for 3 concurrent users in under 2 seconds.
2. RAM capable of supporting 3 concurrent users with graphics updates 2 seconds or less.
3. Operating Systems software consistent with the EMCS
4. Terminal system software consistent with the EMCS
5. Server software consistent with the EMCS
6. Network card capable of supporting graphic data updates for 3 concurrent users under 2 seconds.
7. CD-ROM drive
8. Hard drive sized to store 5 years of trended data for all points connected to the server.
9. Current version of Internet software consistent with the EMCS.

2.8 NODES

A. Application Nodes:

1. Application nodes shall perform the function of monitoring system variables, both from real hardware points, software variables, and controller parameters such as setpoints that are relevant to its operation.
2. Application Nodes shall be entirely solid-state devices. No rigid disk drives will be permitted in the equipment rooms.
3. The application nodes shall be capable of managing and directing all information traffic on the Tier 1 network, between the Tier 1 and Tier2 networks, and to servers.
4. Any node on the Tier 1 network shall be equipped with all software necessary to interface with a Tier 1 Operator Workstation via network or local port.
5. The operating system of the Application Node shall support multi-user access. At minimum three users shall be able to access the same application node simultaneously.
6. Communication between nodes shall be peer-to-peer via 10/100 Ethernet using the BACnet protocol.
7. The Application Node shall be capable of direct connection to a subnet. The subnet shall use BACnet communications per ANSI/ASHRAE Standard 135-2001.
8. Application Nodes shall be programmable and governed by the requirements of their applicable codes, approvals and regulations. Configurable nodes are not acceptable.
9. The Application Nodes shall be designed, packaged, installed, programmed and commissioned in consideration of their specific service and prevailing operating conditions. They shall be proven standard product of their original manufacturer and not a custom product for this Project.
10. A failure at an Application Node shall not cause failures or non-normal operation at any other Application Node or subnet node other than the possible loss of active real-time information from the failed Application Node.
11. Application Nodes shall comply with FCC Part 15 subpart J Class A emission requirements.
12. Each Application Node shall be equipped with battery back-up source.
13. Application Nodes shall be physically separate from server hardware and software, reside in the building, and be the only means of EMCS data transfer to the server. Application node shall be a complete off the shelf software/hardware package manufactured by a licensed Application node manufacturer.

B. HVAC Node:

1. HVAC Node shall provide both standalone and networked direct digital control of HVAC systems.
2. A dedicated HVAC Node shall be configured and provided for each primary HVAC system (air handler, chiller, boiler) and each terminal HVAC system (VAV Box, Unit Heater, Fan Coil Unit, Cabinet Heater, Heat Pump, Fan Powered Box, CV Box)
3. Each HVAC Node shall retain program, control algorithms, and setpoint information in non-volatile memory in the event of a power failure and shall return to normal operation upon restoration of power.
4. Each HVAC Node shall report its communication status to the EMCS. The EMCS shall provide a system advisory upon communication failure and restoration.
5. The HVAC Node shall provide the ability to download and upload configuration data, both locally at the Node and via the EMCS communications network.
6. HVAC nodes connected directly to the Tier 1 network shall be subject to all of the conditions listed in Section 2.07.A Application Node.
7. Configurable rather than programmable nodes may be used but must perform specified sequences. The configurable nodes shall be replaced at the Contractor's expense if during the design, checkout or warranty periods it is discovered that the configurable node cannot adequately perform the specified sequence.

2.9 NODE SOFTWARE

A. Application and HVAC Node Software:

1. Event Messaging: Provide for the automatic execution of user-defined messages on the occurrence of each predefined EMCS real-time event including equipment/point status change, approaching limit or alarm, time of day and the like. Direct messages to any number of operator PCs, e-mail destinations, and pagers.
2. Optimum Start/Stop: Provide software to start equipment on a sliding schedule based upon indoor and outdoor conditions, to determine the minimum time of HVAC system operation needed to satisfy the space environmental requirements. The program shall also determine the earliest possible time to stop the mechanical systems. The optimum start/stop program shall operate in conjunction with, and be coordinated with, the scheduled start/stop and night setback programs.
3. Auto Alarm Lockout: Provide for scheduled and automatic lockout of alarm annunciation from equipment during non-normal operating conditions including shutdown, emergency power operation, fire alarm and the like.
4. Energy Monitoring: Provide software to monitor and totalize consumption as measured by pulse meters.
5. Event Initiated Programs and Custom Logic: Provide software to define custom logic sequences that will reside in the nodes. The definition software will also reside in the node and be accessible via the network or directly connected workstation.
6. System Restart: Upon restoration of the AC power to an HVAC Node, automatically restart all equipment and restore all loads to the state as required by the EMCS. Provide appropriate time delays to prevent demand surges or overload trips.
7. Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands.

8. Runtime Totalization: Automatically sample, calculate and store runtime hours for binary input and output points as listed in the point schedule of this specification.
9. Analog/Pulse Totalization: Sample, calculate and store consumption totals on a daily, weekly, or monthly basis for user-selected analog and binary pulse input-type points.
10. Setpoints and Setpoint Ranges: All setpoints and their ranges shall be accessible via an Operator's Workstation.

PART 3 - PERFORMANCE/EXECUTION

3.1 EMCS SPECIFIC REQUIREMENTS

A. Temperature Sensors:

1. Office and classroom temperature sensors shall have pushbutton interface capabilities that allow for occupied/unoccupied override and adjustable setpoint unless otherwise specified on drawings. Sensors shall be capable of displaying room temperature and setpoint and shall be capable of a 5-degree F deadband between cooling and heating.
2. Gyms, hallways and other high traffic areas subject to abuse shall have stainless steel, flush mounted, plain front temperature sensors.
3. Room temperature sensors shall be mounted 48" ADA unless otherwise specified on drawings. Verify locations with customer representative.

B. Operator Workstation Schedule:

1. One (1) desktop workstation and (1) laptop capable of displaying all system graphics and accessing the data and control code in all controllers. Confirm PC type with customer representative. Workstation count does not include separate servers, if separate servers are necessary for system operation.
2. Supplied workstations shall have all software and hardware required for optional dial-up, website remote access, and multiple user access.
3. Workstations shall be fully tested and certified compatible with all EMCS software

C. Actuation / Control Type:

1. Primary Equipment:
 - a. As a default, spring return is required in all equipment exposed to outside air and/or fail-safe situations.
 - b. All air handling equipment damper and valve actuation shall be electric, spring return and proportionally controlled.
 - c. Air handling equipment is defined as any unit with outside air intake.
 - d. All valves associated with units directly processing outside air and the main hydronic system shall have mechanical override capabilities.
 - e. All 120 VAC driven actuators shall have disconnects in accordance with electrical standards.

2. Terminal Equipment:

- a. Terminal Air Boxes (VAV, etc.) shall have electric damper and valve actuation. 3-point floating actuation is acceptable.
- b. Hydronic Based Heaters shall have electric actuated valves with electric thermostat control.

D. Current Sensors and Current Switches:

1. Install on all fans including fan terminal boxes, heat pumps fans, and exhaust fans. Install on all hydronic pumps. Install on all compressors.
2. Use sensor types that provide detection of belt breakage when belt driven equipment is used.
3. As default, all variable speed motors shall have current sensors on their power input if manufacturer variable speed motor status is not available.

E. Extra HVAC Node Physical Hardware Points:

1. All HVAC nodes controlling major hydronic system elements such as chillers, boilers, main system valves and pumps, and major outside air system units such as AHUs, HPs, Split-Systems, and Gas Furnaces, shall have one unused universal input, analog output, and digital output.

F. Adjust room numbers and floor plans on graphics as necessary to reflect actual conditions.

G. Meters:

1. Water Meters:

- a. Install with built in strainers, locking nuts, gaskets and coupling pieces.
- b. Installation by Division 23.
- c. Totalizing pulse output type, accuracy shall be 2% of rate fluid.
- d. Turbine style meter.
- e. Maximum pressure drop shall be less than 3 psi at design flow rates or meter size to match pipe size.

2. Gas Meter:

- a. Installation by Division 23.
- b. Diaphragm meter with self-lubricating bearings.
- c. Capacity and line pressure to match building requirements.
- d. Include totalizing pulse option.

3. Power Meter:

- a. Meter measures Accumulated Real Energy (kWh), Instantaneous Peak (kW); Current (amps), Maximum Peak (kW) for all phases and in total.
- b. Meter shall communicate using BACnet MS/TP protocol and shall be compatible with EMCS.
- c. Meter shall include all current transformers, fuses, resistors, power transformers and enclosures.

- d. CT installation by Division 26. Coordinate CT type with EC. Solid core CTs preferred.
- e. Default power reading every 15 minutes.

H. Wireless Temperature Sensor System:

1. Overall System: The Contractor and/or Installation Firm shall provide fully supervised wireless temperature sensing equipment by operating above 900MHZ frequency band. To provide extended range for larger installations, wireless repeaters are available. In order to provide maximum reliability and interference immunity, all wireless sensors (transmitters and repeaters) shall use a spread spectrum, frequency-hopping technique, which sends redundant messages across a bandwidth that is at least 10MHz wide.
 - a. The wireless sensors and repeaters shall be capable of periodically transmitting check-in signals to monitor the integrity of their wireless links. These transmitters and repeaters shall be able to be programmed for check-in transmissions that occur as frequently as every 60 seconds. The information provided in these check-in messages shall at least include battery condition status and tamper status or temperature data.
 - b. Wireless receivers shall resolve signals from the transmitters and repeaters specifically registered into the system, even in the presence of RF interference. The receivers shall interface to a direct serial data interface on an Andover Controls Corporation CS type Net Controller.
2. Repeater: To accommodate wireless temperature applications in large commercial and industrial facilities, or to support future site expansion or remodeling, a repeater product shall be available to increase data transmission range. This repeater must provide at least 200 milliwatts of effective radiated RF power. The repeaters shall have the ability for communication with other repeaters, thus allowing for multiple repeaters to be installed as a micro-cellular network. Data and supervisory check-in signals from transmitters must be maintained reliably with multiple repeaters in the system. The repeater shall NOT require a home run wire back to the receiver.
 - a. Open Field Transmit Range: 4 miles
 - b. Ambient Operating Temp: 32°F to 140°F
3. Wireless Sensors (Transmitters): The wireless equipment shall include either a transmitter with an external temperature probe attached to a terminal block or a sensor with an on-board thermistor. In addition to measuring and temperature data, the sensor shall be capable of monitoring and transmitting Delta R (change in resistance).
 - a. Open Field Transmit Range: 2500 feet
 - b. Ambient Operating Temp: 32°F to 140°F
4. Receivers: The wireless equipment shall include receivers that decode valid temperature system transmission. Receivers can support hundreds of temperature transmitters.
 - a. Ambient Operating Temp: 32°F to 140°F

5. Wireless Survey Tool: A portable, hand-held, easy-to-use survey kit shall be available that will measure transmitter signal strength as well as signal margin (dBm above background noise of received signals). The survey kit shall have the ability to determine the performance of the transmitters to be installed, and if necessary, the amount and locations of wireless repeaters.
6. Quality Assurance: To ensure consistent product quality, the wireless equipment manufacturer shall be ISO9001 registered with an active certification.

3.2 INSTALLATION PRACTICES

A. EMCS Wiring:

1. All conduit, wiring, accessories and wiring connections required for the installation of the Energy Management System, as herein specified, shall be provided by the EMCS Contractor unless specifically shown on the Electrical Drawings under Division 26, Electrical.
2. The EMCS contractor is responsible for coordinating with the Electrical contractor (At EMCS Contractors' expense) to furnish and install any additional line voltage circuits, line voltage wiring, line voltage panels, and associated line voltage appurtenances not shown on the Electrical Drawings as required to provide a complete and functioning EMCS system, regardless of the quantity or presence of EMCS circuits shown on the Electrical Drawings.
3. All wiring shall comply with the requirements of applicable portions of Division 26 and all local and national electric codes, unless specified otherwise in this section.
4. All EMCS wiring materials and installation methods shall comply with EMCS manufacturer recommendations.
5. The sizing type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the EMCS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the EMCS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
6. Wire/conduit ratios shall follow the same wire/conduit ratios included in Division 26.
7. Class 2 Wiring:
 - a. All Class 2 (24VAC or less) wiring shall be installed in conduit or be plenum rated and shall be installed in accordance with local code requirements.
 - b. Conduit is not required for Class 2 wiring in concealed accessible locations. Inaccessible locations such as "hard lid" ceilings require conduit.
 - c. Wire supports and is installed per local wiring code requirements. As a default, wire shall be supported every 5' from the building structure utilizing metal hangers designed for this application.
 - d. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Engineer.
 - e. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
 - f. Provide firestopping for all penetrations used by dedicated EMCS conduits and raceways using approved fire resistive sealant. All other project firestopping to be by other trade.
 - g. All wiring passing through penetrations, including walls or other structure, shall be in conduit or enclosed raceway.

- h. Penetration of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.
 - i. No penetrations in structural elements shall be made before receipt of written approval from the Structural Engineer.
- 8. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.
- 9. Perform circuit tests using qualified personnel only. Provide necessary instruments and equipment to demonstrate that:
 - a. All circuits are continuous and free from short circuits and grounds.
 - b. All circuits are free from unspecified grounds; that resistance to ground of all circuits is no less than 50 megaohms.
 - c. All circuits are free from induced voltages.
- 10. Provide complete testing for all cables used under this Contract. Provide all equipment, tools, and personnel as necessary to conduct these tests.
- 11. Provide for complete grounding of all signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

B. EMCS Line Voltage Power Source:

- 1. 120-volt AC circuits used for the EMCS shall be taken from panelboards and circuit breakers provided by Division 26. The Controls Contractor shall be responsible for installing, adding or adjusting all 120-volt AC circuits. Control's contractor shall coordinate all 120-volt AC work with Division 26.
- 2. Circuits used for the EMCS shall be dedicated to the EMCS and shall not be used for any other purposes.
- 3. DDC terminal unit controllers may use 120-volt AC power from motor power circuits.

C. EMCS Identification Standards:

- 1. Node Identification: All nodes shall be identified by a permanent label fastened to the outside of the enclosure. Labels shall be suitable for the node location.
- 2. Cable and/or conduit shall be labeled at suitable intervals with the EMCS system manufacturer's name. Labeling shall be sufficient to trace cable from device to device.
- 3. Specify a different wire color for analog, digital, power and communication wiring. Include wiring color on control drawings legends.
- 4. Raceway Identification: All the covers to junction and pull boxes of the EMCS raceways shall be labeled.
- 5. Wire Identification: All low and line voltage EMCS wiring shall be identified by a number, as referenced to the associated shop drawing and as-built drawing, at each end of the conductor or cable. Identification number shall be permanently secured to the conductor or cable and shall be typed.

D. EMCS Node Installation:

1. The EMCS panels and cabinets shall be mounted at shoulder height wherever possible. All panels shall be accessible. Each cabinet shall be anchored per the manufacturer's recommendations.
2. The EMCS Contractor shall be responsible for coordinating panel locations with other trades and Electrical and Mechanical Contractors.

E. Input Devices:

1. All Input devices shall be installed per the manufacturer's recommendation and shall be of the type and accuracy suitable for this specific application.
2. Locate components of the EMCS in accessible local control panels wherever possible.
3. The Mechanical Contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
4. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.
5. Outside Air Sensors:
 - a. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.
 - b. Sensors shall be installed with a rainproof, perforated cover.
6. Water Differential Pressure Sensors:
 - a. Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.
 - b. Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.
 - c. The transmitters shall be installed in an accessible location.
 - d. Installation of pipe taps and shutoff valves by Division 23.
7. Medium to High Differential Water Pressure Applications (Over 21" w.c.):
 - a. Air bleed units, bypass valves and compression fittings shall be provided.
 - b. Installation of pipe taps, valves and air bleed units by Division 23.
8. Building Differential Air Pressure Applications (-0.25" to +0.25" w.c.):
 - a. Transmitter's exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
 - b. The interior tip shall be inconspicuous and located as shown on the drawings.
9. Duct Temperature Sensors:
 - a. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
 - b. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.

- c. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor. Sensors shall be installed in a "Z" configuration as default.
 - d. The sensor shall be mounted to suitable support using factory approved element holders.
- 10. Low Temperature Limit Switches:
 - a. Install on the discharge side of the first water or steam coil in the air stream.
 - b. Mount element horizontally across coil in a serpentine pattern ensuring each square foot of coil is protected by 1 foot of sensor.
 - c. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.
- 11. Air Differential Pressure Status Switches:
 - a. Install with static pressure tips, tubing, fittings, and air filter.
- 12. Water Differential Pressure Status Switches:
 - a. Install with shut off valves for isolation.
 - b. Installation of pipe taps and valves by Division 23.
- 13. Room Temperature Sensor:
 - a. Install sensor with insulation if mounted on an exterior wall.
- 14. CO2 sensor:
 - a. Shall be factory calibrated and be self-calibrating when installed.
 - b. Range: 0-2000 ppm.
 - c. Accuracy: plus, or minus 30 ppm plus 2% of reading.
 - d. UL listed.
- 15. Refrigerant Sensors:
 - a. Shall be factory calibrated and be self-calibrating when installed.
 - b. Shall be maintenance free.
 - c. Range: 0-1000 ppm
 - d. Accuracy: plus, or minus 25 ppm plus 20% of reading
 - e. UL listed
 - f. Shall have audible alarm if levels above 50 ppm are detected.
 - g. Shall be 24 VAC or 24 VDC.

F. HVAC Output Devices:

- 1. All output devices shall be installed per the manufacturer's recommendation and shall be suitable in type and accuracy for this specific application. The Mechanical Contractor shall install all in-line devices such as control valves, dampers, etc.

2. Actuators: All control actuators shall be sized and capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.
 3. Electronic Signal Isolation Transducers: Whenever an analog output signal from the EMCS is to be connected to an external control system as an input (such as a chiller control panel) or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. It is the Controls Contractor's responsibility to determine if isolation is necessary.
 4. Relays: All relays used to start/stop any piece of mechanical equipment that does not have an HOA switch shall have a Closed-Open-Auto override switch located on the load side of the relay.
- G. Provide a file that tracks all software changes along with associated login name and password. Start file at beginning of construction process.

3.3 THIRD PARTY EQUIPMENT INTERFACE

- A. The EMCS shall utilize the following protocols to communicate with the third-party equipment described in this section:
1. Connecting via Ethernet TCP/IP BACnet at the Tier 1 level in accordance with ANSI/ASHRAE Standard 135-2001.
 2. Tier 2 connection specifications shall be via BACnet in accordance with ASNI/AHSRAE Standard 135-2001. Gateways may be employed to communicate with existing or third-party controllers. Objects commonly used for HVAC control shall be accessible. Accessible is defined as the ability to read, write, create and acknowledge objects. Objects are defined as input and output points, setpoints, on/off switches, alarms, schedules and trend logs.
- B. Each of the following independent systems Contractor shall provide all material and field labor necessary to accomplish interfaces to the EMCS:
1. Fire Alarm System: Fire Alarm System Interface: Fire alarm system and air handling equipment smoke detectors shall be provided under Division 26. Coordinate EMCS requirements with Fire Alarm System Contractor to monitor the Fire Alarm System only. One fire alarm panel contact shall be monitored by the EMCS operator workstation.
 2. Lighting Control System: The entire lighting control system shall be provided under Division 26. Coordinate all EMCS Point numbers and requirements with Electrical Contractor. All lighting control system points as shown on the drawings shall be monitored by the EMCS Workstation and shown on graphics as detailed in the EMCS Description Graphic Displays Section (Section 2.01.I). As default, assume all exterior lighting shall be controlled by EMCS.
 - a. The Lighting Control Application shall be part of the EMCS System and fully accessible from any Workstation. Point inputs and outputs from the lighting control system shall have real-time interoperability with EMCS software features including circuit status, scheduling and independent overrides.

- b. Include graphical software programming utilizing floor plans and color to communicate information related to lighting zone status and scheduling. The graphical program shall enable operators to manage their lighting system on a day-to-day basis. The user shall navigate within the system to check on the conditions, schedules, etc. by using a 'point and click' interface based upon floor plans and area graphics.
3. Boiler, Chiller and Variable Frequency Drive Control Systems: Whenever possible, use Modbus, BACnet or another communications interface. Verify with manufacturer. If the communications interface is unavailable, the Controls Contractor is expected to provide control relays and current sensors to enable/disable and record status and alarm conditions on the unit. Any analog (i.e., setpoint) terminal point interface shall be provided by the manufacturer.

3.4 TRAINING

- A. The EMCS Contractor shall provide the following training services:
 1. Provide two days of on-site orientation with a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the EMCS software layout and naming conventions, and a walk through of the facility to identify panel and device locations. Training may be split into smaller sessions on different days if the Owner prefers.
 2. Supply a list of available factory training classes and contact information.

3.5 COMMISSIONING

- A. Controls Contractor shall provide the Commissioning Agent with a completed Acceptance Verification document prior to beginning point-to-point activities. Final Acceptance Verification document shall be included in the Commissioning Field Notebook. The commissioning agent may be an independent agent, the customer, or the Design Engineer.
- B. Acceptance Verification Document is defined as a series of check sheets that include all EMCS points and functions. Each point entry shall be signed and dated verifying that each point and function has been fully calibrated and tested.
- C. The Controls Contractor shall provide qualified technician to support the commissioning requirements outlined in Sections 016500 and 230800. The Controls Contractor shall provide support to the commissioning agent during the performance testing and shall provide trends as needed for their review.
- D. Conduct functional performance tests to demonstrate that controls systems maintain setpoints and operate through the full range of operations. The commissioning agent will provide functional tests that the Controls Contractor shall review and provide comments on the tests for incorporation into the final test documents.
- E. Provide System Performance Trend Logs as specified by the Design Engineer or commissioning agent to verify that all systems are functioning satisfactorily.

- F. Provide all necessary specialist labor, materials and tools to demonstrate to the Engineer that the EMCS has been commissioned and is operating in compliance with the contract. Prepare a list of noted deficiencies signed by both the Engineer and the EMCS Contractor.
- G. Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.
- H. Final Commissioning:
 - 1. Upon successful completion of Owner-Witnessed Functional Tests, a Performance Period (15 consecutive calendar days) shall commence on the first day following the last performance test. This period shall be completed prior to final acceptance of the project. In the event of failure to meet standard of performance during any initiated performance period, it is not required that one 15-calendar day period expire in order for another performance period to begin.
 - 2. If equipment or system operates so as to demonstrate continuing compliance with specified requirements for a period of 15 consecutive calendar days from commencement date of performance period, it shall be deemed to have met standard of performance. In addition, equipment or systems shall operate in conformance with all Contract Specifications and with Contractor's bid and published Specifications in effect on date Contract is executed, provided such specifications are equal to or better than specifications submitted with Contractor's bid.
 - 3. Performance period shall be monitored through trend review of controls systems. The Controls Contractor shall be responsible for configuring the controls system to collect trends and shall provide trends to the commissioning agent for review. Typical trend data will be collected on approximately 8 points for each unit and as determined for other systems. Trend data for each unit shall be collected in a single file and all columns in each file shall have descriptive headers. Trend collection or points shall be provided in 15-minute increments.
 - 4. Provide a complete set of trend logs for all HVAC equipment for a 24-hour period on a normally occupied day. Trend points shall be in 15-minute increments and shall include setpoints.
- I. Commissioning of the Web interface shall not require modification or creation of HTML or ASP pages. All dynamic graphics and real-time data available at the EMCS graphical workstation shall be available to users via a web browser.

END OF SECTION 230900

SECTION 232100 - SLEEVES AND SEALS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL

- A. Includes sleeving and sealing of piping and ductwork.

1.2 RELATED SECTIONS

- A. General Conditions, Division 1
- B. Section 221116 – Domestic Water Pipe and Fittings
- C. Section 233113 – Steel Ductwork
- D. Section 15900 – Fiberglass Ductwork

1.3 REFERENCES

- A. ASTM E814: Fire Tests of Through-Penetration Fire Stops
- B. UL 1479: Through-Penetration Fire Stop Systems

1.4 SUBMITTAL REQUIREMENTS

- A. Submittal requirements for this Section:
 - 1. Seals

1.5 OPERATION AND MAINTENANCE REQUIREMENTS FOR THIS SECTION

Not Applicable

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Products shall comply with Section 200000, paragraph 2.01, Approved Manufacturers.
- B. Fire Seals: 3M, Dow Corning, General Electric, Rectorseal Metacaulk

2.2 PIPE SLEEVES

- A. Size: Inside diameter of pipe sleeves shall be at least 1/2-inch larger than the outside diameter of the pipe or pipe covering, so as to allow free movement of piping.
- B. Ends: Sleeve ends shall be cut flush with finished surfaces, except in rooms having floor drains where sleeves shall be extended 3/4-inch above finished floor.
- C. Material - Structural: Sleeves through structural elements shall be fabricated from Schedule 40 steel pipe.
- D. Material - Non-structural: Sleeves through non-structural elements shall be fabricated from 18-gauge galvanized sheet metal or 24-gauge spiral duct.
- E. De-burr pipe ends and smooth slab penetration (to accept final slab finish) from sleeves extending above finished floor.

2.3 DUCT SLEEVES

- A. Size: Inside dimension of sleeves shall be at least 1/2" larger than the outside dimensions of the duct or duct covering on all sides.
- B. Ends: Sleeve ends shall be cut flush with finished surface.
- C. Material - Non-structural: Sleeves shall be fabricated from 20-gauge galvanized steel, shall be continuous around the interior without holes or openings, and shall match the configuration of the item being sleeved.
- D. Material - Structural: Sleeves through structural elements shall be fabricated from Schedule 40 steel pipe (round openings) and welded steel supporting elements (sizes/arrangement as shown on drawings) for other openings.

2.4 SEALS

- A. Seals in Interior Fire Rated Assemblies: Shall be tested in accordance with ASTM E814 and shall be UL classified per UL 1479 as a through-penetration fire stop device.
- B. Seals in Exterior Masonry Walls and Floors:
 - 1. Piping: Seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seal assembly shall expand when mechanically tightened to provide an absolute watertight seal between the pipe and wall opening. Sizing shall be per manufacturer's recommendations. Seal shall be Thunderline "Link-Seal" or approved equal.
 - 2. Ducts: Silicone type sealant, designed for use with duct material involved as weatherproof sealant and as specified in Section 079200.

- C. Seals in Other Areas: Packed fiberglass or wool insulation, where no weatherproofing or adhesive properties are required; otherwise, sealants shall be silicone type, as specified in applicable Division 7 Specification Section.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPE SLEEVES

- A. Provide pipe sleeves for all piping passing through walls, floors, partitions, roofs, foundations, footings, grade beams, and similar elements, except that sleeves are not required for penetrations through existing single solid elements, having no voids, at the location where the piping passes through the solid elements (e.g., solid wood stud, core drilled solid concrete, etc.). Where a sleeve is required, such sleeve shall continue all the way through any solid items within that element.
- B. Set sleeves plumb or level (or sloped as required for drainage pipe) in proper position, tightly fitted into the work.
- C. Fill openings around outside of pipe sleeve with same material as surrounding construction, or with material of equivalent fire and smoke rating.
- D. Seal around all pipes inside of pipe sleeve.
- E. Insulation shall run continuous through sleeves in non-fire rated elements. Insulation shall not run continuous through sleeves in fire rated elements unless the fire sealant system used is UL accepted for use with insulated pipes.
- F. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade.

3.2 INSTALLATION OF DUCT SLEEVES

- A. Provide duct sleeves for all round ducts less than 15 inches in diameter where the duct passes through any floors, walls, ceilings, partitions, or roofs and similar elements.
- B. Provide duct sleeves for all square and rectangular ducts having their largest dimension 14 inches and less where the duct passes through any floors, walls, ceilings, partitions, roofs, and similar elements.
- C. Round ducts larger than 15 inches in diameter, and square or rectangular ducts larger than 14 inches in any dimension, shall have framed openings where the duct passes through any element. Such framed openings shall be of the same type as the structural materials used in the wall and shall comply with materials specified for this project. Sleeves shall be provided in addition to the framed opening where any void space(s) occurs through the penetration (as through CMU walls, double walls, etc.).
- D. Set sleeves plumb or level, in proper position and location, tightly fitted into the work.

- E. Fill openings around outside of duct sleeve with same material as surrounding construction, or with material of equivalent fire and smoke rating.
- F. Sleeves are not required for penetrations through existing single solid elements, having no voids, at the location where the duct passes through the element (e.g., precast concrete panels with pre-framed openings, core drilled/saw cut solid concrete, etc.). Where a sleeve is required, such sleeve shall continue all the way through any solid items within that element, however.
- G. Insulation shall run continuous through sleeves in non-fire rated elements. Insulation shall not run continuous through sleeves in fire rated elements unless the fire sealant system used is UL accepted for use with insulated pipes.
- H. Sleeves for fire dampers shall be as specified for fire dampers and be in compliance with the damper UL listing.

3.3 INSTALLATION OF SEALS

- A. Provide seals around all piping and ducts passing through walls, floors, roofs, foundations, footings, grade beams, partitions, and similar elements.
- B. Seals shall be of material and workmanship to maintain the fire and smoke rating of element being penetrated. Seals ability to maintain the rating of the element being penetrated shall be listed in UL Laboratories Building Materials Directory or otherwise confirmed by an approved listing agency. It shall be the Contractor's responsibility to submit shop drawings and technical data showing seals and systems proposed, and corresponding agency approval. The Contractor shall also be responsible to submit any data as required by local agencies to satisfy them that the Contractor's proposed fire seals are satisfactory.
- C. Seals shall be watertight where the penetration may be exposed to water or moisture.
- D. Duct penetrations through roof or exterior wall assemblies shall be provided with flashings for a weathertight assembly in accordance with SMACNA HVAC Duct Construction Standards. Such openings shall be sealed to be weatherproof.

END OF SECTION 232100

SECTION 233113 - STEEL DUCTWORK

PART 1 - GENERAL

1.1 GENERAL

- A. Includes, but not limited to, furnishing and installing above-ground ductwork and related items specified below and shown on Drawings.

1.2 RELATED SECTIONS

- A. General Conditions and Division 01 apply to this Section.
- B. Section 200000 - General Mechanical Conditions
- C. Section 230529 - Hangers and Supports for HVAC Piping & Equipment
- D. Section 230713 - Equipment/Ductwork Insulation
- E. Section 233300 - HVAC Specialties

1.3 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Duct liner
- B. Acoustic duct
- C. Access doors
- D. Volume dampers
- E. Motorized dampers
- F. Duct Silencers
- G. Duct Sealers
- H. Duct Closure Collars
- I. Turning vanes

1.4 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

- A. Motorized dampers
- B. Grease duct test report

1.5 DEFINITIONS

- A. Duct Sizes: All duct dimensions shown are inside clear dimensions. Where inside duct lining is specified or indicated, duct dimensions are to the inside face of lining.
- B. Low Pressure System: Velocities less than 1,500 fpm and static pressure in duct 2 inches w.g. or less.
- C. Medium Pressure System: Velocities less than 2,500 fpm or static pressure in duct up through 6 inches w.g.
- D. High Pressure System: Velocities greater than 2,500 fpm or static pressure in duct over 6 inches w.g.
- E. Primary Duct System: See Section 230713 - Equipment/Ductwork Insulation.
- F. Gauges: Steel sheet and wire are U.S. Standard Gauge; aluminum sheet is Brown and Sharpe Gauge.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

Not Applicable

2.2 DUCTS

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal, except as indicated. Fabricate of zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A 527-85, "Specification for Sheet Steel Zinc Coated (Galvanized) by the Hot-Dip Process, Lock Forming Quality", with G 60 coating.
- B. Construct T's, bends, and elbows with radius of 1-1/2 times width of duct on centerline. Where not possible, provide turning vanes.
- C. Increase duct sizes gradually, not exceeding 30° divergence and 45° convergence.
- D. Use crimp joints with or without bead for joining round duct sizes 8 inches (200 mm) and smaller with crimp in direction of airflow.
- E. Kitchen Hood Exhaust Ductwork: Fabricate in accordance with NFPA 96.
- F. Fume hood exhaust ductwork shall conform to the IMC, Chapter 5.

2.3 DUCT JOINTS

- A. General: Duct with sides or diameter up to and including 36 inches shall be as scheduled below.

Max. Side Inches	Required Minimum Metal Gauges Steel, U.S. Standard Gauge	Type of Transverse Joint Connections	Bracing Required
Under 13"	26	S-drive, pocket or bar slips on 7 - 10" centers	None
13" to 24"	24	S-drive, pocket or bar slips on 7-10" centers	None
25" to 30"	24	S-drive, 1" pocket or 1" bar slips on 7'-10" centers	1"x1"x1/8" angles 4' from joints
31" to 36"	22	Drive 1"pocket or 1"bar slips on 7'-10" centers	1"x1"x1/8" angles 4' from joints

- B. Ducts with sides over 36 inches to 48 inches, transverse duct joint system by Ductmate/25, Nexus, or WDCI (Lite) (SMACNA "E" or "G" Type connection).
- C. Ducts 48 inches and larger, Ductmates/35, Nexus, or WDCI (Heavy) (SMACNA "J" Type connection).
- D. Proprietary duct connections may be used on other sizes, Ductmate, WDCI, or equal.

2.4 ROUND DUCT

- A. Fabricate of zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A 527-85, "Specification for Sheet Steel Zinc Coated (Galvanized) by the Hot-Dip Process, Lock Forming Quality", with G 60 coating.
- B. Gauge Selection Table:

Duct Diameter in Inches	Maximum 2" w.g. Static Positive		Maximum 2" w.g. Static Negative	
	Spiral Seam Gauge	Longitudinal Seam Gauge	Spiral Seam Gauge	Longitudinal Seam Gauge
3 thru 8	28	28	28	24
9 thru 14	28	26	26	24
15 thru 26	26	24	24	22
27 thru 36	24	22	22	20
37 thru 50	22	20	20	18
51 thru 60	20	18	18	16
61 thru 84	18	16	16	14

- C. Provide insulation where required by the Insulation Schedule in Section 230713 - Equipment/Ductwork Insulation.

2.5 SPIRAL DUCT

- A. The outer pressure sheet shall be manufactured from galvanized steel meeting ASTM A-527-67 in the following minimum gauges:

Nominal Size Range	Solid Spiral Wound Duct Outer Pressure Shell	Solid Welded Fitting Outer Pressure Shell
3"-12"	26 Ga.	20 Ga.
13"-24"	24 Ga.	20 Ga.
25"-34"	22 Ga.	20 Ga.
35"-48"	20 Ga.	18 Ga.
50"-58"	18 Ga.	16 Ga.

2.6 QUICK FIT DUCTING

- A. Ductwork shall be of a clamp-together design using a die-formed, rolled edge, which is then joined together by a single lever clamp of similar material. All clamp together ducting shall be of continuous laser welded construction along the longitudinal seam of the rolled form duct. All connections shall have (PVC seal in clamp, for standard installation) (Gortex seal for mist or food grade applications).

1. Duct material sheet blanks are five feet long, which is then rolled and fused together with a laser weld process along the longitudinal seam.
2. The ends of the duct are then pressed in a die to form a rolled bead on each end of the duct. This rolled end is used for clamping components together as well as reinforcement every 5 feet.
3. An 11" long 'slip-joint' of the same construction is used when a run less than 5' is required. To create the desired span, the rolled bead is cut off at one end of a 5' section of pipe, 6" shorter than the required overall span. The cut pipe shall slip inside the 'slip-joint' which shall have a slightly larger ID, and a rubber O-ring is used to make up the bead on the cut pipe for clamping the assembly together.

- B. Component Material:

1. Straight duct and other connecting components to be constructed of galvanized sheets produced by the continuous galvanizing process, which conforms to ASTM-A-527, and commercial quality ASTM A-527. (Ducting constructed of stainless steel to be 304 2B finish (2B finish is annealed, pickled and bright code rolled). (Galvanized ducting from diameters 3" – 6" shall be 24 Ga., 7" – 12" 22 Ga., and 14" – 22" 20 Ga.)

- C. Approved Manufacturers:

1. Nordfab Co.

2.7 DUCT LINER

- A. Densities and R-value:

1. R-3.3: 1.0 inch of 1.5 to 3.0 lb/cu. Ft. duct liner

2. R-5.3: 1.5 inches of 1.5 to 3.0 lb/cu. Ft. duct liner
3. R-7: 2.0 inches of 1.5 to 3.0 lb/cu. Ft. duct liner

B. Duct Liner:

1. 'K' ('ksi') Value: ASTM C518, 0.25 at 75°F (0.036 at 24°C)
2. Noise Reduction Coefficient: 0.65 or higher based on "Type A mounting"
3. Maximum Velocity on Mat or Coated Air Side: 5,000 ft/min (25.4 m/sec)
4. Adhesive: UL listed waterproof type
5. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened
6. Approved Manufacturers:
 - a. Manville Permacote Linacoustic (HP)

C. Spiral Duct Liner:

1. For ductwork requiring 1-inch (25 mm) Spiracoustic Plus System Lining:
 - a. The installed 1-inch lining shall have a Thermal Resistance (R-Value) of 4.3 (.76) at 75°F (24°C) mean temperature, and Noise Reduction Coefficients (NRC) per ASTM C 423, Type "A" mounting.
 - b. Metal duct with inside diameters from 8 inches to 18 inches (203 to 457 mm) shall be lined with 1-inch Preformed Round Liner.
 - 1) Approved Manufacturers:
 - a) Permacote Spiracoustic Liner
 - c. Metal duct with inside diameters from 18 inches to 32 inches (457 to 813 mm) shall be lined with 1-inch Round Liner Board.
 - 1) Approved Manufacturers
 - a) Spiracoustic Plus "SD" Liner
 - d. Metal duct with inside diameters greater than or equal to 34 inches (364 mm) shall be lined with 1-inch Round Liner Board.
 - 1) Approved Manufacturers
 - a) Spiracoustic Plus "LD" Liner
2. For ductwork requiring 1 1/2-inch (38 mm) Lining:
 - a. The installed 1 1/2-inch lining shall have a Thermal Resistance (R-Value) of 6.3 (1.11) at 75°F (24°C) mean temperature, and a Noise Reduction Coefficient (NRC) of 0.95 per ASTM C 423, Type "A" mounting.
 - b. Metal duct with inside diameters from 9 inches to 18 inches (229 to 457 mm) shall be lined with 1 1/2-inch Preformed Round Liner.
 - 1) Approved Manufacturers:
 - a) Permacote Spiracoustic Liner

- c. Metal duct with inside diameters from 22 inches to 38 inches (559 to 965 mm), shall be lined with 1 1/2-inch Round Liner Board.
 - 1) Approved Manufacturers:
 - a) Spiracoustic Plus "SD" Liner
- d. Metal duct with inside diameters greater than or equal to 40 inches (1.02 m), shall be lined with 1 1/2-inch Spiracoustic Plus LD Round Liner Board.

D. Fiber Free Duct Liner (Rectangular/Spiral):

- 1. Liner shall be fiber-free, closed cell type.
- 2. Provide with, factory applied pressure sensitive adhesive.
- 3. Shall meet the requirements of NFPA 90A and 90B for Duct Coverings and Linings, and UL 181 for Mold Growth.
- 4. Liner shall be rated to withstand temperature up to 250°F.
- 5. Liner shall meet the requirements of the International Energy Conservation Code (IECC) and ASHRAE for R-Value 4.2 at 1" thickness.
- 6. Approved Manufacturers:
 - a. Armacell
 - b. K-Flex Duct Products

2.8 ACOUSTIC DUCT

- A. Provide internally insulated, sound control duct and fittings to be acousti-k27 (perforated liner) Type K (solid liner).
 - 1. Outer pressure shell per spiral duct above.
 - 2. The spiral wound inner liner duct (perforated or solid) is made from 28-gauge galvanized steel and is ribbed for diameters from 9 through 58 inches.
 - 3. The inner liner of the fitting is made from 26-gauge galvanized steel for fittings 3 through 28 inches in diameter, 24 gauge for fittings 29 through 40 inches in diameter, and 22 gauge for fittings 42 through 58 inches in diameter.
 - 4. The construction is to give specific acoustic impedance to conform to the noise reduction characteristics published by United Sheet Metal. The construction is to provide a thermal conductivity "K" factor of .27 BTU/hr./Sq.ft./in. deg. F. at 75 deg. mean temperature. The products shall conform to published performance test data for energy loss of duct and fittings. The construction shall have mechanical means to maintain positive concentricity of liner with shell and mechanical means to retain insulation against dislocation by assembly processes. Adhesives of any type are not permitted in construction unless the Flame Spread, Smoke Developed and Sound Attenuation tests were performed with the adhesives as used.
 - 5. Where indicated on drawings or Part 3 of the specifications, provide duct and fittings with construction to provide 100% mechanical separation and air stream. Construction to provide protection against any possibility of fiber entrainment.
 - a. Joints 0"-20" diameter, interior slip coupling beaded at center, fastened to duct with sealing compound applied continuously around joint before assembling and after fastening. Wrap joints with 3-inch-wide duct tape.

- b. Joints 21"-72" diameter, use 3 piece, gasketed, flanged joints consisting of 2 internal flanges (with integral mastic sealant) split to accommodate minor differences in duct diameter, and one external closure bank designed to compress gasketing between internal flanges. Example: Ductmate Spiralmate or equal.
- 6. Approved Manufacturer:
 - a. McGill AirFlow

2.9 ACCESS DOORS IN DUCTS

- A. At each backdraft damper and at each motorized damper, install a factory built 1" insulated access door with hinges and sash locks. Locate doors within 6 inches of installed dampers. Construction shall be galvanized sheet metal, 22 ga. minimum frame and 24 ga. minimum door. Minimum door shall be 12x12. If the duct is too small for 12" door, then maximum door size shall be installed in duct.
- B. Access doors for fire damper shall have a minimum clear opening of 12"x12" or as specified on Drawings to easily service fire damper. Doors shall be within 6 inches of fire dampers.
- C. Approved Manufacturers:
 - 1. Nailor - Hart Industries Inc.
 - 2. Cesco - Advanced Air
 - 3. AirBalance Fire/Seal
 - 4. Louvers & Dampers
 - 5. Kees Inc.
 - 6. Ductmate Industries Inc "Sandwich" Access Door
 - 7. National Controlled Air Inc.
 - 8. Greenheck
 - 9. Elmdor

2.10 FLEXIBLE EQUIPMENT CONNECTIONS

- A. Provide flexible equipment connections between ductwork and equipment. See Section 233300 - HVAC Specialties.

2.11 VOLUME DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Fabricate splitter dampers of same material and gage as duct to 24 inches (600 mm) size in either direction, and two gages heavier for larger sizes, secured with continuous hinge or rod, operated with minimum 1/4-inch (6 mm) diameter rod.
- C. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inch (240 x 760 mm).

- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch (300 x 825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. Except in round ductwork 12 inches (300 mm) in diameter and smaller, provide end bearings.
- F. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where width exceeds 30 inches (750 mm), provide regulator at both ends.

2.12 MOTORIZED DAMPERS

A. General:

- 1. Coordinate actuator type with Controls Contractor.
- 2. Damper actuators and actuator linkages shall be mounted in the airstream for all rooftop fans/roof hoods and mounted external of the airflow at all other locations, unless specifically indicated otherwise on plans.
- 3. Multi section damper assemblies shall be provided with a factory installed common jackshaft.
- 4. Provide with double flange duct connection.
- 5. Shall be Class IA leakage rated.
- 6. Provide parallel blade airfoil type for open/closed control and opposed blade airfoil type for modulating/throttling control.

B. Damper Blades:

- 1. Extruded aluminum or galvanized steel air foils with replaceable rubber blade seals, 6-inches wide maximum.
- 2. 304 stainless steel when installed in dishwasher hood ductwork.
- 3. Jamb seals shall be flexible metal compression type.

C. Performance:

- 1. Maximum leakage rate shall be 3 cfm/sq. ft. of damper area per 1.0-inch w.g. in accordance with AMCA Standard 500D.
- 2. Maximum pressure drop for a 12"x12" damper shall be 0.08" w.g. at 1,000 fpm face velocity.

D. Approved Manufacturers:

- 1. Ruskin (CD50/CD60)
- 2. Greenheck (VCD-33/VCD-43)

2.13 DUCT HANGERS

- A. See Section 230529 - Hangers and Supports for HVAC Piping & Equipment.

2.14 DUCT SEALANT AND ADHESIVES

- A. Duct Sealant technical makeup shall be water based, solvent-free and of the synthetic latex family. Sealants shall be UL 181 Listed, meet all SMACNA pressure and seal classes and be rated to ± 15 inches water gauge. Sealants shall have flame spread of 0 and smoke development of 0 when tested in accordance to ASTM E-84. They shall be formulated to withstand working temperatures of -25°F to $+200^{\circ}\text{F}$. All sealants shall exceed 500 hours under ASTM C-732 (Artificial Weathering) and pass ASTM C-734 (Low Temperature Flexibility after Artificial Weathering). All sealants shall be of an elastomeric nature, have a minimum weight of 12 pounds and a minimum solids content by weight of $66\% \pm 2\%$. Sealants shall be resistant to cracking, peeling, mold and mildew. Sealants shall also have excellent water and UV resistance. Sealants shall meet FDA, USDA and EPA standards as well as meet NFPA 90A and 90B requirements. Sealant shall be Design Polymerics DP 1010 or DP 1020 duct sealant or equal.
- B. Solvent based duct sealant VOC shall be less than or equal to 50 g/l and be UL 723 Classified with a flame spread of 0 and a smoke development of 0. Sealant shall have passed 1000 hours of QUV accelerated outdoor aging testing. Sealant shall be Design Polymerics DP 1090 duct sealant or equal.
 - 1. All traverse joints, longitudinal seams and penetrations in duct systems shall be sealed with duct sealant of the type specified. Spiral lockseams are not longitudinal seams and do not require duct sealant. All sealants shall be applied per the manufacturers' recommendations. Joints that are not fully welded shall be sealed. For spiral and flat oval duct slip connections; coat both the female and male ends. The slip connections should then be brushed over with an additional coat 2 to 3 inches wide 20 to 40 mils. thick.
 - 2. All conditioned air supply ducts, return ducts and fresh air intakes shall have all joints and seams sealed or welded, except spiral seams round and flat oval ducts, which are exempt.
 - 3. Seal sealants and joint sealants shall not be used as a substitute for good workmanship. No ductwork will be covered or installed until inspected and pressure tested if necessary.
- C. Gaskets for TDC, TDF and applied flange connections shall meet all SMACNA pressure and seal classes. The gasket shall meet UL 723, ASTM E-84, NFPA 90A and 90B requirements as well as FDA, USDA and EPA standards. The tape shall be 5/8 inches by 3/16 inches and applied according to the manufacturers' directions. Expanded or extruded foam gaskets are not acceptable. Gasket shall be Design Polymerics DP 1040 Butyl Gasket Tape or equal.
- D. Exterior Ductwork: Sealant shall be Design Polymerics DP 1090, or equal.

2.15 DUCT CLOSURE COLLARS

- A. General: Closure collars shall provide closure of opening between duct and opening in element penetrated and shall abut tight up to and overlap duct and shall consist of rolled angle material (for round ducts) and welded framed angles (for rectangular/round ducts).
- B. Size: Closure collars shall be sized to match duct/opening applied to and shall have minimum 2-inch overlap on duct side and 2-inch overlap at opening/ penetrated element side but shall completely cover opening in element penetrated with minimum 1-inch overlap to undisturbed element (i.e., wall, floor, etc.).

- C. Material: Closure collars shall be fabricated of 20-gauge galvanized steel for ducts 15 inches in diameter and less and shall be fabricated of 18-gauge galvanized steel duct for all larger ducts and all square and rectangular ducts.

2.16 TURNING VANES

- A. Turning vanes may be either Contractor or factory fabricated. Factory fabricated vanes shall be Barber Colman "Airturns" or approved.
- B. Vanes and runners shall be fabricated of minimum 24 gauge galvanized.
- C. Turning vanes shall comply with SMACNA HVAC Duct Construction Standards. For duct widths less than 19 inches, vanes may be single wall construction; for widths greater than 19 inches, vanes shall be double wall "airfoil" type.
- D. Turning vanes shall be equally spaced, parallel to each other, and securely attached to runners.
- E. For elbows where the inlet and outlet dimensions are not the same, modify vane shape or angle to provide optimum turning.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ducts:
 - 1. Straight and smooth on inside with joints neatly finished unless otherwise directed.
 - 2. Duct panels through 48-inch dimension having acoustic duct liner need not be crossbroken or beaded.
 - 3. Crossbreak unlined ducts and duct panels larger than 48 inch or bead 12 inches on center.
 - 4. Securely anchor ducts to building structure with screws.
 - 5. Brace and install ducts so they shall be free of vibration under all conditions of operation.
 - 6. Round, horizontal ducts shall be hung with bands, which extend the entire perimeter of the duct.
 - 7. Ducts shall be braced and guyed to prevent lateral or horizontal swing.
 - 8. Ducts shall not bear on top of structural members.
 - 9. Make duct take-offs to branches, registers, grilles, and diffusers as detailed on Drawings.
 - 10. Ducts shall be large enough to accommodate inside duct liner. Dimension shown on Drawings are net clear inside dimensions after duct liner has been installed.
 - 11. Properly flash where ducts protrude above roof.
 - 12. Install internal ends of slip joints in direction of flow. Make joints airtight using specified duct sealer.
 - 13. Cover horizontal and longitudinal joints on exterior ducts two layers of Hardcast tape installed with Hardcast HC-20 adhesive according to Manufacturer's recommendations.
 - 14. Ducts installed on mechanical space floor or walkway where ducts may be subject to abuse shall have Ductmate/35 or (heavy) SMACNA "J" type connection on all joints.
 - 15. Contractor shall obtain a signed statement from kitchen Contractor verifying ceiling height and hood configuration prior to hood ductwork fabrication.

16. Provide acoustic duct for the first 15 feet downstream of all air handling unit supply and return ducts.
17. All exposed ducts shall be spiral.
18. Quick fit duct shall be used where called out on the plans or as called out in specialty exhaust specifications (i.e., 23313 Sawdust Collection System).
19. Provide duct transitions to equipment openings.

B. Duct Liner:

1. Adhere insulation to sheet metal with full coverage of a UL listed adhesive.
2. Secure insulation with mechanical liner fasteners as indicated by SMACNA or manufacturer. Pin length should be as recommended by the liner manufacturer.
3. All exposed edges of the fibrous type of liner must be factory or field coated. For systems operating at 4000 fpm or higher, a metal nosing must be installed in all liner leading edges.
4. Repair fibrous type liner surface penetrations with UL listed adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.
6. Provide duct liner for all return air ducts unless specifically excluded in Section 230713.
7. Provide acoustic duct liner for duct indicated on plan and Section 230713.
8. Provide liner for all supply duct unless specifically excluded from Section 230713.
9. Provide duct liner for the first 10' in and out of all exhaust fans (excluding dishwasher, kitchen fume, and particulate fans).

C. Turning Vanes:

1. Install turning vanes in all square duct turns, and at locations shown on drawings.
2. Securely attach turning vane runners to ductwork.

D. Flexible Connections: See Section 233300 - HVAC Specialties.

E. Balancing Dampers:

1. Provide each take-off with an adjustable volume damper to balance that branch.
2. Anchor dampers securely to duct.
3. Install dampers in main ducts within insulation.
4. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.

F. Motorized Dampers:

1. Motorized dampers shall be installed in all outside air intakes, exhaust outlets, and relief outlets per WSEC and as shown in drawings.

G. Grilles, Registers, and Diffusers: Install and anchor securely.

H. Adjustable Lock Splitter Dampers:

1. Dampers in equipment rooms shall be complete with locking quadrant.
2. Other dampers shall have concealed ceiling damper regulator with plate.

I. Painting of Ductwork: Paint ductwork visible through registers, grilles, and diffusers flat black.

J. Ductwork Leakage Criteria:

1. All transverse joints and longitudinal seams shall conform to SMACNA's Class A sealing requirements as defined on page 1-6 of the 1985 SMACNA Manual, First Edition.
2. Constant Volume Systems/Supply Ductwork:
 - a. Allowable Leakage – per SMACNA
3. Constant Volume Systems/Return Ductwork:
 - a. Return Ductwork – per SMACNA
4. Variable Air Volume Systems/Supply Ductwork:
 - a. Fan to VAV Boxes -- 1% of design cfm
 - b. VAV Boxes to Registers -- 2% of design cfm
5. Variable Air Volume Systems/Return Ductwork:
 - a. Return Ductwork -- 2% of design cfm

K. Ductwork Leakage Testing:

1. Duct leakage testing is required for all duct systems constructed to a pressure class of 3” water column or greater per the 2015 Washington State Energy Code, Section C403.2.8.3.3.
2. Installed ductwork shall be tested prior to installation of access doors, take-offs, insulation, etc.
3. All leak testing shall be witnessed by the Engineer or representative of the Engineer. The Contractor shall give the Engineer 72 hours’ notice prior to testing. Any testing not witnessed by the Engineer or his/her representative, shall be considered invalid and will be redone.
4. Ductwork shall be tested in accordance with the requirements outlined in the SMACNA HVAC Air Duct Leakage Test Manual and shown to have a (CL) less than or equal to 4.0.
5. Duct leakage, in excess of SMACNA HVAC Air Duct Leakage Manual, shall be repaired and have the test re-performed until the leakage rate is within acceptable levels.
6. Submit leakage test report identifying on a plan all the ducts tested and tested leakage rate.

L. Duct Cleanliness Criteria: Unless otherwise specified, the delivery, storage, and installation of all un-lined ductwork shall comply with the intermediate duct cleanliness level of SMACNA Duct Cleanliness for New Construction Guidelines. All lined and acoustic ducts shall comply with the advanced level.

END OF SECTION 233113

SECTION 233300 - HVAC SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes, but not limited to, furnishing and installing specified material as described in Contract Documents.
- B. Filters used in air handling units and heat pumps.
- C. Flexible ductwork from supply air branch duct runouts to diffusers where indicated on drawings.
- D. Furnishing and installing fire dampers, ceiling radiation, and fire/smoke dampers at penetrations of fire rated walls, floors, and ceiling membranes, at ducts, registers, grilles, or louvers as indicated on drawings. Installation shall be complete with sleeves, angles, and all other accessories as required by UL installation instructions, local codes, and reviewing authorities.
- E. Section Includes:
 - 1. Hood exhaust specialties
 - 2. Backdraft dampers
 - 3. Filters and filter housing
 - 4. Flexible duct
 - 5. Flexible equipment connections
 - 6. Fire and fire/smoke dampers
 - 7. Field applied grease duct enclosure

1.2 RELATED SECTIONS

- A. General Conditions
- B. Division 01
- C. Section 200000 - General Mechanical Requirements
- D. Section 233113 - Steel Ductwork
- E. Section 15900 - Fiberglass Ductwork (Optional)

1.3 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Backdraft dampers
- B. Filters
- C. Filter housing

- D. Air filter gauge
- E. Flexible ductwork
- F. Flexible equipment connections
- G. Duct smoke detectors

1.4 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

- A. Backdraft dampers
- B. Filters (Summarized list including equipment tag and size and quantity of filter per unit.)
 - 1. Provide dates or projected dates of extra filter replacement.
- C. Air Filter gauge pressure drop
- D. Fire and/or smoke dampers
- E. Airflow station maintenance and calibration
- F. Duct smoke detectors
- G. Hoods

1.5 QUALITY ASSURANCES

- A. Requirements of Regulatory Agencies:
 - 1. Bear the AMCA seal and UL label, NSF approved.
 - 2. Fire and fire/smoke dampers are to conform to UL Standards 555, 5558, and 555C and NFPA requirements as required and bear the correct UL label for the damper's application.
 - 3. Fire and fire/smoke dampers shall be approved by State Fire Authorities where so required.
 - 4. Fabric duct shall be UL listed in accordance with the 25/50 flame spread/smoke developed requirements of NFPA-90-A.

1.6 SPARE PARTS

- A. Deliver with O&M Manuals six fusible links of each type used on the project where replaceable link-type dampers are furnished.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

Not Applicable

2.2 BACKDRAFT DAMPERS (COUNTER BALANCED)

- A. General: 0.125 inches extruded aluminum frame, 0.07 inches aluminum blades with extruded vinyl edges, synthetic bearings, counterbalance, adjustable zinc plated bar on blades.
- B. Backdraft dampers are to be factory set to open at 0.01" w.c. of building pressure and shall have a maximum static pressure drop of 0.05" w.c. at 700 fpm per AMCA Standard 500. Backdraft dampers shall have a leakage rate at no more than 20 CFM/sq. ft. at 1" w.c. of static pressure with a dimension of 24" or greater and 40 CFM/sq. ft. at 1" w.c. of static pressure with dimension smaller than 24" per AMCA Standard 500D.
- C. Approved Manufacturer:
 - 1. Ruskin
 - 2. Greenheck

2.3 FILTERS

- A. 2" MERV 8:
 - 1. General: 30% efficient filters as specified herein shall be medium efficiency, pleated panel type, disposable filters; Farr 30/30 or approved and shall have an average efficiency of 25-30% atmospheric and 90-92% arrestance by ASHRAE Standard 52-76 unless instructed otherwise.
 - 2. Filter Housings: Shall be sized to fit furnished unit or duct to be installed in and provide minimum filter sizes to obtain a maximum filter velocity of 300 fpm.
 - 3. Resistance: Initial resistance of a 24"x24"x2" filter handling 2000 CFM shall not exceed 0.31" w.g.
 - 4. Duct Holding Capacity: Shall be no less than 60 grams per square foot of face area at 1.0" w.g.
 - 5. Size: Filters shall be 2" deep (unless indicated otherwise), with number and sizes indicated, or as required to give minimum nominal face area as scheduled on drawings.
 - 6. Provide a filter pull strap for all multiple filter sets longer than 24 inches.
 - 7. Approved Manufacturers:
 - a. Farr Co.
 - b. Airguard
 - c. Purolator
 - d. Eco-Air
- B. 2" or 4" MERV 13 Low Static:
 - 1. General: 80% efficient filters as specified herein shall be high efficiency, pleated panel type, disposable filters; Filtration Group MERV 13 Green Pleat or approved and shall have a Minimum Efficiency Reporting Value of MERV 13 when evaluated under the guidelines of ASHRAE Standard 52.2 2007.
 - 2. Filter Housings: Shall be sized to fit furnished unit or duct to be installed in and provide minimum filter sizes to obtain a maximum filter velocity of 300 fpm.
 - 3. Resistance: Initial resistance of a 24"x24"x2" filter handling 500 fpm shall not exceed 0.38" w.g. and 24"x24"x4" shall not exceed 0.23" w.g.

4. Duct Holding Capacity: Shall be no less than 60 grams per square foot of face area at 1.0" w.g.
5. Size: Filters shall be 2" deep (unless indicated otherwise), with number and sizes indicated, or as required to give minimum nominal face area as scheduled on drawings.
6. Provide a filter pull strap for all multiple filter sets longer than 24 inches.
7. Approved Manufacturers:
 - a. Filtration Group

C. 2" or 4" MERV 13:

1. General: 80% efficient filters as specified herein shall be high efficiency, pleated panel type, disposable filters and shall have a Minimum Efficiency Reporting Value of MERV 13 when evaluated under the guidelines of current ASHRAE Standard 52.2.
2. Filter Housings: Shall be sized to fit furnished unit or duct to be installed in and provide minimum filter sizes to obtain a maximum filter velocity of 300 fpm.
3. Resistance: Initial resistance of a 24"x24"x2" filter handling 500 CFM shall not exceed 0.41" w.g. and 24"x24"x4" shall not exceed 0.35" w.g.
4. Duct Holding Capacity: Shall be no less than 60 grams per square foot of face area at 1.0" w.g.
5. Size: Filters shall be 2" deep (unless indicated otherwise), with number and sizes indicated, or as required to give minimum nominal face area as scheduled on drawings.
6. Provide a filter pull strap for all multiple filter sets longer than 24 inches.
7. Approved Manufacturers:
 - a. Farr
 - b. Airguard
 - c. Purolator
 - d. Eco-Air

2.4 FILTER HOUSINGS - FAN COIL UNITS

- A. Shall be fabricated and furnished as part of the fan coil units.

2.5 FILTER HOUSINGS - DUCT MOUNTED

- A. Filter housings shall be factory or Contractor fabricated of not less than 20-gauge galvanized steel.
- B. Housing shall have access doors on two sides, constructed of minimum 20-gauge galvanized steel and shall be hinged type with minimum of two heavy-duty latches (Ventlock or equal) and have neoprene sponge gasketing.
- C. Holding frames shall be constructed of a minimum of 20-gauge galvanized steel, with U-type bearing channels, polyurethane gasketing on surfaces adjacent to filters.

2.6 TEMPORARY AIR INLET FILTERS

- A. Type: Glass fiber or synthetic material blanket type filter media. Inlets and outlets shall be MERV 8 and unit shall be same as final.
- B. Capacity: Shall have an average arrestance no less than 64%; dust holding capacity of 172 grams.
- C. Size: Minimum 1" thick cut to size as required to cover inlets.

2.7 AIR FILTER GAUGE

- A. An air filter gauge for measuring the resistance to air flow through the filters. The gauge shall be diaphragm actuated, shall have 3-7/8" diameter white dial with black figures and graduations, shall have pointer zero adjustment and shall be furnished complete with two static pressure tips, fittings for 1/4" metal tubing and means for mounting the gauge.
- B. Gauge shall be Dwyer No. 2001-ASF reading to 3 times nominal operating pressure.

2.8 FLEXIBLE DUCTWORK

- A. Formable, flexible, circular duct shall have a fiberglass scrim (or equivalent) and retain its cross-section, shape, rigidity, and shall not restrict air flow after bending.
- B. Normal 1-1/2 inches thick, 3/4 lb./cu ft density fiberglass insulation with airtight, see-through polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.
- C. Assembly including insulation and vapor barrier, shall meet Class 1 requirements of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
- D. Approved Manufacturers:
 - 1. Wiremold
 - 2. Flexible Air Movers Inc.
 - 3. J.P. Lamborn
 - 4. General Flex Corp.
 - 5. Young & Co. Mfg. 165
 - 6. Thermaflex 'GKM'
 - 7. Cleavaflex
 - 8. Hart & Cooley

2.9 FLEXIBLE EQUIPMENT CONNECTIONS (INDOOR)

- A. General: 30 oz. closely woven UL approved glass fabric, double coated with neoprene. Fire retardant, waterproof, airtight, resistant to acids and grease, and withstand constant temperatures of 200°F.

B. Approved Manufacturers:

1. Ventglas by Ventfabrics
2. DuroDyne MFN

2.10 FLEXIBLE EQUIPMENT CONNECTIONS (OUTDOOR)

- A. General: 26 oz. closely woven UL approved glass fabric, double coated with Hypalon. Fire retardant, waterproof, airtight, resistant to acids and grease, resistant to ozone and weathering, and withstand constant temperatures of 250°F.

B. Approved Manufacturers:

1. Ventglas by Ventfabrics
2. DuroDyne MFN

2.11 DUCT SMOKE DETECTORS

- A. General: Smoke detectors shall be installed in supply duct within 4'-0" of each air handler of 2000 cfm and above.
- B. Responsibility: This Contractor shall be responsible for control circuits from smoke detectors to fan starter and to remote test station.
- C. Equipment: Detectors shall be "Notifier" DH400 series with sampling tube. Remote test station shall be "Notifier" RTS 451.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas for compliance with requirements for installation tolerances and for structural rigidity, strength, anchors, and other conditions affecting performance of heat exchangers.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Backdraft Dampers: Provide access doors to backdraft dampers.

B. Filters and Filter Housing:

1. Contractor to install temporary filters to provide temporary sealing of all duct systems during the construction period to prevent the entry of dirt, dust and debris into the duct systems. These systems that are operated during the construction period shall have temporary filters installed over all inlets and filters installed in the air handling equipment. Filters installed in the equipment shall be the same type as final filters required for the units. Temporary air inlet type filters shall be taped over all inlets to completely filter all air drawn into the systems.
2. Contractor to provide and install four (4) complete sets of all filters as scheduled below:
 - a. At equipment start-up
 - b. Prior to balancing system
 - c. Three (3) months after building occupancy
 - d. During the one-year warranty to be scheduled with Owner
3. Construct and install filter housings to prevent passage of unfiltered air. Provide sheet metal blanks, felt, rubber, and/or neoprene seals as necessary.
4. Provide air filter gauge on units over 2000 cfm. Connect sensing tips to gauge with copper or aluminum tubing. Locate gauge in easily read position, provide brightly colored tape marker to indicate clean filters pressure drop and change-out pressure drop (use clean pressure drop plus 0.15" unless instructed otherwise).
5. Furnish Owner with schedule of filter sizes for each air handler, heat pump, furnace, and fan coil unit.

C. Flexible Equipment Connections:

1. Provide insulated flexible equipment connections between ducts and vibrating equipment. Fans which are internally isolated with spring isolators do not require flexible connections, unless indicated on the plans.
2. Install flexible connections with sufficient slack to permit 2 inches of horizontal or vertical movement of ducts or equipment at connection point without stretching the flexible material.
3. Where installed exposed to weather, provide a galvanized "hat" channel protecting top and vertical stretches of flexible connector from sunlight and weather.

D. Flexible Ductwork:

1. Install duct in fully extended condition free of sags and kinks, using ten-foot maximum lengths.
2. Make duct connections by coating exterior of duct collar for 3 inches with duct sealer and securing duct in place over sheet metal collar with 1/2-inch-wide metal cinch bands and sheet metal screws. Tape exterior of flex to duct ahead of damper.

E. Install duct smoke detectors in air handling units over 2000 CFM.

F. Field Quality Control:

1. Test, adjust and balance air handling equipment, main supply air ductwork and branch supply air ductwork. Replace any damaged or malfunctioning HVAC system components upstream of inlet to fabric air dispersion system.

G. Cleaning:

1. After completing system installation, including outlet fitting and devices, inspect exposed finish. Apply edge guard to edge of sheet metal ductwork prior to installation of fabric air dispersion system.
2. Clean air handling unit and ductwork prior to the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
3. If DuctSox systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry. Refer to manufacturer's published literature for proper laundering methods.

END OF SECTION 233300

SECTION 233423 - EXHAUST FANS

PART 1 - GENERAL

1.1 GENERAL

- A. Includes, but not limited to, furnishing and installing specified material as described in Contract Documents.

1.2 RELATED SECTIONS

- A. General Conditions and Division 1 apply to this Section.
- B. Section 200000 - General Mechanical Conditions
- C. Section 233113 – Steel Ductwork

1.3 QUALITY ASSURANCES (REQUIREMENTS OF REGULATORY AGENCIES)

- A. Bear AMCA seal, UL 507 (for continuous operation), and UL 705 (volume control by speed control on direct drive units).

1.4 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Exhaust Fans
- B. Exhaust Fan Curbs (Rooftop Fans)
- C. Fan curves showing system curve, and a fan curve with the maximum operation point with maximum motor size (limited by maximum shaft speed of and/or surge point).

1.5 OPERATION AND MAINTENANCE OF THIS SECTION

- A. Submittal Data including Curves
- B. Exhaust Fan Operation and Maintenance Manual

PART 2 - PRODUCTS

2.1 IN-LINE FANS

A. General:

1. Motors on V-belt units shall be supported on the exterior of the fan casing with bearings encased within the fan tube.
2. All models shall incorporate a panel to permit access to the interior.
3. Centrex wheels shall be backwardly inclined, non-overloading and made of aluminum.
4. Inlets shall be deep spun for non-turbulent entrance condition.
5. Approved Manufacturers:
 - a. Cook
 - b. Greenheck
 - c. Pace
 - d. Penn Barry
 - e. Twin City Fans

2.2 PROPELLER FANS

A. Propeller fans shall be direct drive type with wire basket rear guard. Blades shall be statically and dynamically balanced. Resilient mounted motor. Furnish with combination louver/shutter.

1. Approved Manufacturer:
 - a. Breidert
 - b. Carnes
 - c. Cook
 - d. Greenheck
 - e. Jenn
 - f. Penn Barry
 - g. Twin City Fans

2.3 SPEED CONTROL

- A. Use manufacturer's recommended speed control, which varies speed from 50 to 100% of full speed.
- B. All fan motors 1/12 HP or greater and less than 1 HP shall be Electronically Commutated Motors (ECM) or shall have a minimum efficiency of 70 percent when rated in accordance with DOE 10 C.F.R. 431. These motor speeds shall be adjustable.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Anchor fan units securely to structure or curb.
- B. Extend all internal wiring to box on exterior of unit.
- C. Factory mount speed control on outside of case on in-line fans, including wall propeller fans, and underneath weather casing for rooftop fans.
- D. Grease hood exhaust fan. Up-blast discharge shall be a minimum of 40" from top of fan to roof. Provide with vented curb and replaceable grease termination receptor.

END OF SECTION 233423

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SECTION 233700 - AIR TERMINALS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install complete, all air terminals described in Contract Documents.
2. Ceiling diffusers with damper
3. Louvers connected to ductwork
4. Roof hoods

1.2 RELATED SECTIONS

- A. General Conditions and Division 1 apply to this Section.
- B. Section 200000 - General Mechanical Conditions

1.3 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Grilles, registers, and diffusers
- B. Louvers
- C. Wall caps

PART 2 - PRODUCTS

2.1 GRILLES, REGISTERS AND DIFFUSERS (GRD)

- A. Shall be as scheduled on drawings.
- B. Provide the various grilles, registers and diffusers shown on the plans and of the various types herein before specified. All terminals with prime-coat finish shall be installed before the walls and ceiling are painted, in order that they may be finish painted by the General Contractor. Those with factory finish or aluminum construction shall be installed after the walls and ceilings are painted. All air terminals located in shower, toilet rooms, locker and dressing rooms shall be of aluminum construction w/baked off-white finish. All other Air Terminals shall be of a standard steel construction; wall-mounted terminals shall be prime coat finish; ceiling diffusers, exhaust and return air terminals shall have factory-applied baked enamel finish, color as selected by Architect.

C. Approved Manufacturers: (subject to submittal approval):

1. Anemostat
2. Nailor
3. Kees
4. Krueger
5. Price
6. Titus
7. Tuttle & Bailey
8. Shoemaker (except 700MA)

2.2 LOUVERS

- A. Provide stationary type with 4" frames, drainable blades, and aluminum bird screen. The frame and blade shall be 6063-T-5 aluminum alloy. Blades shall be at 37.5° angle and supported by hidden mullions. Intermediate support mullions shall not interrupt blade exterior appearance. Louvers shall receive finish color coating of modified fluoropolymer baked enamel following cleaning and pretreatment of metal. A 50% Kynar resin shall provide approximately 0.3" total dry film thickness when baked at 450°F. Color shall be as selected by the Architect. Provide appropriate frame type for installation type.
- B. Louvers shown are minimum sizes for airflow requirements. Refer to Architectural elevations for exact size and location of louvers. This contractor is to provide full size louver as shown on the plans or Architectural elevations (whichever is larger), including but not limited to: hidden mullions, louver extensions, and louver shapes. Any louver area not used for ductwork shall be blanked off with sheet metal. The General Contractor is to provide insulation for blanked off sections.
- C. Louver performance shall be as follows:
1. Maximum S.P. drop of 0.15" at 800 ft./min.
 2. Minimum beginning point of water penetration at 0.01 oz/sq. ft. is 800 feet per minute (48"x48" size at 15-minute test period).
 3. Minimum AMCA rated free area of 54% (48"x48" size).
 4. Approved Manufacturers:
 - a. Ruskin (ELF 375DX)
 - b. American Warming
 - c. Wonder Metals
 - d. Greenheck
 - e. Metal Form
 - f. United Enertech

2.3 WALL CAPS

- A. Wall caps shall be constructed of extruded aluminum, with bird screen, sizes and model numbers as indicated on plans.
- B. Dryer vent caps shall be of aluminum construction with integral backdraft damper.

2.4 MISCELLANEOUS

- A. Bird Screen: 1/2-inch mesh, constructed of either 0.051-inch aluminum wire or 19-gauge galvanized steel wire.
- B. Insect Screen: 14 x 18, 0.009" galvanized steel mesh.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The interior of duct connection including opposed blade damper and all visible duct interiors at connection shall be painted matte black.
- B. Each air terminal shall be installed with a spun rubber gasket between the flange and the frame or wall.
- C. Each air terminal with flexible duct connection shall have a square-to-round transition adapter box.
- D. Anchor securely into openings.
- E. All air terminals that supply, return, and/or exhaust air, which are not required to have an OBD, shall be provided with a volume damper.
- F. Provide a round neck to flex duct reducers as required.
- G. Provide bird screened openings (1/2" mesh) on all duct openings where indicated and where openings do not have grilles or registers.
- H. All outlet and inlets exposed to the weather shall be adequately flashed and installed in a manner to assure complete weatherproofness.
- I. Provide blank-off panels on louver portion not connected to a duct. Blank-off panels to be painted flat black.
- J. Install louvers level and plumb.
- K. Secure louver frames in openings with concealed fasteners.
- L. Provide bird screen for all louvers, wall caps, and roof hoods.
- M. Provide insect screens where indicated on drawings.
- N. Provide louvers with motorized dampers on all ductless, through wall relief penetrations unless otherwise noted on the drawings.

END OF SECTION

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SECTION 237200 - AIR-TO-AIR HEAT EXCHANGERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To: Furnish and install material as described in Contract Documents.
- B. Related Sections:
 - 1. General Conditions, Division 1
 - 2. Section 200000 – General Mechanical Requirements

1.2 QUALITY ASSURANCE

- A. Qualifications: Units shall be started, checked out, and adjusted by Unit Manufacturer's authorized factory trained service mechanic.
- B. Requirements of Regulatory Agencies: Each unit shall be UL labeled.

1.3 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. Equipment
- B. Fan Curves
- C. Sound Data

1.4 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

- A. Submittal Information
- B. Operation and Maintenance Manual

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Innovent
- B. Annexair
- C. Extex

2.2 AIR-TO-AIR HEAT EXCHANGER

- A. Air-to-air heat exchanger shall be manufactured as shown on equipment schedule. Substitutions, provided they meet all requirements of plans and specifications, shall have prior approval from Engineer/Owner. Contractor will be required to furnish plan and elevation details of units in the event of substitution. Any capacity increase in pumps, piping, cooling tower or boiler will be the Contractor's responsibility. Any changes in electrical loads due to substitution of equipment other than that specified shall be coordinated with the Electrical Contractor and any additional costs for this work shall be borne by the Contractor and/or supplier.
- B. Packaged Heat Recovery Unit:
 - 1. Packaged unit includes Supply air inlet section, exhaust air inlet section, heat exchanger, supply fan(s) section, exhaust fan(s) section and control panel
 - 2. Unit is constructed of 18 gauge electro-galvanized and bonderized sheet metal with two (2) exterior coats of acrylic vinyl paint
 - 3. Unit reinforced with galvanized steel angles and channels to form a rigid assembly
 - 4. Entire casing insulated with 1" thick, 1.5lb. density glass-fiber acoustic insulation with aluminum face, meets NFPA 90
 - 5. Access doors for easy access to all serviceable interior components, hinged and gasketed with quick opening type door latches providing a tight closure
- C. Supply Air Inlet Section:
 - 1. Filter section per Section 233300 – HVAC Specialties
 - 2. Filter access door
 - 3. Low leak face and bypass dampers are modulated by a frost and a temperature control thermostat: Defrost mode fresh air bypasses heat exchanger/temperature control mode dampers modulate to achieve set temperature
- D. Exhaust Air Inlet Section:
 - 1. Plenum access door
 - 2. Water-tight condensate pan with bottom pitched to drain fitting to drain off condensate from heat exchanger
- E. Heat Exchanger:
 - 1. Arranged for counter flow air pattern
 - 2. Aluminum plates with completely separated airstreams for use in 5 to 8 ph. environments
 - 3. Airtight sealant between adjacent airstreams of elastic synthetic resin adhesive suitable for temperature of -40°F to +212°F
 - 4. Unit is reinforced to withstand 10" W.G. pressure differential across surfaces without leakage or deflection of plates
 - 5. Casing constructed of aluminum with 3/4" I.P.S. condensate drain located in exhaust section
 - 6. Heat exchanger is tested to ASHRAE Standard 84-78 for zero leakage, efficiency and pressure drop by an independent test lab

F. Supply Fan(s) Section:

1. Centrifugal type, forward-curved, Class I wheel, DWDI
2. Fans are statically and dynamically balanced, rated and tested in accordance with AMCA and ASHRAE Standards
3. Bearings are ball bearing type, grease lubricated with an average life of 200,000 hours
4. Solid steel shafts oversized to assure that any RPM encountered will not be greater than 75% of the first critical speed

G. Exhaust Fan(s) Section:

1. Centrifugal type, forward-curved, Class I wheel, DWDI
2. Fans are statically and dynamically balanced, rated and tested in accordance with AMCA and ASHRAE Standards
3. Bearings are ball bearing type, grease lubricated with an average life of 200,000 hours
4. Solid steel shafts oversized to assure that any RPM encountered will not be greater than 75% of the first critical speed

H. Motor and Drive:

1. Motors mounted on a NEMA standard adjustable sliding base for belt adjustment
2. Base mounted on spring isolators selected for 95% efficiency at required fan RPM, snubbers where required for seismic restraint
3. V-belt drive with variable pitch motor sheaves selected for 150% of the motors rated horsepower

I. Control Panel:

1. Magnetic starters with external motor overload protection
2. Low voltage control circuit
3. Low voltage damper actuators and controls
4. Factory mounted disconnect switch
5. Control box and controls are UL listed
6. Access door provided so electrical components can be serviced without opening airflow components

J. Electric Auxiliary Heat in Supply Fan Section:

1. Casing is galvanized steel with insulated frames
2. nickel and 20% chromium open resistance coils
3. Controls and interlocks: Differential airflow switch, disk type automatic reset thermal cutout for primary protection, manual reset thermal cutout for secondary protection de-mercury type contactors, over-current protection for each stage including dual element type fuses, unfused disconnect switch, control transformer with primary fusing, individual control contactor for each heating stage, and step controller.

K. Filters: As specified in Section 233300 – HVAC Specialties.

L. Controls: Unit shall be furnished with devices that are compatible with Section 230900 - Control System. Unit shall have all necessary interconnections.

- M. Hydronic Coils: See Section 232000 – Hydronic System

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install units in locations shown on plans and in accordance with manufacturer's instructions.
- B. Piping: Provide condensate.
- C. Unit Protection: Units shall be protected during construction to prevent debris from depositing on the unit.
- D. Horizontal Units:
 - 1. Pitch units towards condensate drain outlet to facilitate condensate drainage.
 - 2. Hung Units: Support units with hangers, rods, and manufacturer furnished clips and vibration isolators.
 - 3. Drain Pan: Provide drain pans below each unit; pipe drain pan to nearest point of drainage.
- E. Vertical Units: Install units on isolator pad to minimize vibration transfer to structure. Large vertical units shall be installed on external rubber type vibration isolators.

3.2 START-UP

- A. Initial Checks: Prior to operating units, checks shall be made to ensure that adequate voltage, duct connections, electrical connections, control connections, and other items as listed by the manufacturer are properly provided/connected and operating to insure safe and proper unit operation.
- B. Testing and Adjustment: Operate unit in various modes of operation to test for proper operation, including fan rotation, proper damper travel (where applicable), correct interface to other controls.
- C. Final Check: When testing and adjustment is complete, a final check of each unit shall be done by the manufacturer's authorized service representative to verify proper unit operation.

END OF SECTION 237200

SECTION 260000 - ELECTRICAL GENERAL CONDITIONS

PART 1 - GENERAL

1.1 GENERAL

- A. Conform to the General Conditions, Supplementary Conditions, and related work in other Divisions for all work in Divisions 26, 27, and 28. See Division 01 for sequence of work.

1.2 WORK INCLUDED

- A. It is the intention of this division of the specifications and the accompanying drawings to describe and provide for the furnishing, installing, testing and placing in satisfactory and successful operation all equipment, materials, devices, and necessary appurtenances to provide a complete electrical system, together with such other miscellaneous installations and equipment hereinafter specified and/or shown in the plans. The work shall include all materials, appliances and apparatus not specifically mentioned herein or noted on the plans, but which are necessary to make a complete working installation of all electrical systems shown on the plans or described herein. Equipment and devices furnished and installed under other divisions of this specification (or by the Owner) shall be connected under this division. The drawings and specifications are complementary and what is called for in either is binding as if called for in both.
- B. By submitting a bid, the Contractor is acknowledging that they have made a thorough examination of the Contract Documents, the existing site and building conditions, and have determined that these documents do sufficiently describe the scope of construction work required under this Contract.

1.3 SCOPE OF BASIC BID

- A. Included in Divisions 26, 27, and 28 are all work and related items necessary to provide all electrical installations except as specifically excluded. In general, this includes all labor, equipment, tools, etc., to complete the electrical work.

1.4 RELATED WORK

- A. Temporary Power and Lighting - See Section 015100
- B. Mechanical Control Wiring – See Division 23
- C. Cutting and Patching - See Division 01
- D. Trenching, backfill and asphalt work – See Division 02.

1.5 STANDARDS AND REGULATIONS

- A. The work shall comply with the latest edition of the applicable Standards and Codes of the following:
- ASTM American Society for Testing and Materials
 - CBM Certified Ballasts Manufacturers
 - ETL Electrical Testing Laboratories
 - IPCEA Insulated Power Cable Engineers Associated
 - NBFU National Board of Fire Underwriters
 - NEC National Electrical Code
 - NESC National Electrical Safety Code
 - NEMA National Electrical Manufacturers Association
 - NFPA National Fire Protection Association
 - U.L. Underwriters Laboratories Inc.
 - WAC Washington Administrative Code
 - WSEC 2018 Washington State Energy Code
 - Federal, State, and Local Building Codes
 - State Electrical Code
- B. If any conflict occurs between Government adopted Code Rules and this specification, the codes are to govern. Nothing in these drawings and specifications shall be construed to permit work not conforming with governing codes. Also, this shall not be construed as relieving the Contractor from complying with any requirements of the plans and specifications which may be in excess of, but not in conflict with, the requirements of the Governing Codes.

1.6 PERMITS & FEES

- A. The Contractor shall obtain and pay for all licenses, permits, and inspections required by laws, ordinances, and rules governing work specified herein. The Contractor shall arrange for inspection of work by the inspectors and shall give the inspectors all necessary assistance in their work of inspection.
- B. The Contractor shall consult with and follow the requirements of the local fire, power, telephone, and television utilities serving the area and shall coordinate the work with them.
- C. Utility connection and hook-up charges for power, telephone, and television shall be paid by the Owner directly to the utility. The Electrical Contractor is required to provide any and all coordination necessary to support the utility connection, file for application of service (or assist the Owner in filing for application of service) and coordinate dates for service with the utilities.
- D. This project has utilized the electronic plan review submittal process for the applicable jurisdiction. The engineer will make available to the contractor an electronic version of the Approved Plans in PDF format on a USB thumb drive. The contractor shall include in their bid all costs associated with printing the plans, full size and in color, as required by the local Electrical Inspector.

1.7 DEFINITIONS

- A. When "provide" is used, it shall be interpreted as "furnishing and installing complete in operating condition".
- B. When "drawings" is used, it shall be interpreted as "all Contract Drawings for all disciplines".
- C. When "Contractor" is used, it shall be interpreted as the Electrical Contractor.

1.8 INTENT OF DRAWINGS

- A. The electrical drawings are intended to serve as working drawings for general layout. The equipment layout is diagrammatic and, unless specifically dimensioned or detailed, does not indicate all fittings, hardware, or appurtenances required for a complete operating installation.
- B. Anything shown on the drawings but not covered in the specifications, or anything covered in the specifications but not shown on the drawings, shall be as if covered in both. In case of conflict between the drawings and specifications, the Engineer will select the method to be used. The Contractor shall be responsible for verifying all measurements before proceeding with the work.
- C. Wiring diagrams are not intended to indicate the exact course of raceways or exact location of outlets. Raceway and outlet locations are approximately correct and are subject to revision as may be necessary or desirable at the time of installation. Precise location in every case shall be subject to the Engineer's approval.

1.9 PROTECTION

- A. The Contractor shall store and guard all equipment before installation and shall protect same and replace any equipment that has been damaged prior to final acceptance. See Division 01 for detailed requirements.

1.10 HOUSEKEEPING

- A. All electrical materials shall be kept stored in an orderly fashion protected from heat, cold, and the weather.
- B. All marred surfaces shall be refinished and painted after installation.
- C. All debris shall be removed from premises during work, as directed, and at completion of job.

1.11 TEMPORARY USE

- A. Temporary or interim use of any and all portions of the electrical system shall be under the supervision of the Electrical Contractor.

- B. Temporary power and lighting for use during construction shall be provided per the requirements of the Division 01 specifications.

1.12 AS-BUILT DRAWINGS

- A. The Contractor shall maintain, in addition to any reference drawings, an as-built set of prints, on which all deviations from the original design shall be drafted in a neat, legible manner with red colored pencil or pen. This red-lined set shall identify all drawing revisions including addenda items, change orders, and Contractor revisions. The Contractor is responsible to revise panel schedules and load calculations as required.
- B. Drawings shall show locations of all concealed raceway runs larger than 1", giving the number of conductors and size of raceway. Underground ducts shall be shown with cross section elevations. All pipe, raceway, manholes or lines of other trades shall be included.
- C. The Contractor shall update all references to specific products to indicate actual products installed on project. This shall include, but not be limited to, lighting fixtures, baseboard heaters, etc.
- D. Upon completion of the Division 26 work, the Contractor shall deliver the red-lined drawings and one set of neatly drafted as-built drawings on electronic media in AutoCAD R-2013 format and full-size PDF to the Engineer for transmittal through the Engineer to the Owner.
- E. See Section 270000 for additional requirements of low voltage systems.

1.13 WARRANTY

- A. Provide a written warranty that Divisions 26, 27, and 28 work is free from mechanical and electrical defects. Contractor shall replace and repair, to the satisfaction of the Engineer, any parts of the installation which may fail within a period of 12 months after the date of substantial completion, provided that such failure is due to defects in material or workmanship, or failure to follow the specifications and drawings.
- B. See Section 270000 for additional requirements of low voltage systems.

1.14 INSTRUCTIONS AND MANUALS

- A. Operation and maintenance data shall be submitted in accordance with Section 017823.
- B. Manuals shall contain shop drawings, wiring diagrams, operating and maintenance instructions, replacement parts lists, and equipment nameplate data for all equipment and systems installed under the project. Signal equipment submittals shall contain step-by-step circuit description information designed to acquaint maintenance personnel with equipment operation in each mode of operation. Manuals shall contain original brochures supplied by manufacturers. Copies of originals will not be accepted.

- C. Each type of device provided shall be identified in the O & M Manual using the same identification as shown on the drawings and specifications. The information included must be the exact equipment installed, not the complete "line" of the manufacturer. Installed equipment shall be neatly and clearly identified on sheets where both installed equipment and other equipment are shown. Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier are not acceptable. The following information shall be provided for each device:
1. Manufacturer's name, address, and phone number.
 2. Local supplier's name, address, and phone number.
 3. Complete parts lists including quantities and manufacturer's part numbers.
 4. Installation instructions.
 5. Recommended maintenance items including maintenance procedure and recommended interval of maintenance listed in hours of operation, calendar unit or other similar time unit.
- D. The O & M Manual shall be assembled as detailed in Section 017000. As a minimum, the following sections shall be broken out:
1. Light Fixtures
 2. Panelboards, Switchgear, and Transformers
 3. Motor Controls
 4. Fire Alarm System
 5. Intrusion Alarm
 6. Access Control System
 7. Telecommunication System
 8. Television System
 9. Sound Systems
 10. Low Voltage Lighting Control Systems
 11. Surge Protection Device (SPD)
 12. Data Network
 13. Generator
 14. Automatic Transfer Switch
 15. Uninterruptible Power Supply System
 16. Electrical System Protective Device Study
 17. Ground Fault Testing Results
- E. Wiring Diagrams for each system shall be complete for the specific system installed under the Contract. "Typical" line diagrams will not be acceptable unless properly marked to indicate the exact field installation.

1.15 WORK NOT INCLUDED

- A. Indicated motors, controls, and equipment as described in other divisions shall be furnished by other trades, but shall be moved, set, and wired to electrical controls and power supply by the Electrical Contractor.
- B. Work to be included under this Contract shall be defined on drawings and in these specifications. Any details beyond these limits are meant only to give installation clarity to that portion which is a part of this Contract.

1.16 INSTRUCTION PERIODS

- A. Upon completion of the work and after all tests and final inspection of the work by the authority(ies) having jurisdiction, the Contractor shall demonstrate and instruct the Owner's designated operation and maintenance personnel in the operation and maintenance of the various electrical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be superintendents or foremen knowledgeable in each system and suppliers' representatives when so specified.
- B. Scheduled Instruction periods shall be:
- | | |
|---|---------|
| 1. Access Control System | 1/2 day |
| 2. CCTV System | 1/2 day |
| 3. Data Network | 1/2 day |
| 4. Daylighting Control Systems | 1/2 day |
| 5. Fire Alarm System | 1/2 day |
| 6. Generator Systems | 1/2 day |
| 7. Low Voltage Lighting Control Systems | 1/2 day |
| 8. Security System | 1/2 day |
| 9. Sound Systems | 1/2 day |
| 10. Television System | 1/2 day |
- C. Costs for time involved by Contractor shall be included in the bid.

1.17 COMPLETION OF WORK

- A. Upon completion of Divisions 26, 27, and 28 work, the Contractor shall comply with the requirements of Section 017000 for project closeout.
- B. Arrange for and obtain all required inspections and certificates pertaining to Divisions 26, 27, and 28 work and deliver the certificates to the Engineer in triplicate.

- C. Prior to or at the time of final inspection, the Contractor shall, as outlined in detail in the specifications, complete the delivery of all the following items:

1.	Completion Letter	
2.	Certificate of Final Inspection. Electrical Inspector Fire Department	COMPLETION OF WORK - 260000 – 1.17
3.	Warranty to Owner (with copy for Engineer)	SUPPLEMENTARY GENERAL CONDITIONS - 260000- 1.13
4.	Marked Set, Electronic Media Set on Solid- State Drive-in AutoCAD R-2013 Format, and full-size PDF of As-Built Electrical Drawings	GENERAL AS-BUILT DRAWINGS - 260000– 1.12
5.	Certificate of Completion and Document Requirements for Protective Device Study	ELECTRICAL SYSTEM PROTECTIVE DEVICE STUDY - 260573
6.	Motor Current Readings	GENERAL, TESTS - 260519 – 3.03(D)
7.	Phase Current Readings	GENERAL, TESTS - 260519 – 3.03 (E)
8.	OHMIC Test Readings	GENERAL, TESTS - 260519 – 3.03 (B)
9.	Ground Fault Settings	
10.	Panelboard and Special Equipment Shop Drawings and Final Approved List of Materials Installed	MATERIALS, GENERAL - 260000– 2.03
11.	Certificate of Feeders Torque Results	WIRES AND CABLES - 260519
12.	* Receipt from person to whom delivered the following spare glasses, plastic diffusers, lamps, and ballast fuses.	LIGHTING FIXTURES - 265000
13.	* Receipt from person to whom delivered the following: Spare Elements for Fire Detectors, Fuses for Switches, Spare Keys for Panelboards, receptacles switches, plugs, etc.	LOW VOLTAGE – 270000 FIRE ALARM – 283100 FUSES – 262813 PANELBOARDS – 262416 SWITCHES & RECEPTACLES – 262726
14.	Wiring diagrams, Maintenance Manuals, Operation Instructions, and Brochures (5 sets minimum)	GENERAL, INSTRUCTIONS & MANUALS – 260000– 1.14

* Secure delivery instructions from Architect for delivery to Owner.

1.18 SHOP DRAWING SUBMITTALS

- A. This Contractor shall submit to the Architect as described in Section 016000. When shop drawings are submitted electronically, they shall be submitted as described in Paragraph B below.
- B. The Contractor shall submit to the Architect electronic shop drawings in PDF format. Electronic Shop Drawings that are submitted without following the format as outlined below will be returned for corrections without any further review.
 - 1. A separate PDF file shall be submitted for each Division including All submittal items for that Division as outlined below:
 - a. Division 25 – Integrated Automation
 - b. Division 26 – Electrical
 - c. Division 27 – Telecommunications
 - d. Division 28 – Electronic Safety and Security
 - 2. The contractor shall provide either a digital or hardware method of transporting the electronic submittal to the Architect. Files larger than 10 Megabytes shall not be sent via email and shall be transferred via a file transfer protocol, PC compatible CD or PC compatible thumb drive. Divisions shall not be broken up into separate files for transfer via email.
 - 3. Each Specification PDF shall be submitted with the following format and salient attributes:
 - a. Cover page including:
 - 1) Project Title as indicated on the plans
 - 2) Project Location including address, city, state, country
 - 3) Prime Contractor name, phone number, and email address
 - 4) Sub-Contractor name, phone number, and email address
 - 5) Specification Division number and title
 - 6) Index Page outlining each specification section included in the submittal. This list shall be linked to a corresponding Specification Section Divider for each section. This link shall enable the reviewer to jump to a specification section by clicking the item in the list.
 - 7) Specification Section Divider: Shop Drawings shall be divided by specification section and each section shall begin with a divider-page outlining the Specification number, title, and a list of submittal items for the section. In the upper right-hand corner of the divider page, a link shall be provided returning the reviewer to the Index Page.
 - 8) Each Submittal Item listed on the Specification Section Divider shall be linked to the specific item being submitted. Each Submittal Item shall be highlighted yellow with a note reference to the specific paragraph giving the submittal requirements.
 - 9) Each page of the submittal shall be numbered in the bottom right corner of the page. Page numbering shall be Roman numerals for all pages before the First Specification Section. Each Specification Section page shall be numbered with the Specification Section number, a dash, and the page number in the Specification Section.

- 10) Specification items shall be specifically highlighted as they apply to the project rather than highlighting an entire product family. Items that do not apply to this project shall be crossed out with a red "X".
 - 11) The PDF file shall not be protected to prevent printing, selecting of text within the document, or extracting of pages from the document.
- C. Shop drawings shall be submitted complete, at one time, and with each item indexed with dividers and separated per specification section and shall include, at a minimum, the items of equipment listed below:
1. All panelboards, showing breaker arrangement with circuit numbers, relays, and panel skirts.
 2. Motor starters and controls designating where items are intended to be used, and equipment being controlled.
 3. Transformers (Dry Type)
 4. Surge Protection Device
 5. Disconnect Switches
 6. Fuses and spare fuse cabinet
 7. Electrical System Protective Device Study
 8. Lighting Fixtures (Complete)
 9. Lighting Fixture Lamps and Ballasts referenced to fixture types
 10. Low Voltage Lighting Control Systems
 11. Wiring Devices
 12. Back Boxes
 13. Coverplates
 14. Raceways and Connectors
 15. Fire Wall Penetration Seals
 16. Cable Tray
 17. Copper Wire
 18. *Fire Alarm System
 19. *Security System
 20. *CCTV
 21. *Access Control System
 22. *Telecommunication System
 23. *Sound Systems
 24. *Audio/Visual Presentation Systems
 25. *Data Network Systems
 26. Automatic Transfer Switches
 27. Generator System
 28. Any other items requested by Engineer.
 29. *See Section 270000 for further requirements.
- D. Within ten (10) working days after the date of the letter rejecting any items of equipment, lighting fixtures, or materials as not in accordance with the specifications, the Contractor shall submit a new list of items to furnish and install in place of those items rejected. If the Contractor fails to submit this new list within the above specified time, or if any items on this second list are rejected as not being in accordance with these specifications, the Engineer may select the items which the Contractor shall furnish and install without change in Contract price or time of completion.

- E. The acceptance of a manufacturer's name or product by the Engineer does not relieve the Contractor of the responsibility for providing materials and equipment which comply in all details with the requirements of the Contract Documents. The Contractor shall be solely responsible for submitting materials at such a time to allow a minimum of two weeks for the Engineer's review.
- F. Electrical Drawings for the project have been developed by the Engineer using AutoCAD Revision 2013 software or newer. These drawing files will be made available to the Contractor for development of shop drawings and/or As-Builts with a signed waiver of responsibility.

1.19 SCHEDULE OF VALUES

- A. Provide Schedule of Values per Division 01 and related project requirements.
- B. Divisions 26, 27, and 28 Breakdown: Provide schedule of values for the following categories (as a minimum):
 - 1. Electrical Mobilization
 - 2. Electrical Submittals
 - 3. Electrical General Project Management, General Design, General Coordination
 - 4. Branch Circuit Materials Rough-in
 - 5. Branch Circuit Materials Rough in – Labor
 - 6. Branch Circuit Trim – Materials
 - 7. Branch Circuit Trim – Labor
 - 8. Service Materials
 - 9. Service Materials – Labor
 - 10. Feeder Materials
 - 11. Feeder Materials - Labor
 - 12. Panelboard, Gear, Disconnects, Starters
 - 13. Panelboard, Gear, Disconnects, Starters – Labor
 - 14. Light Fixtures
 - 15. Light Fixtures – Labor
 - 16. *Distributed Audio-Video Communication System
 - 17. *Sound Systems – Break out per space
 - 18. *Fire Alarm/Emergency Communication System
 - 19. *Security System
 - 20. *Data System
 - 21. Generator and Transfer Switches
 - 22. Electrical System Protective Device Study
 - 23. Commissioning
 - 24. Electrical Punchlist, Closeout, and Owner Training
 - Provide engineering/shop drawings, material, and labor for each system. Engineering/shop drawings shall be 10% of the labor and material value.
- C. The dollar value for “Electrical Punchlist, Closeout, and Owner Training” shall in no case be less than 2% of the total dollar value of Divisions 26, 27, and 28 work (or as indicated in Division 01, whichever is higher).

- D. The Contractor is advised that in addition to payments held out for retainage and project final completion (i.e., “Electrical Punchlist, Closeout, and Owner Training”), as specified above and in Division 01, the Owner reserves the right to withhold 10% of the funds for any of the above categories until the systems (of that category) have been proven to operate as specified and have been completely tested and adjusted.

PART 2 - PRODUCTS

2.1 COMPETITIVE PRODUCTS

- A. Any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The Contractor, in such cases, may use any article, device, product, material, fixture, form, or type of construction which in the judgment of the Engineer, expressed in writing, is equal to that specified. However, any manufacturer not listed as an accepted bidder for a specific item must be submitted for acceptance in writing in accordance with Section 016000.

2.2 MANUFACTURER/EQUIPMENT PRIOR APPROVALS

- A. Any manufacturer/equipment not listed as an approved substitute for a specified item must be submitted for acceptance in accordance with Section 016000, in writing, with detailed information to include:
 - 1. Manufacturer's Catalog Data
 - 2. Complete Physical and Technical Data
 - 3. Wiring Diagrams
 - 4. Detailed reference (written or highlighted) noting compliance with the appropriate Specification Section and all applicable Specification item numbers within that Section
 - 5. Complete type written index cross referencing all proposed substitutes and specified items
 - 6. Detailed reference to specified items (written or highlighted) noting equal quality and performance of proposed substitute equipment
 - 7. Other descriptive data, as required by the Engineer
- B. If substitute material is determined to be acceptable by the Engineer, it will be included in a subsequent Addenda prior to bidding. The acceptance of a manufacturer's name or product by the Engineer does not relieve the Contractor of the responsibility for providing materials and equipment which comply in all details with the requirements of the Contract Documents.
- C. Only materials which are specified or published in addenda as acceptable shall be used.

2.3 MATERIALS

- A. All materials must be of the quality herein specified. All materials shall be new, of the best quality, and free from defects. They shall be designed to ensure satisfactory operation and operational life in the environmental conditions which will prevail where they are being installed.
- B. Each type of material shall be of the same make and quality. The materials furnished shall be standard products of the manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design.
- C. All materials shall be U.L. or E.T.L. listed for the purpose for which they are used.
- D. Equipment in compliance with U.L. standards but not bearing their label is not acceptable. If the manufacturer cannot arrange for labeling of an assembled unit at the factory the unit shall be field evaluated per the Washington State Administrative Code (WAC) and the electrical inspector's requirements.

2.4 COMPLETE SYSTEM

- A. All the systems mentioned shall be complete and operational in every detail except where specifically noted otherwise. Mention of certain materials in these specifications shall not be construed as releasing the Contractor from furnishing such additional materials and performing all labor required to provide a complete and operable system.

2.5 NAMEPLATES

- A. Provide nameplates constructed of plastic (black on white) laminated material engraved through black surface material to white sublayer (attach with screws on NEMA 1 enclosures). EXCEPTION (1): Emergency distribution system component labeling - white letters on red background. Exception (2): Series rated systems shall be yellow background with white letters.
 - 1. Service Entrance Label: Refer to Section 262413.
 - 2. Panelboard Labels: Refer to Section 262416.
 - 3. Switch and Receptacle Labels: Refer to Section 262726.
 - 4. Motor Starter and Disconnect Labels: Refer to Section 262816.
 - 5. Special Equipment/Outlet Labels: Refer to Appropriate Sections.
 - 6. Medium Voltage Feeder Tags: Refer to Section 260573.
 - 7. Under 600 Volt Feeder Tags: Refer to Section 260519.

PART 3 - EXECUTION

3.1 GENERAL

- A. Careful consideration shall be given to clearances under and over beams, pipes and ducts, to provide proper headroom in all cases. Check drawings to determine heights of all suspended ceilings and size of pipe shafts where raceway and wire-ways shall run. Coordinate installation of Divisions 26, 27, and 28 wiring and equipment with Division 23 and other trades. Where insufficient room for proper installation appears, obtain clarification from the Engineer before any installation begins.
- B. Cutting and Patching:
 - 1. Obtain permission from the Architect and/or Owner's Representative prior to cutting. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills except where space limitations prevent the use of such drills.
 - 2. All construction materials damaged or cut into during the installation of this work must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

3.2 COORDINATION

- A. The Contractor is responsible for accomplishing work contained within Divisions 26, 27, and 28. The work shall coordinate with that of the other Contractors and/or other trades doing work in the building. The contractor shall examine all drawings, including the several divisions of mechanical, structural, civil and architectural, for construction details and necessary coordination. Specific locations of construction features and equipment shall be obtained from the Contract Documents, field measurements, and/or from the trade providing the material or equipment. No extra costs will be allowed for failure to obtain this information.
- B. All conflicts shall be reported to the Engineer in writing before installation for decision and correction. Special attention is called to the following items:
 - 1. Door swings to the end that switches will be located on "Strike" side of the door.
 - 2. Location of grilles, pipes, sprinkler heads, ducts, and other mechanical equipment so that all electrical outlets, lighting fixtures, and other electrical outlets and equipment are clear from and in proper relation to these items.
 - 3. Location of cabinets, counters, and doors so that electrical outlets, lighting fixtures, and equipment are clear from and in proper relation to these items.
 - 4. Type and height of ceiling.
 - 5. All device measurements referenced on drawings or specifications are to be centered of device unless noted otherwise.
- C. The Contractor will not be paid for work requiring reinstallation due to lack of coordination or interference with other Contractors or trades. This includes, but is not limited to, removing, replacing, relocating, cutting, patching, and finishing.

- D. The Contractor shall review the installation manual for each device to be installed. If a conflict appears to occur between the manufacturer's recommended installation practices and the plans or specifications, notify the Engineer immediately. Final determination shall be by the Engineer. The Contractor will not be paid for reinstallation due to failure to comply with manufacturer instructions or design documents.
- E. Device and fixture locations may be changed within 15 feet, without extra charge if so desired by the Engineer, before installation.

3.3 REQUESTS FOR INFORMATION (RFI)

- A. It is our intent to provide a timely response for RFIs regarding Divisions 26, 27, and 28 Work. To further expedite this process, where a suggestion can be determined or derived at by the initiator of the RFI, it is required this suggestion be supplied with the submitted RFI. If no suggestion is given where one is possible, the RFI will be returned as incomplete.

3.4 CLEANING AND PAINTING

- A. All equipment, whether exposed to the weather or stored indoors, shall be covered to protect it from water, dust and dirt.
- B. After installing all metal finishes shall be cleaned and polished, cleaned of all dirt, rust, cement, plaster, grease, and paint.
- C. All equipment with a primer coat of paint shall be given two (2) or more coats of finish enamel and scratched surfaces be refinished to look like new. Markings, identification, and nameplates shall be replaced.

3.5 EQUIPMENT IDENTIFICATION

- A. Provide identifying engraved Bakelite nameplate on all equipment, including pull boxes, to clearly indicate its use, area served, circuit identification, voltage, and any other useful data.
- B. Each auxiliary system, including communications, shall be clearly labeled to indicate its function.

3.6 DEVIATION

- A. Deviation from the shop drawings in construction or installation of equipment shall not be made unless Shop Drawings showing proposed deviations are submitted to and approved by the Engineer. If any equipment is furnished under this or other divisions with current, voltage, or phase ratings that differ from those shown on the drawings, the Contractor shall notify the Engineer in writing immediately and shall not connect said equipment until instructed as to required changes by the Architect. No extension of time will be granted as a result of such changes.

3.7 EXCAVATIONS

- A. All excavations are to be conducted so that no walls or footings shall be disturbed in any way.
- B. Remove all surplus earth not needed for backfilling and dispose of same as directed.

3.8 WIRING METHODS

- A. All low voltage wiring shall be in raceway with junction boxes and fittings, where concealed in walls, in inaccessible ceiling space, or exposed in finished or unfinished areas.
- B. Provide conduit sleeves through all walls to accommodate all low voltage cabling. Conduit sleeves shall be sized to allow for 40% future spare capacity.
- C. All branch circuit wiring shall be installed in raceway with junction boxes and fittings.
- D. Provide access panels as needed for pull boxes and equipment located above ceiling or behind walls.
- E. All emergency systems outlet and junction boxes shall have a red plastic tag inside marked critical or life safety as applicable.
- F. Multiple feeder runs shall be rod hung, using a strut type channel with individual one-hole clamps, back plates, and machine screws.
- G. Any low voltage cables that are not terminated at both ends shall be tagged and labeled per code.
- H. See Section 270000 for additional requirements of low voltage systems.

3.9 PENETRATIONS OF FIRE RATED ELEMENTS

- A. Penetrations of fire rated elements must be made such as to retain that rating. See architectural sheets for specific fire rated locations.

3.10 HANGERS AND SUPPORTS

- A. Provide hangers, brackets, suspension rods and supplementary steel to support equipment.
- B. Hangers provided under other divisions shall not be used for support of Divisions 26, 27, or 28 equipment unless permitted by Architect/Engineer.

3.11 CHASES AND OPENINGS

- A. Provide to the masonry and concrete trades all templates and details of chases, openings in floors, and walls as required for Divisions 26, 27, and equipment installation.

3.12 PAINTING

- A. Painting in general will be covered under another division of this specification, except items furnished under Divisions 26, 27, and 28 that are scratched or marred in shipment or installation and shall be refinished by the Division 26 Contractor.

3.13 WORKMANSHIP AND OBSERVATION

- A. Workmanship shall be of the best quality, and none but competent workers shall be employed under the supervision of a competent foreman. All completed work shall represent a neat, professional appearance.
- B. All work and materials shall be subject to observation at any and all times by representatives of the Engineer.

3.14 MISCELLANEOUS

- A. Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and electrical equipment, as required by the International Building Code.
- B. Conduits that cross seismic separations shall be installed with flexible connection suitable to accommodate conditions. Secure raceways on each side of a separation and provide a minimum of 36" length of flexible conduit to span separation.

3.15 CABLE AND WIRING ROUTED UNDERGROUND OR UNDERSLAB

- A. All cables and conductors, both line voltage and low voltage, routed underground or underslab shall be U.L. listed for installation in wet locations per NEC and WAC codes.

END OF SECTION 260000

SECTION 260010 - EXCAVATION AND BACKFILL FOR ELECTRICAL UNDERGROUND UTILITIES

PART 1 - GENERAL

1.1 GENERAL INCLUDES

- A. Excavation and Associated Grading
- B. Trenching and Trench Protection
- C. Backfilling and Compaction
- D. Verification of Existing Utilities
- E. Protection of Utilities

1.2 RELATED SECTIONS

- A. Section 260000 – Electrical General Conditions
- B. Section 260533 - Raceways
- C. Section 265000 - Lighting
- D. Section 270000 – Low Voltage System General Requirements
- E. Section 272000 – Data and Voice Infrastructure
- F. Section 281600 – Intrusion Alarm System
- G. Section 283176– Fire Alarm/Emergency Communication System

1.3 QUALITY ASSURANCE

- A. Inspection of Job Conditions: Prior to starting work and during work, the installer shall examine the work by others and shall evaluate site and job conditions under which excavation, trenching, backfilling for underground utilities work will be performed, and notify the General Contractor in writing of unsatisfactory conditions or work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Codes and Standards: Comply with requirements of the following Codes and Standards (Latest Edition) except as modified herein:
 - 1. International Conference of Building Officials, "International Building Code".
 - 2. Local requirements for all utility work.

3. OSHA and WISHA regulations.
4. APWA Standard Specifications.
5. National Electrical Code – NFPA 70.

1.4 RESPONSIBILITY

- A. The Contractor is solely responsible for compliance with the requirements of the drawings, specifications, local codes and standards, proper construction coordination with work of other trades, and protection and worker's safety. Contractor shall advise Engineer of any discrepancy in, or disagreement with, the specifications and/or drawings prior to starting work and not proceed until issue is resolved. Commencement of work shall indicate Contractor's acknowledgement of their expertise in this type of work. Any delay resulting from failure to comply with this procedure will not be the basis for an extension of the completion date.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced.
- B. American Society of Testing and Materials (ASTM) Publications:
 1. D 422-63 Particle Size Analysis of Soils.
 2. D 423-66 Liquid Limit of Soils.
 3. D 424-59 Plastic Limit and Plasticity Index of Soils.
 4. D 1557-78 Moisture Density Relations of Soils using a 10 lb. (4.54kg) Rammer and 18 inches (457 mm) Drop.
 5. D 2167-66 Density of Soil In-Place by the Rubber Balloon Method.
 6. D 2217-66 Wet preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Contents.
 7. D 2487-69 Classification of Soils for Engineering Purposes.
 8. D 2922-81 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 9. E 548-79 Generic Criteria for Use in the Evaluation of Testing and Inspection Agencies.

PART 2 - MATERIALS

2.1 SATISFACTORY MATERIALS

- A. Materials classified as ASTM D2487, Unified Soil Classification System as SW, SP, GW, and GP are satisfactory for backfill use. Materials classified as SP-SM, GP-GM, GM, GC and ML are also satisfactory for backfill use provided that they contain moisture contents suitable for the intended use and are reasonably free of organic matter. Native material, not considered unsatisfactory as specified below, may comply. Except that no material shall have any object with a dimension exceeding 2 inches and no object shall be sharply angular.

2.2 UNSATISFACTORY MATERIALS

- A. Materials classified in ASTM D2487, Unified Soil Classification System as PT, OH, and OL is unsatisfactory. Unsatisfactory materials also include man-made fills, refuse and all materials containing excessive organic matter or having moisture contents which are not suitable for the intended use, or having objects with dimensions exceeding 2 inches (boulders, etc.).

2.3 UNSTABLE MATERIAL

- A. Unstable material shall consist of material too wet to properly support the utility conduit or appurtenance structure, and material identified as unsuitable in the National Electrical Code 300-5(F).

2.4 GRAVELLY SAND BORROW MATERIAL

- A. Gravelly sand borrow material to provide backfill, or replace unsuitable soil, shall meet the requirements of SW, SP, GW, and GP materials, except that the maximum percentage passing the No. 200 sieve shall not exceed 5% based on the soil fraction passing the U.S. No. 4 sieve, and not contain discrete particles greater than 2 inches in diameter.

2.5 DEGREE OF COMPACTION

- A. Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557; Method D. Minimum compaction requirements shall be as specified in PART 3.

2.6 DRAINAGE GRAVEL

- A. Shall be 3/4-inch washed gravel with no more than 2% passing 1/2-inch sieve opening.

2.7 SPECIAL BEDDING AND INITIAL BACKFILL MATERIAL

- A. Minus 3/8-inch washed pea gravel.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. If workers enter any trench or other excavation four or more feet in depth that does not meet the open pit requirements of WSDOT Section 2.09.3(3)B, it shall be shored and cribbed. The Contractor alone shall be responsible for worker safety. All trench safety systems shall meet the requirements of the Washington Industrial Safety and Health Act, Chapter 49.17 RCW.

- B. Excavation of every description and of whatever substances encountered, shall be performed to allow the installation of all utilities at the lines and grades as required. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides or cave-ins. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes, or other approved methods. The stockpiles shall also be protected from contamination with unsatisfactory excavated material or other material that may destroy the quality and fitness of the suitable stockpiled material.
- C. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on-site or imported material from approved sources at no additional cost to the Owner.
- D. Excavated material not required or not satisfactory for backfill shall be removed from the site and shall be disposed of off site, at the Contractor's expense, at the Contractor's waste area. Any excess satisfactory excavated materials shall not be mixed with unsatisfactory materials. Unsatisfactory materials shall not cover available suitable materials or be disposed of in such a manner as to interfere with subsequent borrow operations.
- E. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed so that the stability of the bottom and sides of the excavation is maintained. Unauthorized over-excavation shall be backfilled in accordance with paragraph 3.05 BACKFILLING at no additional cost to the Owner.
- F. The Contractor shall provide dewatering as required for installation of underground work.

3.2 TRENCH EXCAVATION

- A. The trench excavation shall meet the requirements of the National Electrical Code and local utility standards.
- B. Bottom Preparation: The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the conduit and for bedding. Stones of 2 inches or greater in any dimension, or as recommended by the conduit manufacturer, whichever is smaller, shall be removed to avoid point bearing.
- C. Removal of Unsuitable Material: Where unsuitable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph 3.05 BACKFILLING. When removal of unsuitable material is required due to the fault or neglect of the Contractor in their performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Owner.
- D. Bedding: The bedding surface for the conduit shall provide a firm foundation of uniform density throughout the entire length of the conduit. The conduit shall be bedded carefully in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular conduit or to the lower curved portion of conduit arch for the entire length of pipe or arch. When necessary, the bedding shall be tamped. Provide bedding using pea gravel, where noted on the drawings.

3.3 EXCAVATION FOR APPURTENANCES

- A. Excavation for manholes, handholes or similar structures below grade shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.4 JACKING, BORING, AND TUNNELING

- A. Unless otherwise indicated, excavation shall be by open cut, except that sections of a trench may be jacked, bored, or tunneled if the raceway, cable or duct can be safely and properly installed and backfill can be properly tamped in such sections.

3.5 BACKFILLING

- A. Backfill material shall be compacted to 6" layers and as specified in Paragraph 3.06 - Compaction.
 - 1. Trench Backfill: Trenches shall be backfilled to finish grade.
 - 2. Replacement of Unstable Material: Unstable material removed from the bottom of the trench of excavation shall be replaced with select granular material or gravel borrow placed in layers not exceeding 6 inches loose thickness.
 - 3. Bedding and Initial Backfill: Bedding shall consist of satisfactory materials. Initial backfill shall be in a 6-inch lift.

3.6 COMPACTION

- A. Each layer of fill, or the excavated subgrade, shall be compacted to at least 95%, per ASTM D1557, of laboratory maximum density. Compaction shall be accomplished by approved tamping rollers, pneumatic-tired rollers, three-wheel power rollers, or other approved compaction equipment.

3.7 PROTECTION

- A. Newly graded excavated or bedded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes.

END OF SECTION 260010

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SECTION 260519 - WIRES AND CABLES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all wire, cable, and terminations complete.

1.2 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

PART 2 - PRODUCTS

2.1 WIRE AND CABLE (COPPER, 600-VOLT)

- A. Interior and Above Grade: All wires to be Type THW or RHW. Type THWN/THHN or XHHW wire may be utilized at Contractors' option, subject to Code requirements. Wire and cables shall be brought to the project in original containers bearing the Underwriter's label. Provide Type AVA wire where conductors are subject to temperature above 167 °F.
- B. Underground: All conductors to be type USE. Increase raceway size when necessary to accommodate conductors per Code. Exception: underground conductors completely contained in Code recognized raceway and boxes may be Type THW, THWN or XHHW.

2.2 WIRE AND CABLE (ALUMINUM, 600-VOLT)

- A. May be used at Contractor's option (except for ground cable) subject to the following requirements:
 - 1. Increased size for same current capacity (increased raceway size may be necessary).
 - 2. No aluminum conductors smaller than #4 AWG shall be used.
 - 3. Insulation requirements are the same as for copper conductor wires and cables.
 - 4. Aluminum conductors shall be made of an AA-8000 series electrical grade aluminum alloy conductor material.

2.3 SPLICES

- A. Above Grade: Solderless type only. Pre-insulated "twist-on" type (limited to size #10 and smaller). Bolt on compression type with application of preformed insulated cover, heat shrinkable tubing or plastic insulated tape acceptable for all sizes.
- B. Below Grade: Splices below grade shall be in handholes and shall be made watertight with epoxy resin type splicing kits similar to Scotchcast.

2.4 TERMINATIONS

- A. Compression set, bolted or screw terminal.
- B. Conductors #12 and smaller shall utilize eye or forked tongue type compression set terminator when termination is to a bolted or screw set type terminal block or terminal cabinet.

2.5 PLASTIC CABLE TIES

- A. Nylon or Equivalent, locking type.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install all wiring in raceway unless shown or specifically authorized otherwise.

3.2 WIRE SIZE

- A. No. 12 AWG minimum for power and lighting circuits.
- B. Provide solid wire for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger (600) volts.

3.3 TESTS

- A. In addition to the factory testing of all equipment and cable, the Contractor shall test all wiring connections for continuity and ground before any fixtures or other loads are connected. Tests shall be made with a 500V minimum DC "Megger" type tester. If tests indicate faulty insulation (less than 2 megohms), such defects shall be corrected and tested again. Contractor shall provide all apparatus to make tests and shall bear all expenses of required testing. Routine operation tests shall be made on all pieces of equipment to demonstrate that the working parts are in operating condition. Results of all tests shall be recorded and submitted to the Architect. The Contractor shall immediately replace all parts, which fail to pass the test.
- B. Measure the OHMIC value of the Electric Service Entrance metallic "System Ground" with reference to "Earth Ground" using the "Multiple Ground Rod Fall-In-Potential" method and suitable instruments. Maximum resistance to ground shall be less than 10 ohms. If this resistance cannot be obtained with the ground system shown, notify the Architect immediately for further instructions. Provide OHMIC test results to Engineer.
- C. All circuits both in and out of the building shall test out free of grounds, short circuits and other defects.

- D. Check and record catalog number and ampere size of controller overload heaters installed, nameplate full-load amperes, and actual operating amperes of each motor. **IMPORTANT:** Submit recorded data in triplicate to the Engineer. Check proper load balance on the electrical system, direction of rotation, lubrication, and overload protection of all motors before placing in operation.
- E. Provide a log of ampere reading for all panels from phase to neutral for 4 wire panels and from phase to phase for 3-wire panels. These readings shall be taken with all loads activated.
- F. The final test of all equipment shall be made on dates designated by the Architect/Engineer and all readings shall be made in their presence.
- G. Feeders shall be checked to ensure all phases are energized before connecting to their respective motors. Each motor shall rotate in the proper direction for its respective load. Prior to the rotation test, all bearings shall be inspected for proper lubrication.
- H. Minimum megger test for equipment shall be as follows:

Equipment Maximum	Minimum Test
<u>Voltage Rating</u>	<u>Resistance</u>
1,000-Volts or less	2 Megohms

- I. Provide certification of torque values for feeder and service entrance conductors per equipment manufacturer's recommendation.

3.4 CONDUCTOR SIZES, REFERENCED ON PLANS

- A. Copper, type THW or RHW unless noted.

3.5 ALUMINUM CONDUCTORS

- A. Aluminum conductors serving switchboards and service entrance rated panelboard shall be terminated using compression type oxide inhibiting compound filled aluminum lugs only.
- B. Compression fittings shall be sized for the conductor used and shall be set with a tool, which assures a preset deformation before release.
- C. Aluminum lugs, where in contact with copper studs, bolts or bus, shall be plated.
- D. Bolted aluminum lugs shall be installed with a Belleville washer under the nut unless specifically permitted otherwise.
- E. Branch panelboards with bolted pressure lugs shall use aluminum conductors designed to minimize creep - Stabiloy by ALCAN, or equal. Oxide inhibiting joint compound shall be applied to both the conductor and terminal lug. Manufacturer's torque specifications shall be used to prevent creep.

3.6 PULLING

- A. Use no mechanical means for pulling No. 8 AWG conductors and smaller. Powdered soap stone or approved spray cream shall be the only lubricant used.

3.7 STRIPPING INSULATION

- A. Do not ring the cable; always pare or pencil.

3.8 TAPING

- A. If used shall be half lapped synthetic tape.

3.9 CONDUCTORS IN PANELS AND SWITCHBOARDS

- A. Conductors in panels, switchboards, and terminal cabinets shall be neatly grouped and formed in a manner to "Fan" into terminals with regular spacing.

3.10 CABLE SUPPORTS

- A. Provide conductor support devices as required by code in vertical cable runs.

3.11 RACEWAY SIZES REFERENCED ON DRAWINGS

- A. Raceways are sized for copper, type THW, unless otherwise noted. Size all raceways per code unless specifically noted to be larger on the drawings.

END OF SECTION 260519

SECTION 260526 - GROUNDING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. A grounding system shall be provided for neutral ground and equipment ground as required by the Code.
- B. An isolated grounding system shall be provided for all isolated ground receptacles as allowed by Code (2020 NEC 250.146(D)).
- C. Provide all grounding of other systems as indicated in Divisions 26, 27, and 28.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

- A. Copper, code size, with physical protection where subject to damage. Bare or green insulated.

2.2 GROUND RODS

- A. 3/4" x 8'-0" copper clad steel.

2.3 ISOLATED GROUND BARS

- A. Provide in all panels containing isolated ground circuits.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide all grounding for electrical systems and equipment as required by codes and as specified herein.

3.2 SIZE OF GROUND WIRE

- A. Provide ground wire sizing as required by Code. Where ground wire is exposed to physical damage or is used outside of the building, protect it with conduit.

3.3 GROUND RODS

- A. Provide as shown and/or required. Connect the ground conductor to each rod.

3.4 CONCRETE-ENCASED ELECTRODE

- A. Provide in accordance with NEC 2020, Article 250.52(A)(3) and Article 250.68(C)(3).

3.5 GROUND CONNECTION OF WATER PIPING

- A. Metal internal piping shall be grounded, as part of this Contract. This includes jumpers for dielectric fittings.

3.6 CONNECTION TO THE GROUND BUS

- A. Provide connections in accordance with the codes; including but not limited to conduit system, switchboard frame, service neutral and electrically operated equipment and devices. No device or equipment shall be connected for electrical service which has a neutral conductor connected to a grounding conductor or to the frame within the device or equipment.

3.7 METHOD OF CONNECTION

- A. Make all underground ground connections and ground cable splices by thermal welding. Aboveground ground connections and ground cable splices may be by permanent compression connector. Grounding lugs, where provided as standard Manufacturer's items on equipment furnished, may be used.

3.8 FLEXIBLE RACEWAY

- A. Shall not be used for grounding. Install separate ground conductor in all flexible raceway.

3.9 PVC RACEWAY

- A. Install separate ground conductor in all PVC raceway as required per Code.

3.10 DROP CORDS

- A. Shall have a grounding wire and be connected with a grounding type plug and receptacle.

3.11 TESTING REQUIREMENTS

- A. Measure the OHMIC value of the Electric Service Entrance metallic "System Ground" with reference to "Earth Ground" using the "Multiple Ground Rod Fall-In-Potential" method and suitable instruments. Maximum resistance to ground shall be less than 25 ohms. If this resistance cannot be obtained with the ground system shown, notify the Architect immediately for further instructions. Provide OHMIC test results to Engineer.

END OF SECTION 260526

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SECTION 260532 - OUTLET AND PULL BOXES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide outlet and pull boxes to enclose devices, permit the pulling of conductors, and for wire splices and branches.

1.2 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

PART 2 - PRODUCTS

2.1 INTERIOR WIRING

- A. General: Outlet and pull boxes shall be pressed drawn steel, zinc coated with plaster ring where applicable. Welded boxes are not allowed. Four-inch size minimum. Large pull boxes shall be fabricated sheet steel, zinc coated or baked enamel finish, with return flange and screw retained cover.
- B. Surface Metal Raceway: Boxes of same manufacturer and to match raceway. Boxes to accommodate standard devices and device plate.
- C. Concrete and Masonry: Boxes for casting in concrete or mounting in masonry walls shall be the type specifically designed for that purpose.
- D. Install pull boxes to be accessible after completion of building construction.
- E. Ceiling outlet boxes shall be galvanized octagonal 4 inch, 1-1/2-inch-deep (without fixture stud), 2-1/8 inches deep (with fixture stud).

2.2 EXTERIOR WIRING

- A. Above Grade: Outlet and junction boxes shall be cast or malleable iron or shall be cast of corrosion resistant alloy compatible with raceway to which it is connected. Pull boxes shall be fabricated of heavy gauge steel and hot dipped galvanized. All boxes shall have gasketed covers.

- B. Below Grade: Where exposed to earth, boxes (handholes) shall be constructed of precast concrete with size, configuration, cover, grates and reinforcing as required by the particular installation.
 - 1. Manufacturer: With non-slip lid and similar to Oldcastle utility vault 3030LA with base or Fogtite J11 Type 2 with base. Lid shall be H-20 rated where installed in traffic areas. Where not exposed to earth shall comply with Paragraph 2.02A above.
- C. Exterior outlet boxes shall be weather resistant and rain tight, with appropriate covers, gaskets and screws.

PART 3 - EXECUTION

3.1 ANCHORING

- A. All boxes shall be firmly anchored directly or with concealed bracing to building studs or joints. Boxes must be attached so that they will not rock or shift when devices are operated.

3.2 FLUSH MOUNTING

- A. Except for surface mounted boxes or boxes above accessible ceilings, all boxes shall have front edge (box or plaster ring) even with the finished surface of the wall or ceiling.

3.3 ELECTRICAL OUTLETS

- A. General: Coordinate the work of this section with the work of other sections and trades. Study all Drawings that form a part of this Contract and confer with various trades involved to eliminate conflicts between the work of this section and the work of other trades. Check and verify outlet locations indicated on Architectural Drawings, door swings, installation details, layouts of suspended ceilings and locations of all plumbing, heating and ventilating equipment.
- B. Centered on Built-In Work: In the case of doors, cabinets, recessed or similar features, or where outlets are centered between such features, such as between a door jamb and a cabinet, make these outlet locations exact. Relocate any outlets which are located off the center.
- C. Vertical and Horizontal Relationships: Where more than one outlet is shown or specified to be at the same elevation or one above the other, align them exactly on centerlines horizontally or vertically. Relocate as directed all such outlets (including lighting, receptacle, power signal and thermostat outlets) which are not so installed, at no additional cost to Owner.

D. Device Outlet Height: Measure from the finished floor.

*Switches	4-feet, set vertically, to top of box
*Receptacles, Telecommunications	18-inches, set vertically to centerline
Other	As noted or as directed by Architect
*Heights may vary.	See Drawings for additional information

E. Ceiling Location: For acoustical material locate outlet either at the corner joint or in the center of a panel, whichever is closer to the normal spacing. Locate all outlets in the same room in the same panel location.

F. Installed in Sound Walls: Boxes installed on sound walls shall not be installed back-to-back. All boxes shall be separated by one stud space and shall be interconnected with flex conduit with a 90° loop. Where stud space separation is not possible, utilize sound attenuating mastic around each box. 3M Fire Barrier Moldable Putty Pads MPP+ (2.54 mm minimum) or similar.

3.4 ELECTRICAL WORK IN COUNTERBACKS, MILLWORK AND CASEWORK

A. Provide as shown and/or specified. Provide templates, where required, to other trades for drilling and cutting to ensure accurate location of electrical fixtures (outlets and devices) as verified with the Architect. Provide all wiring, devices, plates and connections required by said fixture.

3.5 CONNECTION TO EQUIPMENT

A. For equipment furnished under this or other Divisions of the Specifications, or by others. Provide outlet boxes of sizes and at locations necessary to serve such equipment. An outlet box is required if the equipment has pigtail wires for external connection, does not have space to accommodate circuit wiring used. Study equipment details to assure proper coordination.

3.6 BLANK COVERS

A. Provide blank covers or plates over all boxes not covered by equipment.

3.7 JUNCTION OR PULL BOXES

A. Pull and junction boxes shall be installed as shown, to facilitate pulling of wire and to limit the numbers of bends within Code requirements. Boxes shall be permanently accessible and shall be placed only at locations approved by the Architect.

B. In suspended ceiling spaces, boxes shall be supported from the structure independently from ceiling suspension system.

C. The Drawings do not necessarily show every pull box or junction box required. The Contractor is permitted to provide boxes deemed necessary when installed in accordance with these Specifications.

3.8 ELECTRIC WATER COOLER

- A. Conceal the electrical outlet behind the unit housing as provided for by the Manufacturer.

3.9 BOXES CONTAINING MULTIPLE DEVICES

- A. Boxes containing emergency and normal devices are permitted only with steel barriers manufactured especially for the purpose of dividing the box into two completely separate compartments.
- B. Device boxes containing multiple devices and wiring rated over 150 Volts to ground and over 300 Volts between conductors are permitted only with steel barrier manufactured especially for the purpose of dividing the box into separate compartments for each device having exposed live parts.

3.10 BOXES IN EARTH

- A. Provide for all wire splices and as required to pull conductors. Boxes (handholes) shall be set in place on a 3" sand bed. Coverplates shall be flush to, and match the slope of, the final surface grade.

3.11 COLOR CODING

- A. All junction boxes installed in accessible spaces and exposed in unfinished areas shall be color coded using spray paint or tape on the box and cover as applicable in the following manner:

277/480-Volt	Sand
120/208-Volt	Gray
Emergency Power	Orange
Fire Alarm	Red
Clock & Program	Green
Intrusion Alarm	Yellow
Telephone	Dark Blue
Television	Rust

- B. The colors shall match the colors used on the raceway - See Section 260533.

3.12 NAMEPLATES

- A. For all line voltage junction boxes, provide engraved nameplate indicating circuit numbering of all wiring in junction box.

END OF SECTION 260532

SECTION 260533 – RACEWAY

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide raceway system complete.

1.2 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

PART 2 - PRODUCTS

2.1 GALVANIZED RIGID STEEL CONDUIT (GRS)

- A. General: Hot dipped galvanized.
- B. Fittings: Galvanized malleable iron or noncorrosive alloy compatible with galvanized conduit. Erickson couplings, watertight split couplings (OZ Gedney type or equivalent) permitted. Running thread or set screw type fittings not approved.

2.2 INTERMEDIATE METAL CONDUIT (IMC)

- A. General: Hot Dipped galvanized.
- B. Fittings: Galvanized malleable iron or noncorrosive alloy compatible with galvanized conduit. Erickson couplings, watertight split couplings (OZ Gedney type or equivalent) permitted. Running thread or set screw type fittings not approved.

2.3 ELECTRICAL METALLIC TUBING (EMT)

- A. General: Hot dipped galvanized.
- B. Fittings: Raintight; steel or malleable iron type using a split corrugated compression ring and tightening nut, or stainless-steel locking disc. Steel set screw fittings are acceptable for dry locations. Indenter, drive-on and pressure cast or die cast type set screw are not acceptable.

2.4 FLEXIBLE METAL CONDUIT (FMC, LFMC)

- A. Dry Locations:
 - 1. General: Galvanized flexible steel for dry locations only.

2. Fittings: Malleable iron or steel, Thomas and Betts "squeeze" type or equal.

B. Damp and Wet Locations:

1. Liquid Tight: Polyvinyl chloride (PVC) weatherproof cover over flexible steel conduit.
2. Fittings: Thomas and Betts "liquid tight" or equal.

2.5 SURFACE METAL RACEWAY

- A. Formed steel or aluminum type. Standard factory finish. Where color choice is available, consult Architect/Engineer for selection prior to ordering.

2.6 RIGID NON-METALLIC CONDUIT (PVC)

- A. Schedule 40 rigid polyvinyl chloride type unless otherwise noted.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install Raceway concealed in construction unless noted otherwise on the Drawings or specifically approved in writing by the Architect/Engineer.
- B. Cut Raceway ends square, ream and extend maximum distance into all couplings and connectors.
- C. Provide and install manufactured end caps on all Raceway ends during construction to prevent the entrance of water or dirt. Tape, as a cover, not permitted.
- D. Swab out all Raceways before pulling wires.
- E. All elbows for GRS and PVC Raceway shall be factory radius bends. For all other Raceway, use factory radius bends of 1-1/4" and larger diameter.
- F. Raceway shall not penetrate sheet metal ducts unless permission is granted by Architect/Engineer. All sleeves shall be provided for Raceway installation.
- G. Provide (2) 3/4" conduit stubs into accessible ceiling space from all recessed panelboards or systems terminal boxes.

3.2 GALVANIZED RIGID STEEL CONDUIT

- A. All Connections shall be watertight. Install for all raceways in concrete or where subject to damage.

3.3 INTERMEDIATE METAL CONDUIT

- A. Intermediate metal conduit is permitted as a substitute for galvanized rigid steel conduit except where GRS is required by Code.

3.4 ELECTRICAL METALLIC TUBING

- A. Install for wiring in masonry, frame construction, furred ceilings and above suspended ceilings. May be used for exposed work in unfinished areas where not subject to damage. Where construction involves masonry work, surface cut masonry units wherever such masonry units are to remain unplastered or uncovered in complete construction.

3.5 RACEWAYS UNDERGROUND

- A. Galvanized rigid steel conduit - painted with two coats of bitumastic paint - or galvanized rigid steel conduit with 15 mil. polyvinyl chloride (PVC) jacket (repair abrasions with PVC base paint or PVC).
- B. PVC raceways may be used for underground runs when permitted by the Code. Field bends, when necessary, shall be formed only with the factory recommended heater. Penetrations through floor and walls shall be galvanized rigid steel (GRS) conduit. PVC, if used, shall be increased in size from that shown to include Code required ground wire.
- C. All underground bends in excess of 10° and all elbows shall be GRS.
- D. Arrange and slope raceways entering building to drain away from building.
- E. Ground wires shall be provided in all PVC raceway.

3.6 INSERTS, SHIELDS AND SLEEVES

- A. Furnish and set in place, in advance of pouring slabs and walls, all inserts and sleeves needed to execute Division 26 equipment installation.
- B. Where supports in slabs are required after wall has been poured, use a drilled-in threaded insert, installed as recommended by Manufacturer.
- C. Sleeves shall be provided for all wall penetrations.

3.7 RACEWAYS THAT STUB UP THROUGH FLOOR

- A. Install at such depth that the exposed raceway is vertical, and no curved section of the elbow is visible.
- B. PVC raceway shall not be stubbed through floors.

3.8 SEALING OF RACEWAY PENETRATIONS

- A. Exterior Wall Surfaces Above Grade: Seal around all penetrations with caulking approved by Engineer. For concrete construction above ground level, cast Raceway in wall or core drill wall and hard pack with a mixture of equal parts of sand and cement.
- B. Exterior Surfaces Below Grade: Cast raceway into wall (or floor) or use manufactured seal assembly (such as OZ Gedney type "FSK") cast in place.
- C. Roofs: Provide mopped, lead, roof jack where raceway penetrates roof membrane.
- D. Fire Rated Floors, Walls, Ceiling/Roofs: Concrete or masonry, seal around raceway penetration with Dow Corning 3-6548 silicone RTV foam or approved equal. Plaster or gypsum wallboard, seal around raceway penetration with plaster, fire tape per local Fire Marshal's requirements.

3.9 SEALING OF RACEWAYS

- A. Seal interior of all raceways which pass through buildings roofs, floors or through outside walls of the building, above or below grade. Seal on the end inside the building using duct sealing mastic, non-hardening compound type, specially designed for such service to maintain the integrity of the seal of the wall, floor or roof. Pack around the wires in the Raceways.

3.10 HANGERS FOR RACEWAYS

- A. In suspended ceiling spaces the Contractor may, at their option, attach 1/2" or 3/4" EMT raceways to the ceiling suspension system where such system is structurally suitable on independent wire secured at both ends; in which case, provide clips manufactured for the purpose.
- B. When more than two raceways use the same routing, group together on a patented channel support system (such as Unistrut).

3.11 SURFACE METAL RACEWAY

- A. Install parallel to the building surface (i.e., wall, ceiling, floor). Fasten to surface as recommended by Manufacturer. Mount so raceway is in the least obvious location. Shall be used in lieu of conduit in finished areas.

3.12 FLEXIBLE CONDUIT

- A. Flexible conduit shall be used only for connection to motors and equipment subject to vibration with 90° loop minimum to allow for isolation and for lay-in lighting fixtures above T-Bar ceilings. For fixture installations, one end of flex must terminate in rough-in junction box. Flex conduit shall not be installed over 6' long or used to connect from fixture to fixture. Use liquid tight for pumps, equipment which is regularly washed down, and equipment in damp locations. Provide ground wire.

3.13 COLOR CODING

- A. General: Provide color bands of tape or paint one inch (25 mm) wide for raceways up to two inches (51 mm) in diameter and one-half the raceway diameter for larger raceways, applied at panel and pullbox locations within each room, and 50 ft. (15.25 m) on centers within an area.
- B. Color Banding:
- | | |
|-----------------------------|-----------|
| 120/208 Volt | Gray |
| 277/480 Volt | Sand |
| Clock and Program | Green |
| Emergency Power | Orange |
| Fire Alarm | Red |
| Intrusion Alarm | Yellow |
| Low Voltage Switching | Black |
| Telephone | Dark Blue |
| Television | Rust |
- C. The colors shall match the colors used on the boxes - See Section 260532.

3.14 PULL CORDS

- A. Nylon type shall be included in all installed empty raceway.

END OF SECTION 260533

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SECTION 260534 - METAL-CLAD CABLE (TYPE MC) AND FITTINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide metal-clad (Type MC) cable for power, control, and lighting systems.
- B. Provide wiring connections and terminations.

1.2 REGULATORY REQUIREMENTS

- A. Products shall be tested, approved, and labeled/listed by Underwriters Laboratories, Inc. in accordance with UL 1569.

1.3 USES PERMITTED

- A. MC Cable is permitted to be used for 20-Amp lighting and power circuits where routing is above grade, concealed, and the installation meets the requirements of NEC 330.
- B. MC Cable shall NOT be used for homerun circuits from the fixture, receptacle, or equipment to the panelboard. Hard conduit must be used from the panelboard to the nearest accessible ceiling space to the panelboard.
- C. MC Cable shall not be used for HVAC equipment.

PART 2 - PRODUCTS

2.1 CABLE ASSEMBLY

- A. Metal-clad cable assemblies shall consist of 2, 3, or 4 current-carrying conductors and an equipment ground conductor.
- B. Conductors: Solid copper conductor, No. 12 AWG minimum or No. 10 AWG maximum. Installation methods shall be as specified under Part 3 - Execution below.
- C. Insulation: Conductor insulation shall be rated 600-volt, Type THHN, 90°C dry.
- D. Fillers: Fillers shall be non-hygroscopic and non-wicking.
- E. Binder: Core binder shall be corrugated polyester.
- F. Sheath: The metal sheath shall be galvanized steel or aluminum. The metal sheath shall be extruded onto the cable or applied longitudinally, then wrapped and welded. The sheath shall then be corrugated for greater flexibility.

- G. Jacketing: When PVC jacketing is required, the jacket shall be flame-retardant PVC with a temperature range of -40°C to 90°C.
- H. Equipment Grounding Conductor: The equipment ground wire shall be of the same construction as specified in 2.02.A and 2.02.B and be at a minimum the same size as the current carrying conductors. The insulation color shall be green.

2.2 FITTINGS

- A. Fittings shall be UL listed and identified for such use with metal-clad continuous corrugated sheath cable, with or without PVC jacketing, as is appropriate for the installation.
- B. Connectors shall be of steel or malleable iron and shall be a squeeze type clamp connector with a locknut for non-jacketed metal-clad cable. Compression gland type connectors shall be used for jacketed metal-clad cable.

PART 3 - EXECUTION

3.1 INSTALLATION – POWER AND LIGHTING SYSTEMS WIRING

- A. All wiring shall be installed in compliance with the latest version of the National Electrical Code and all other applicable codes and standards as indicated elsewhere in these specifications.
- B. Use of metal-clad cable shall be permitted only for lighting, equipment, and receptacle branch circuits. Metal-clad cable shall not be permitted in locations designated to be hazardous Class I, II, or III.
- C. Metal-clad cable shall be permitted only for motor circuits where the motor being served is less than 1/2 HP and rated for 120V, single phase. Metal-clad cable is not permitted for HVAC equipment and controls.
- D. Metal-clad cable shall only be installed concealed within walls and above ceiling interstitial spaces. Where there is no ceiling interstitial space, metal-clad cable may not be used.
- E. Metal-clad cable shall not be installed between floor levels. Provide hard pipe (i.e., EMT, RGS, IMC) when routing between floors levels.
- F. Bends in corrugated sheath metal-clad cable shall be made so that the cable will not be damaged. The radius of the curve of the inner edge of any bend shall not be less than (7) times the diameter of the metallic sheath.
- G. Metal-clad cable is not permitted to connect branch circuits to fumehoods, gas storage cabinets, or chemical storage cabinets.
- H. No metal-clad cable shall be installed in ventilation ducts or plenums.

- I. Conductors in Enclosures: Provide neat and workmanlike installation with conductors tied with T&B Ty-Rap, Virginia Plastics, or equal, nylon wire ties in terminal cabinets, gutters and similar locations.
- J. MC cable shall only be installed in dry locations.

3.2 FITTINGS

- A. Fittings used for connecting metal-clad cable to boxes, light fixtures or other equipment shall be UL listed and identified for such use.
- B. Cable preparation for installation of fittings shall follow manufacturer's instructions. The manufacturer's specialized tools shall be used for preparing cable ends for installation of fittings.
- C. The cable end shall be cut square to ensure flush seating of the cable into the fitting. Fitting securement screws shall be properly torqued. Cable ends shall be fitted with insulating bushings intended for the type of metal-clad cable being installed.
- D. For jacketed metal-clad cable, the outer jacket shall be removed to the length specified by the fitting manufacturer's instructions. Remove oils or solvent by-products from the outer jacket of the cable. The cable end shall be cut square to ensure flush seating of the cable into the fitting. The fitting gland nut shall be properly torqued to the manufacturer's specifications.

3.3 ARRANGEMENT AND SUPPORT

- A. Metal-clad cables shall be run parallel with walls or structural elements. Vertical runs shall be plumb; horizontal runs level and parallel with structure, as appropriate. Groups shall be racked together neatly with both straight runs and bends parallel and uniformly spaced.
- B. Metal-clad cables shall be securely fastened in place at intervals of not more than six feet, with suitable clamps or fasteners of approved type, and all vertical conduits shall be properly supported to present a mechanically rigid and secure installation.
- C. Metal-clad cable installed parallel to framing members, such as studs, joist, or rafters, shall be supported so that the nearest outside surface of the cable is not less than 1-1/4-inches from the nearest edge of the framing member. Where this distance cannot be maintained, the cable shall be protected by a steel plate, sleeve, or equivalent that is at least 1/16-inch thick.
- D. Maintain at least 6-inch clearance between metal-clad cables and other piping systems. Maintain 12-inch clearance between metal-clad cables and heat sources such as flues, steam pipes, and heating appliances.
- E. No metal-clad cable shall be fastened to other conduits or pipes or installed so as to prevent the ready removal of other pipes or ducts for repairs.

- F. Individual metal-clad cables hung from roof structure or structural ceiling shall be supported by split-ring hangers and wrought-iron hanger rods. Where (3) or more metal-clad cables are suspended from the ceiling in parallel runs, use steel channels, Kindorf, Unistrut or equal, hung from 1/2-inch rods to support the conduits. The conduit on these channels shall be held in place with metal-clad cable clamps designed for the particular channel that is used.
- G. Secure metal-clad cable support racks to concrete walls and ceilings by means of cast-in-place anchors; die-cast, rustproof alloy expansion shields; or cast flush anchors. Wooden plugs, plastic inserts, or gunpowder driven inserts shall not be used as a base to secure conduit supports.
- H. Metal-clad cable shall be supported immediately on each side of a bend and not more than one (1) foot from an enclosure where a run of metal-clad cable ends.
- I. Use of Cable Tray:
 - 1. The sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area allowed by NEC Tables 392.9, 392.9(E) and 392.9(F).
 - 2. Cables shall be installed in a single layer with a maintained spacing of not less than one cable diameter between cables.
 - 3. Ampacity of cables installed in cable tray shall meet the requirements of NEC 392.11.

3.4 INSPECTION AND TESTS

- A. General: The electrical installation shall be inspected and tested to ensure safety to building occupants and operating personnel and conformity to Code
- B. Measure and record insulation resistance of all power and control wiring including insulation resistance of all equipment:
 - 1. The insulation resistance of each circuit phase-to-phase and phase-to-ground shall be measured. For circuits rated less than 600-volts, the resistance shall not be less than 2-megohms.
 - 2. Systems rated above 240-volts shall be tested with a 1000-volt Megohmmeter. Circuits rated 240-volts and below shall be tested with a 500-volt Megohmmeter. The D.C. potential shall be applied for (30) seconds.
- C. The Contractor shall record test readings and submit certified test to the Engineer for review and acceptance approval before energizing respective circuits.

END OF SECTION 260534

SECTION 260539 - FLOOR OUTLET DEVICES – FLUSH

PART 1 - GENERAL

1.1 SCOPE

- A. The floor box provides the interface between power and communication cabling in an on grade or above grade concrete floor where power and/or communication services are required.

1.2 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.3 CLASSIFICATION AND USE

- A. This floor box shall have been examined and tested by Underwriters Laboratories Inc. to Standard UL514A and/or UL514C and bear the U.S. UL Listing Mark. This floor box shall also conform to the standards set in the National Electrical Code, Section 300.21. This floor box shall also have been evaluated by UL to meet the applicable U.S. safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.

1.4 SUBMITTALS

- A. In general, all floor boxes shall be of the size and type indicated on the drawings herein specified. All floor boxes shall be located as directed by the Architect or as dimensioned on the architectural drawings. If drawings are not dimensioned, coordinate exact location prior to rough-in.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. The Walker floor box described shall be manufactured by The Wiremold Company. Floor boxes of other manufacturers may be considered, if equal in functionality and quality, by written approval of the specifying Engineer and shall meet all the performance standards specified herein. In addition, the Contractor shall have (10) days to submit to the specifying Engineer, a working sample from any other manufacturer.

2.2 MATERIALS

- A. RFB4 and RFB4-4DB Series Floor Boxes: The floor box shall be manufactured from stamped steel and be approved for use on above grade floors. The box shall be 12-3/4" L x 10" W x 3-7/16" H. There shall be four independent wiring compartments that allow capacity for up to four duplex receptacles and/or communication services. The RFB4 Series Box shall permit tunneling from end power compartment to end power compartment. The RFB4-4DB Series Box shall permit tunneling from adjacent or opposite compartments. Two of the four compartments shall have a minimum wiring capacity of 16.4 cu in., one compartment shall have a minimum capacity of 32.3 cu in., and one compartment shall have a minimum capacity of 50 cu in. The box shall provide the following number of conduit knockouts: one 1/2", three 1", six 3/4", and six 1 1/4". The box shall be fully adjustable, providing a maximum of 1 7/8" pre-pour adjustment, and a maximum of 3/4" after-pour adjustment. The box shall provide a series of device mounting plates that will accept both duplex power devices, as well as plates that will accommodate data connectivity outlets and modular inserts and other open system devices.
- B. RFB4-CI-1 Series Floor Box: This box shall be manufactured from cast-iron and be approved for use on grade and above grade floors. The box shall be 14 1/2" L x 11 7/8" W x 3 7/16" H. There shall be four independent wiring compartments that allow capacity for up to four duplex receptacles and/or communication services. The RFB4-CI-1 Series Box shall permit tunneling from adjacent or opposite compartments. Two of the four compartments shall have a minimum wiring capacity of 27 cu in., and two compartments shall have a minimum wiring capacity of 36 cu in. The box shall provide the following number of conduit hubs: four 1" and four 1 1/4". The box shall be fully adjustable, providing a maximum of 1 7/8" pre-pour adjustment, and a maximum of 3/4" after-pour adjustment.
- C. RFB4-SS Series Floor Box: This box shall be manufactured from stamped-steel and be approved for use on above grade floors. The box shall be 13 5/8" L x 10" W x 2 7/16" H. There shall be four independent wiring compartments that allow capacity for up to four duplex receptacles and/or communication services. The RFB4-SS Series Box shall permit feed through tunneling from adjacent compartments. Two of the four compartments shall have a minimum wiring capacity of 15.7 cu in., and two compartments shall have a minimum wiring capacity of 31.2 cu in. The box shall provide the following number of conduit knockouts: two 1/2", six 3/4", and eight 1". The box shall be fully adjustable, providing a maximum of 1 7/8" pre-pour adjustment, and a maximum of 3/4" after-pour adjustment.
- D. Activation Covers: Activation covers shall be manufactured of diecast aluminum and be available in a textured aluminum finish. Activation covers shall be available in flanged and flangeless versions. Covers shall be available with options for carpet and tile inserts, or blank covers.
1. Flanged covers shall be 8" L x 6 3/4" W.
 2. Flangeless covers shall be 6 3/4" L x 5 5/8" W.
 3. The activation cover shall have been evaluated by UL to meet the applicable U.S. and Canadian safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.
 4. Activation covers must meet or exceed the following load capacity requirements:

S36CCTCAL	930lb
S36BBTCAL	1115lb

5. Provide the S36BBTCAL activation cover where installed in carpeted areas and provide the S36CCTCAL activation cover where installed in tile areas. Coordinate with and pay tile installer to install matching tile in cover.
- E. Communication Modules Mounting Accessories: The floor box shall be provided with all faceplates and bezels to facilitate mounting of UTP, STP (150 ohm), fiber optic, coaxial, and/or communication devices as shown on plans. The box shall provide a series of device mounting plates that will accommodate data workstation connectivity outlets and modular inserts, and any other open system devices as shown on plans.

PART 3 - EXECUTION

3.1 GENERAL

- A. The minimum concrete pour depth shall be 3 7/16" for the RFB4, RFB4-4DB, and the RFB4-CI-1 Series Boxes, and 2 7/16" for the RFB4-SS Series Box. The box shall contain four locations to accommodate leveling for pre-concrete pour adjustment and shall provide four leveling screws for the pre-pour adjustment. Provide only RFB4-SS series boxes for all 2nd floor areas. Slab on grade installation may use either type of floor box.
 1. All pre-set inserts shown on the drawings shall be installed with specified runs of conduit.
 2. Wire-pulling cords shall be in place in the conduit prior to pouring concrete.
 3. Install and activate the assembly as directed by the manufacturer's installation instructions.
 4. Provide all required hardware to properly level boxes prior to pouring of concrete.
 5. The flanged activation cover shall be installed to protect the carpet edge from fraying. Coordinate with the General Contractor or Owner, so as not to interfere with other work in progress.
 6. The floor box shall be warranted for one year from the date of final acceptance.
- B. Coordinate cover orientation with architect prior to installation.

END OF SECTION 260539

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SECTION 260573 - ELECTRICAL SYSTEM STUDIES

PART 1 - GENERAL

1.1 GENERAL

- A. Conform to the General Conditions, Supplementary Conditions, and related work in other Divisions for all work in Division 26. See Division 01 for sequence of work.

1.2 RELATED SECTIONS

- A. Section 260000 – Electrical General Conditions
- B. Section 262413 – Switchboards
- C. Section 262416 – Panelboards
- D. Section 262419 – Motor Controllers
- E. Section 262813 – Fuses
- F. Section 262816 – Disconnects and Fused Switches

1.3 SECTION INCLUDES

- A. This section includes the requirements for the contractor to perform electrical system studies based on the selected electrical equipment.
- B. The required studies include but are not limited to a Coordination Study and an Arc Flash Assessment Study.
- C. Each of the studies performed shall be based on the actual equipment to be installed. Any revisions of the selected equipment shall result in an updated study with the revised equipment submitted for review and approval prior to ordering equipment.
- D. If the contractor installs different equipment than was included in the approved electrical system studies, the owner reserves the right to require the contractor to replace the non-approved electrical equipment at no additional cost to the owner.
- E. The contractor shall provide all studies in agreement with all applicable codes and standards. If a specific code is applicable to the electrical system being modeled, the code shall be referenced, and the portion of the electrical system impacted shall be noted.

1.4 SUBMITTAL REQUIREMENTS OF THIS SECTION

- A. During the Shop Drawing process and prior to ordering electrical equipment, the contractor shall submit an **Electrical System Overcurrent Protective Device Coordination Study**. The Coordination study shall be submitted with the product data for all devices included in the coordination study and shall be formatted as indicated in Paragraph 2.01.
- B. After the electrical system has been installed and is ready for energization, the Contractor shall provide an **Arc Flash Assessment Study**. The Arc Flash Assessment shall be submitted for approval prior to substantial completion. Once the Arc Flash Assessment Study is approved, the Contractor shall print and install the approved Arc Flash notification labels on all equipment containing overcurrent protective devices. Labels installed outdoors shall be suitable for outdoor installation. The Arc Flash Assessment Study shall be assembled as outlined in Paragraph 2.02.

1.5 QUALIFICATIONS

- A. All Studies shall be prepared by a qualified professional electrical engineer.

1.6 DEFINITIONS

- A. For the purposes of this section, overcurrent device coordination shall be defined in two levels as follows:
 - 1. Coordinated = Full coordination outside of the instantaneous region of the overcurrent devices.
 - 2. Selectively Coordinated = Full coordination including the instantaneous region of the overcurrent devices.

1.7 OPERATION AND MAINTENANCE REQUIREMENTS OF THIS SECTION

- A. The contractor shall provide to the owner the following information to be included in the Operation and Maintenance Manual:
 - 1. Final Arc Flash Assessment Study submitted in accordance with the requirements outlined in Section 260000 Electrical General Conditions.
 - 2. The electronic copy shall also include a sub-folder with the software model used to perform the calculations. The model shall include all files necessary to access and review the model electronically. The Contractor shall include a Text File in the directory labeled "MODEL_INFORMATION.TXT" which includes the following:
 - a. Project Name
 - b. Electrical Contractor Name
 - c. Software used to model the system including version
 - d. Date the model was last updated
 - e. Contact information for the individual/organization who prepared the model.

PART 2 - PRODUCTS

2.1 PROTECTIVE DEVICE COORDINATION STUDY

- A. The contractor shall submit an **Electrical System Overcurrent Protective Device Coordination Study** during the Shop Drawing submittal phase of the project prior to ordering equipment with overcurrent protective devices. The Coordination study shall be submitted with the product data for all devices included in the coordination study.
- B. All overcurrent protection devices shall be provided as a coordinated system by the manufacturer. Any cases where the selected manufacturer is unable to coordinate two overcurrent devices in series due to the sizes indicated in the design, the engineer shall be notified and a recommended coordination solution provided by the manufacturer prior to or during the submittal phase. For overcurrent protection devices 400A and larger where the manufacturer is unable to provide a coordinated system, the overcurrent protection devices shall include Long-Time/Short-Time/Instantaneous (LSI) time delay and ampacity settings minimum.
- C. Unless noted otherwise, when a main service overcurrent device with adjustable Ground Fault trip has been specified, the next level feeder overcurrent devices shall also include adjustable Ground Fault trip. The Coordination Study shall also provide recommended settings for all adjustable Ground Fault trip devices.
- D. All emergency system overcurrent protection devices shall be selectively coordinated as defined by applicable codes and standards (2020 NEC 700.32 and WAC 296-46B-700). The scope of the selectively coordinated system shall be as defined by applicable local, state, and federal codes.
- E. For modifications/additions to existing electrical systems, at a minimum the Coordination Study shall include:
 - 1. All new electrical equipment containing overcurrent devices
 - 2. The existing overcurrent protective devices immediately downstream of the new electrical equipment
 - 3. All existing overcurrent protective devices upstream of the new electrical equipment to the main electrical utility service entrance.
- F. The Protective Device Coordination Study shall present the following information in an organized report:
 - 1. Coordination Study Title Page shall include:
 - a. Project Name
 - b. Electrical Contractor name
 - c. Date Study was performed
 - d. Study Type (i.e., Overcurrent Device Coordination Study)
 - e. Name/Company/Contact information for organization performing the study
 - f. Analysis software used to perform the study including version

2. Coordination Study Executive Summary shall include a brief project description, an overall description of the electrical system, and a listing of any items that may need resolution. If specific Code requirements exist for any portion of the electrical system, they shall be noted in addition to how the requirement was implemented.
3. Coordination Study Analysis shall include a detailed outline of the overcurrent device coordination analysis. Time Current Curves shall be provided for each unique coordination path in the electrical system from the Main service protective device to the largest branch circuit breaker. Each Time Current Curve shall be uniquely labeled. The report shall include a list of the overcurrent devices included in each Time Current Curve and a description of any potential un-coordinated devices with the potential impact on the electrical system due to the lack of coordination.
4. Conclusion shall include a summary of overall protective device coordination for the electrical system being modeled. The Conclusion shall also include a table listing all devices with adjustable settings and the recommended settings based on the coordination study. Any uncoordinated electrical devices that include recommended revisions shall be listed with the proposed system revision.
5. As an Appendix, the Coordination Study shall include a one-line diagram of the modeled system with each bus and overcurrent device identified. The naming of the devices in the one-line diagram shall exactly match the device names in the report and time-current curves.

2.2 ARC FLASH ASSESSMENT STUDY

- A. After the electrical system has been installed and is ready for energization, the Contractor shall provide an Arc Flash Assessment Study. The Arc Flash Assessment Study shall be submitted for approval prior to substantial completion. Once the Arc Flash Assessment Study is approved, the Contractor shall print and install the approved Arc Flash notification labels on all equipment containing overcurrent protective devices.
- B. The Arc Flash Assessment Study shall include the following at a minimum:
 1. Study Title Page shall include the following information:
 - a. Project Name
 - b. Date Study was performed
 - c. Name/Company/Contact information for organization performing the study
 - d. Analysis software used to perform the study including version
 2. An Index shall be provided listing each Section included in the Arc Flash Assessment Report.
 3. The Study Executive Summary shall be a brief overview of each section of the Study including any recommended revisions to the electrical system based on the results of the Study. The overview shall include at a minimum, any pieces of equipment with a calculated fault current that exceeds the equipment rating, a listing of any overcurrent devices with revised settings, a brief listing of un-coordinated equipment that necessitate revisions, and a listing of each piece of equipment with a Dangerous level of Arc Flash energy.
- C. Each of the following sections and appendices shall include a dedicated Cover Page outlining the contents of the Section.

- D. Section #1 Fault Analysis shall include an updated Fault Current Analysis of the entire electrical system. The Fault Analysis shall include as a minimum the following information:
1. The available fault current at the Utility for the fault analysis shall be based on the actual Utility fault current and not an assumption. For electrical distribution systems that are primary metered, the study shall include the primary electrical system back to the point of service including but not limited to actual cable lengths/sizes/types and any overcurrent protective devices. The study shall include correspondence from the utility showing the available fault current at the utility service point in the appendices.
 2. Updated cable size/type/length shall be included in the report based on the installed conditions.
 3. Updated transformer information based on the installed transformer nameplates.
 4. Current limiting fuses shall be indicated where applicable based on the actual equipment installed.
 5. Large motors (>50hp) shall be included in the analysis. Smaller motors shall be grouped together on each panel/switchboard.
 6. A Table shall be provided with a comparison of calculated fault current to equipment fault rating for each piece of equipment containing overcurrent protective devices. The calculated fault current shall be adjusted as necessary based on the calculated X/R ratio.
 7. Any equipment that is found to have a rating less than the calculated/adjusted fault current shall be specifically indicated along with recommended corrective action.
 8. The Fault Analysis shall include the system model one-line diagram with the following information indicated:
 - a. Utility connection point with available fault current and X/R ratio.
 - b. Cables with conductor size, length, parallel count, raceway type.
 - c. Transformers with impedance, kVA, X/R ratio.
 - d. Large motors (>50hp). Smaller motors shall be grouped together on each panel/switchboard.
 - e. Electrical equipment with overcurrent protective devices showing calculated fault current.
- E. Section #2 Protective Device Coordination Study shall include an updated Coordination Study for the entire distribution system as outlined in Paragraph 2.01. The updated coordination study shall optimize settings to provide coordination while reducing the Arc Flash energy present.
- F. Section #3 Arc Flash Assessment shall include a description of the method used to calculate the Arc Flash energy present and the assumptions of the study. The following additional items shall be included in the study as a minimum:
1. Table summarizing the Arc flash energy present at each piece of equipment and the conditions under which the incident energy occurred. The table shall also include the arcing time, fault current, upstream overcurrent device, and any notes for different conditions present.
 2. A template Arc Flash label with each piece of information included on the label explained.
 3. Sample Arc Flash Labels for each piece of equipment in the model, showing the code required information.
- G. Appendix A shall include that correspondence from the electric utility providing the available fault current used in the analysis.

- H. Appendix B shall include cut sheets for all electrical equipment included in the Arc Flash Assessment study.

PART 3 - EXECUTION

3.1 TESTING/VERIFICATION

- A. The contractor shall provide testing of each piece of electrical equipment with adjustable overcurrent protective devices to verify proper operation in accordance with the manufacturer's recommendations. The test reports shall indicate the following at a minimum:
1. Equipment name.
 2. Date of the test.
 3. Name and organization of the individual performing the testing
 4. Test results. Any equipment failing the testing shall be replaced at no additional cost to the owner.
 5. As-Left settings. These settings shall be as indicated in the Arc Flash Assessment Study. Any settings that vary from the Study shall be either updated in the Study including a revised submittal package or shall be corrected in the field and an updated test report provided.

3.2 FIELD APPLIED ARC FLASH LABELS

- A. After the Arc Flash Assessment Study is approved and the electrical equipment has been successfully tested, the Contractor shall provide Arc Flash and Shock Hazard warning labels on all electrical devices containing overcurrent protection stating the following information at a minimum:
1. PPE level of protection
 2. Incident energy (cal/cm²) at 24" from the equipment unless specified otherwise by the Owner/Engineer
 3. Flash hazard boundary
 4. Glove class
 5. Limited approach distance
 6. Restricted approach distance
 7. Prohibited approach distance
 8. Date study was performed
- B. Labels shall be permanently affixed to the equipment or wiring method and shall not be handwritten.
- C. The label shall be of sufficient durability to withstand the installed environment. Labels installed outdoors shall be suitable for outdoor installation with no degradation due to sunlight or precipitation.
- D. The label shall meet ANSI Z535 guidelines and requirements.

END OF SECTION 260573

SECTION 260923 – NETWORK DIGITAL LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.1 INTRODUCTION

- A. The work covered in this section is subject to all of the requirements in the general conditions of the specifications. The Contractor shall coordinate all work in this section with all the trades covered in the other sections of the specification to provide a complete and operative system.
- B. Electrical Contractor shall provide all support, labor and material to accommodate commissioning, per Sections 019113 and 260800.

1.2 DESCRIPTION OF WORK

- A. Extent of lighting control system work is indicated by drawings and by the requirements of this section. It is defined to include low voltage lighting control panels, switch inputs, and wiring.
- B. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 QUALITY ASSURANCE

- A. UL & ULC Approvals: The control panels shall be tested and listed under the UL 916 Energy Management Equipment standards by a nationally recognized testing laboratory. Emergency Lighting Equipment shall be listed under UL 924.
- B. NEC Compliance: The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.
- C. NEMA Compliance: The control system shall comply with all applicable portions of the NEMA standards regarding the types of electrical equipment enclosures.
- D. Component Pre-Testing: All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.
- E. System Checkout: A factory-trained technician or factory-authorized personnel or Contractor shall functionally test the control system and verify performance after installation.
- F. Manufacturer: Manufacturer shall have a minimum of ten (10) years' experience in control systems. These specifications are based on the Encelium Networked Light Management System by Osram Sylvania. Substitutions of the specified equipment will be considered providing sufficient documentation is provided to the Engineer which certifies that the equipment qualification meets the requirements of this specification.

- G. Similar systems manufactured by Cooper Wavelinx are acceptable. The listing of any manufacturer as “acceptable” does not imply automatic approval. It is the sole responsibility of the electrical contractor to ensure that any price quotations received, and submittals made are for devices and systems which meet or exceed the specifications included herein.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on lighting control system and components.
- B. Shop Drawings: Submit drawings of lighting control system and accessories including, but not necessarily limited to, the low voltage relay panels, power wiring, and switch inputs.
 - 1. Complete layout of every space with the parts identified and wire routing
 - 2. Riser Diagram/System Diagram
 - 3. Switch Input Wiring
- C. Example Contractor Startup/Commissioning Worksheet
- D. Hardware and Software Operation Manuals

1.5 COORDINATION

- A. Coordinate lighting control components to form an integrated interconnection of compatible components.
- B. Coordinate lighting controls with BAS (building automation system) either through IP based intercommunication of system or hardwired auxiliary relay outputs.
- C. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.

1.6 WARRANTY

- A. All devices in lighting control system shall have a 5-year warranty.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE REQUIREMENTS

- A. This specification is intended to fully describe all of the design, engineering, programming, hardware, software, ancillary devices and associated technical services required to provide a building-wide networked lighting control system. This system is specified to perform scheduled and automated lighting control sequences.

- B. The lighting control “system” shall include a fully distributed WAN/LAN network of global controller/routers, individually addressable System Field Devices that are not integral to luminaires, sensors, switches, relays and other ancillary devices required for a complete and operable system. The system WAN/LAN start-up shall be by the control system manufacturer or contractors certified by the manufacturer.
- C. The basis of system design shall utilize non-proprietary industry standard 0-10V dimming or fixed output ballasts and/or 0-10V LED drivers, occupancy sensors, daylight sensors, etc.
- D. UL 924 listed devices shall have the ability to control 120V/277V/347V load.
- E. System software interface shall have the ability to notify communication failures to system users via system & email messages. Email messages shall be available in html and text formats.
- F. On-going system expansion, service and support shall be available from multiple factory certified vendors. Recommended service agreements may be submitted at the time of bid complete with manufacturers suggested inventory and pricing for system parts and technical support labor.
- G. Lighting Control Software: The system shall offer central lighting control for the facility lighting administrator to perform energy management, configuration maintenance, monitoring operations, and providing support to building occupants.
 - 1. Native central control software shall be utilized for energy performance monitoring and complete programming without the need for any third-party hardware or software. Systems that require any third party linked software or graphics shall be unacceptable.
 - 2. Software shall provide information on general system settings via mouse click on a floor plan. Left clicking over a device on the graphical software interface shall show a description of the selected device/function attribute.
- H. Central Lighting Control:
 - 1. Shall provide an Interactive, Web-based graphical user interface (GUI) showing floor plans and lighting layouts that are native to the lighting control software. The only means required to program and operate the lighting control system shall be programmed and operated from a user interface that is based on a plan view graphical screen on the user’s computer or the lighting control system’s main computer. Shall include the navigational features listed below to allow for user’s orientation within the controlled space, geographic heading and/or landmarks:
 - a. Interactive
 - b. Vector based
 - c. Zoom
 - d. Rotate
 - e. Pan
 - f. Tilt
 - 2. Shall allow building operator to navigate through an entire facility both in two- dimensional and three-dimensional multi-floor view, allowing for fast and easy navigation.

3. Three-dimensional view shall exclude walls and other structural features to avoid shadowing and cluttering of the plan view.
4. Shall display multiple floors in single view resulting in easier system performance visualization for the entire site as well as individual zones or spaces.
5. Shall allow system performance visualization across a portfolio of buildings via a single interface.
6. All programming assignments of lighting loads to control strategies, lighting status and lighting energy reporting shall be native to the software and executed from this GUI. Editing shall be available from this GUI in a drag and drop format or from drop down menus without the need for any third-party software. Systems that utilize or require third party linked graphics are unacceptable. The GUI shall continuously indicate the status of each connected device on the system and a warning indicator on the software if a device goes offline. Systems requiring spreadsheet editing for programming and that don't offer real time feedback are not acceptable.
7. Software settings and properties shall be selectable per individual device, room based, floor based, or global building based.
 - a. Lighting Control Software interface shall provide current status and enable configuration of all system zones including selected individual luminaire availability, current light level, maximum light level, on/off status, occupancy status, and emergency mode (response to an emergency signal) status.
8. Shall have the ability to display various lighting system parameters such as Lighting status (ON/OFF); Lighting levels, Load shedding status, or Lighting energy consumption, Occupancy status in a colorized gradient ("weather" map) type of graphical representation.
9. Energy Analysis data shall be exportable in CSV or image file formats.
10. Shall allow import of native AutoCAD files.
- I. Reports: Reporting feature shall be native to the lighting control software and capable of reporting the following parameters for each device and zone individually without requiring any third-party hardware and software:
 1. Energy consumption broken down by energy management strategy.
 2. Energy demand broken down by energy management strategy.
 3. Occupancy data by zone.
 4. Building wide occupancy status
 5. Time Schedule status
 6. Lighting energy consumption in a color gradient ("weather map" type) view
 7. Energy performance reports shall be printable in a printer-friendly format and downloadable for use in spreadsheet applications, etc.
 8. Battery status report indicating device name, location on the floor plan and battery voltage shall be printable in a printer friendly format and downloadable for use in spreadsheet applications, etc.
 9. Color gradient ("weather map" type) view for the following:
 - a. Robustness of the mesh network (hop count)
 - b. Route of the signal
 - c. Wireless signal strength
 - d. Battery status for wireless components

- J. Daylight Harvesting (Light Regulation Averaging): In a photo sensor-equipped system, the Central Controller Unit shall rationalize changes to light levels when ambient (natural) light is available and shall maintain a steady light level when subjected to fluctuating ambient conditions where 0-10V dimming ballasts and/or drivers exist. Areas equipped with fixed output ballasts and/or drivers shall energize when natural light falls below foot-candle levels specified. System shall utilize light level inputs from common and/or remote sensor locations to minimize the number of photo sensors required. The System shall operate with multiple users in harmony and not react adversely to manual override inputs.
- K. Time Clock Scheduling: The system shall be programmable for scheduling lights on or off via the Lighting Control Software interface.
1. Programming: User friendly, Outlook style interface shall be available for programming schedules.
 2. Override: Manual adjustments via wall stations or personal control software shall temporarily override off status imposed by time clock schedule.
 3. Response to Power Failure: In the event of a power failure, the time clock shall execute schedules that would still be in progress had they begun during the power outage.
 4. Flick Warning: Prior to a scheduled lights-off event or expiry of a temporary override, the system shall provide two short light level drops as a warning to the affected occupants. Flick warning time shall have the ability to be programmed via software between 1 and 5 minutes.
 5. Option to automatically turn on or wait for an input: Using this option, a group of luminaires can be made to turn on automatically in response to a scheduled event or wait for a signal from a wall station to turn the same group of luminaires on (and stay on) for the remainder of the scheduled event.
 6. Shall support BMS Schedules/Calendars
- L. Load Shed Mode: An automatic load shedding mode shall be available where, when activated through the system, the control unit will reduce its output to a programmable maximum electrical demand load. The system shall not shed more load than required and load shedding priority shall be centrally configurable by control zone or by common uses (i.e., all hallways can be treated as one load shed group), with subsequent load shed priority groupings being utilized until the required defined load has been shed, for either a defined period, or until the demand response input has been removed. Systems that simply select a "load shed scene" whereby there is no guarantee that the defined required load will actually be shed are not acceptable.
- M. Emergency Mode: There shall be a mode, when activated through the system, that will immediately adjust lights to full light output and retain that level until the mode is deactivated in the event of an emergency. This setting shall override all other inputs. The system shall interface with the building emergency monitoring system at a convenient point and not require multiple connections.
- N. Addressing: All ballasts and/or drivers shall be centrally addressable, on a per luminaire or multiple luminaire/zone basis, through the Central Control Software. The basis of design shall utilize 0-10V Dimming, Fixed Output Ballasts and/or 0-10V LED Drivers connected to an Output Module. To simplify ongoing maintenance, the system shall not require manual recording of addresses for the purpose of start-up or reconfiguration.

- O. Programmable Task Tuning: The light output level of an individual or group of luminaires shall be programmed via system software.
- P. Continuous Dimming: Individual or group of luminaires dimming in response to user-initiated action and/or system generated signal shall be over continuous range.
- Q. Unoccupied State: The system shall provide two states when occupancy status is vacant as per an occupancy sensor - lights turn off or lights adjust to configurable (dimmed) light level.
- R. Occupied State: The system shall be capable of creating “comfort” or “support” zones to ensure that occupants are not isolated by turning off lights in adjacent areas, such as a hallway path to exit the premises for occupant comfort and safety.
- S. Overlapping Zones: System shall be capable of creating “overlapping” zones to ensure continuous lighting and safety of the occupants as they move from one lighting zone to another (for example, hallways) while minimizing the energy use.
- T. Participation in Intelligent Building Framework: The system shall have the ability to be a component of Intelligent Building framework. Wireless Managers and System server communication shall be based on TCP/IP over Ethernet backbone.
- U. LAN Operations: System shall be capable of operating independent of the building’s existing network infrastructure if desired and shall not rely on tenant supplied PCs for operation. Network infrastructure shall only be utilized for Personal Control Software.
- V. Network Security: Firewall Technologies & VLAN Configuration methods shall be utilized to separate tenants from the lighting control network and ensure the integrity of lighting control network.
- W. Lamp Burn In: The system software shall have the capability of not permitting dimming of new lamps prior to completion of lamp manufacturer recommended accumulated operation at full brightness.
- X. Lighting Maintenance:
 - 1. System software shall notify wireless low battery, lamp or ballast failure events via system & email messages.
 - 2. Wireless devices hop count, route of the signal, signal strength & battery voltage levels shall be available via GUI.
 - 3. Percentage left in Lamp & Ballast Lifetime shall be programmed to display in different colors for easier visual representation and quicker maintenance turnaround time.
 - 4. 0-10V Dimming and/or Fixed Output Ballast/LED Driver replacements shall not require re-programming of the system or re-addressing of the said components.
- Y. Group (zone) Configuration: The assignment of individual or group of system components to zones shall be performed via Central Control Software such that physical rewiring will not be necessary when workspace reconfiguration or re-zoning is performed. Removal of covers, faceplates, ceiling tiles, etc. shall not be required.
- Z. Sensor Control Parameters: Occupancy sensor time delays shall be configurable through software. Light level sensor parameters shall be configurable through software.

- AA. Automatic Time Adjustment: System shall automatically adjust for leap year and daylight savings time and shall provide weekly routine and annual holiday scheduling.
- BB. The system software shall have the capability of providing an optional web-based energy dashboard to show real-time energy savings data and carbon footprint reductions.
- CC. Contact closure input: System shall be capable of receiving momentary and sustained contact closure input from third party sources to control lighting zones.
- DD. The system shall have the ability to control (dim/switch) a group of luminaires with loads up to 20A.
- EE. Plug Load Control: The system shall offer occupancy sensing or time schedule-based plug load control capability.
- FF. Astronomical Clock feature: Luminaires switch ON/OFF with the sunset and sunrise (with an option to select offset, depending on the geographic location (latitude & longitude) of the building. An offset option shall be available to turn the schedule ON/OFF up to 12 hours before or after dusk or dawn.
- GG. System shall auto-configure lighting controls for spaces that have been combined or divided temporarily by moving wall or similar systems.
- HH. System shall automatically lock wall stations and/or disable sensors based on one of the following system inputs: contact closure, a time schedule or the status of a monitored space.
- II. BAS Interface: The light management system shall be capable of interfacing digitally with a building automation system via either BACnet/IP. The lighting control system shall be capable of communicating the status of output devices (lighting loads) as well as input devices (dry contacts, switches, occupancy sensors, vacancy sensors, and photocells) to the BAS. Building Automation System, utilize data from lighting control system input devices such as occupancy sensors to determine the status (occupied/unoccupied) of the mechanical control zones and perform climate adjustments accordingly.
- JJ. AV Interface: The light management system shall be capable of interfacing with an audio-visual system (e.g., LCD Touch Screen Panel) via TCP/IP interface.
- KK. Migration plan to control LED luminaire: System shall be capable of migrating from the control of 0-10V Ballasts to 0-10V LED Drivers utilizing the same control hardware.
- LL. AC Phase Cut Dimming Circuit Integration: System shall have the ability to control Incandescent, Fluorescent or LED lighting load that are otherwise controlled by manual AC Phase Cut Dimmers.
- MM. Wireless networks shall be reliable (mesh topology), self-configuring (discovery) and self-healing. Unexpected interruptions in the network shall be automatically compensated for by re-directing communication.
- NN. Wireless networks shall provide high level of security by employing logically unbreakable secure encryption methods (e.g., 128-bit encryption).

- OO. System design shall ensure seamless communication among devices when hybrid wired/wireless control systems are implemented. Hybrid control system refers to devices that communicate over a DALI/0-10V field bus and/or wireless medium that uses non-proprietary open protocol (e.g., ZigBee®) for communication. Devices in the hybrid control system shall communicate with all the devices in the system regardless of their native protocol they are designed to work with.
1. Luminaires enable wireless communication either via add-on or integrated modules
- PP. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week utilization of a space. Note operating modes should be utilized only in manners consistent with local energy codes.
1. Auto-On / Auto-Off (via occupancy sensors):
 - a. Zones with occupancy sensors automatically turn lights on when an occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until the switch is pressed again, restoring the sensor to Automatic On functionality.
 2. Manual-On / Auto-Off (also called Semi-Automatic, Vacancy Sensing or Occupant Sending Device set to Vacancy Mode):
 - a. Pushing a switch will turn lights on.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 3. Manual-On to Auto-On/Auto-Off:
 - a. Pushing a switch will turn lights on.
 - b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
 4. Auto-to-Override On:
 - a. Zones with occupancy sensors automatically turn lights on when an occupant is detected.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
 5. Manual-to-Override On:
 - a. Pushing a switch will turn lights on.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.

- c. Sequence can be reset via scheduled (ex. daily each morning) events.
6. Auto On / Predictive Off:
- a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - 1) If the switch is pressed, lights turn off and a short “exit timer” begins. After the timer expires, the sensor scans the room to detect whether the occupant is still present. If no occupancy is detected, the zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.

QQ. Lighting Control Applications:

- 1. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:
 - a. Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room and meeting rooms. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
 - b. Bi-Level Lighting – Provide multi-level controls for the Gymnasium and Auxiliary Gymnasium.
 - c. Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:
 - 1) All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.
 - 2) Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
 - 3) Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
 - 4) Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION MEETING

- A. A factory authorized manufacturer's representative shall provide the electrical contractor with a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:
 - 1. Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.
 - 2. Review the specifications for low voltage control wiring and termination.
 - 3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
 - 4. Discuss requirements for integration with other trades.
- B. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
- C. Adjust time delay so that controlled area remains lighted while occupied.
- D. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
 - 1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - 2. Sequence of operation, (e.g., manual ON, Auto OFF. etc.)
 - 3. Load Parameters (e.g., blink warning, etc.)
- E. Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect/ Owner of post start-up activity.

3.2 COMMISSIONING SUPPORT SERVICES

- A. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. The Lighting Control System is to be commissioned per Section 019113-General Commissioning Requirements and Section 260800 - Commissioning of Electrical Systems. The contractor has specific responsibilities for scheduling, coordination startup, test development, testing, and documentation. Coordinate all commissioning activities with the Commissioning Authority. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.

- B. The commissioning agent shall work with the electrical contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

3.3 EQUIPMENT INSTALLATION AND DOCUMENTATION

- A. Installation: The control system shall be installed and fully wired as shown on the plans by the installing Contractor. The Contractor shall complete all electrical connections to all control circuits and override wiring.
- B. Documentation: The Contractor shall provide accurate "as-built" drawings to the Owner for correct programming and proper maintenance of the control system. The "As-builts" shall indicate the load controlled by each relay and the relay panel number.
- C. Operation and Service Manuals: The factory shall supply all operation and service manuals related to the design of the control system.

3.4 PRODUCT SUPPORT AND SERVICE

- A. Factory Support: Factory telephone support shall be available at no cost to the Owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment. The factory shall maintain toll-free numbers for technical support for their customers.

3.5 START-UP & SUPPORT FEATURES

- A. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.
- B. The electrical contractor shall provide both the manufacturer and the electrical engineer with three weeks' written notice of the system start up and adjustment date.
- C. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
- D. To facilitate start-up, all devices daisy-chained together (using CAT-5) shall automatically be grouped together into a functional lighting control zone.
- E. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.
- F. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.
- G. All system devices shall be capable of being given user-defined names.

- H. All devices within the network shall be able to have their firmware reprogrammed remotely and without being physically uninstalled for the purposes of upgrading functionality at a later date.
- I. All sensor devices shall have the ability to detect improper communication wiring and blink its LED in a specific cadence as to alert installation/startup personnel.

3.6 SYSTEM ACCEPTANCE

- A. The Contractor is responsible for complete installation of the system according to strict factory standards and requirements. The following items shall be included requirements:
- B. All system equipment shall operate in accordance with specifications and industrial standard procedures.
- C. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site according to the requirements.
- D. Demonstration of program integrity during normal operation and pursuant to a power outage.
- E. Contractor shall provide a minimum of three (3) hours training on the operation and use of the control system. Additional support services shall be negotiated between the Contractor and the building Owner or manager.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.2 WORK INCLUDED

- A. Provide all panelboard equipment, complete, dead front type.

PART 2 - PRODUCTS

2.1 PANELBOARD TYPE

- A. Panelboards shall be rated at proper voltage and current for intended use with busbars of copper or aluminum. Panels shall be 3-phase, 4-wire, 100% neutral, unless noted otherwise. Where aluminum is utilized, all lugs shall be of an approved compression type. Provide multiple lugs where conductors in parallel or "feed through" are shown on the Drawings.
- B. Conductor Connectors shall be bolted to busbars using Grade 5 bolts and Belleville washers. Feeder conductor connectors shall be rated for 75 °C. wire when 75 °C. wire is indicated. Where aluminum conductors are utilized for feeders or branch circuits the connectors shall conform with Section 260519.
- C. Panelboards shall have a separate ground bus bonded to the panelboard frame.
- D. Where 120-Volt, 15- or 20-Amp breakers are intended for switching loads they shall be of type rated for switching duty labeled "SWD."

2.2 ACCEPTABLE MANUFACTURERS

- A. General Electric
- B. Square-D
- C. Siemens
- D. Cutler-Hammer

2.3 CIRCUIT BREAKERS

- A. The following interrupting capacity, 10,000 AIC Symmetrical shall be considered minimum. Other ratings shall be as specified on panel schedules shown on the Drawings. Series rating of breakers is not allowed.
- B. Mount breakers in all panelboards so that breaker handles operate in a horizontal plane. Bolt in type only. Provide common trip for all multiple pole breakers.
- C. Where noted, provide spare breakers, complete for future connection of wiring circuits. Where "Space" is indicated for breakers, provide all bussing and breaker mounting hardware in the panelboard, provide steel knockouts in dead front metal closure of unused part of panel. If any steel knockouts are removed, provide breakers in such spaces or approved cover plates. Open spaces are not permitted.
- D. For multi-wire branch circuits, provide approved breaker handle ties where required by NEC 210.4.

2.4 CABINET FOR EACH PANELBOARD

- A. Flush or surface, as indicated; tight closing doors without play, when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim of the same height. Where a remote-controlled switch or contactor is mounted in any panelboard, mount on same frame as panelboard interior with screw retained access door in dead front shield, common door over circuit breakers and remote-controlled device. Where flush is mounted, provide (2) 3/4" conduits to accessible ceiling space for future expansion.
- B. All conduits for future expansion shall stub into a junction box, where it is located above grade, and shall be sealed in the panel.
- C. Provide cabinets of sufficient dimensions to allow for future expansion and addition of circuit breakers within the panelboards as indicated on panel schedules.
- D. Provide cabinet front with full height hinged door. One door over the interior and an additional hinged dead front cover over interior and wireway (door-in-door). Full-height front cover hinged to box with concealed trim clamps. Provide flush door locks.
- E. Provide lock for each cabinet door. All Electrical Distribution Equipment Locks shall be keyed identically. Key system shall match existing. Supply Owner with minimum six keys.
- F. Fasten panelboard front with machine screws with oval counter-sunk heads, finish hardware quality, with escutcheons or approved trim clamps. Clamps accessible only when dead front door is open are acceptable. Surface mounted panelboards with fronts greater than 48 inches vertical dimension shall be hinged at right side in addition to hinged door over dead front.
- G. Finish: Provide factory prime coat for cabinets to be located in finished areas. Where cabinets are located in unfinished areas, standard lacquer or enamel finish, gray or blue-gray color, shall be substituted for factory prime coat.

2.5 SYSTEM OF NUMBERING AND BUS ARRANGEMENT

- A. Shall be as shown on the Panel Schedules on the Drawings.

2.6 PANELBOARD NAMEPLATE

- A. Provide engraved and filled (or color layer - engraved through outer layer) plastic nameplate with 1/2-inch-high characters (for panel name); attached with screws to each NEMA 1 panelboard front. White on black, include voltage, phases, wires, and minimum AIC. rating in 3/8-inch characters.
- B. Nameplate color shall be:
 - 1. Emergency System: White letters on red
 - 2. Normal System: White letters on black
- C. Provide a service entrance label nameplate on the main panelboard which includes the following:
 - 1. Architect
 - 2. Electrical Consultant
 - 3. Electrical Contractor
 - 4. Date of Installation
 - 5. Service Voltage & Bus Amperage Rating
 - 6. Symmetrical Short Circuit Current Rating
 - 7. Year of Manufacture
- D. Provide a riser diagram drawing using non-fading ink and mylar installed under glass and attached to the exterior of the main panelboard showing feeder runs, panels, transformers and raceway sizes.

PART 3 - EXECUTION

3.1 MOUNTING

- A. Secure in place with top of cabinet at 6'-0", unless otherwise noted. The top of cabinet and trim shall be level. Firmly anchor cabinets directly or with concealed bracing to Building Structure. When panels are not located in or directly on a wall, provide a support frame of formed steel channel which is anchored to the floor and Ceiling Structure. Interiors shall not be installed until Structure is totally enclosed. Where panels are mounted adjacent to each other, the top edges shall be at the same height.

3.2 CIRCUIT INDEX

- A. For each branch circuit panelboard provide a typewritten index listing each circuit in the panelboard by number with its proper load designation. Mount with a transparent protective cover inside cabinet door. Listing shall match circuit breaker arrangements, typically with odd numbers on the left and even numbers on the right. Room numbers used shall be final room numbers used in the building as verified by the Owner, and not the room number assigned on Plans.

3.3 CABINET PAINTING

- A. Cabinets furnished as prime painting shall be field painted to match the color of adjacent wall. (See Division 09 - Painting).

3.4 SPACE

- A. Verify space available with equipment sizes and Code Required Working Clearances prior to Submittal of Shop Drawings.

3.5 GROUNDING

- A. Provide separate ground busbar for all panels supplying isolated ground circuits.

3.6 FEED THROUGH AND DOUBLE LUGS

- A. Provide feed through or double lugs with an amperage equal to the incoming feeder amperage unless shown as larger.

END OF SECTION 262416

SECTION 262419 - MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.2 WORK INCLUDED

- A. Work under this section includes all requirements for motor controls to be furnished under the electrical portion of the work on all electrical motor driven equipment. Individually mounted starters shall be provided by Division 26 Contractor. Motor controls shall conform to NEMA Standards for each specific purpose.
- B. The Division 26 Contractor shall furnish all motor controllers not included with equipment furnished under other divisions of these specifications or by the Owner. The Division 26 Contractor shall install all motor controllers including all controllers not factory assembled into equipment furnished under other divisions of these specifications or by Owner.

1.3 MOTOR VOLTAGE INFORMATION

- A. Voltages available are 480-volt, 3-phase or 208-volt, 3-Phase, and 115-volt single-phase.
- B. Circuits are designed (in general) for motors as follows:
 - 1. Smaller than 1/2 H.P. - 115-Volts, single-phase 1/2 H.P. and larger – 460- or 200-Volts, 3-phase
- C. Verify motor sizes and voltages provided under other divisions and notify General Contractor immediately if any discrepancies are noted.

1.4 REGULATORY REQUIREMENTS

- A. Provide motor protection switches of the appropriate NEMA size. For units not using NEMA rating, use equivalent NEMA size.

PART 2 - PRODUCTS

2.1 MOTOR STARTERS

- A. Magnetic Motor Starters: Unless noted otherwise, shall be full voltage non-reversing with three overloads sized to suit nameplate Amperes of motor served, motor "On" and "Off" pilot lights, "Hand-Off-Auto" switch, and auxiliary contacts for interlocking.

- B. Combination Motor Starter/Disconnect: Shall be fused switch type with all features of Paragraph A above. In addition, provide disconnect switch auxiliary contacts for disconnection of externally powered control circuits where applicable. Fuses shall be sized in accordance with the motor manufacturer's requirements.
- C. Manual Starters: Shall be toggle switch or push-button type, lockable in the "Off" position, with overload relays, pilot light and enclosure pursuant to Paragraph D below. Manual starters shall only be used where specifically shown or called out on the drawings and only for single phase, fractional horsepower motors.
- D. Enclosures: All motor controllers shall be contained in an enclosure suitable for the environment in which the controller is mounted and shall be weatherproof when exposed to weather.
- E. Overload Devices: Shall be melting alloy or bimetallic type. One overload shall be provided for each phase. Provisions shall be made for resetting the overload devices from outside the starter enclosure. 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.

2.2 ACCEPTABLE MANUFACTURERS

- A. Square D
- B. Allen Bradley
- C. General Electric
- D. Cutler-Hammer
- E. Siemens

2.3 MOTOR CONTROL CENTERS

- A. Motor Control Centers shall consist of one or more enclosed vertical sections jointed together to form a rigid, free-standing assembly. The construction of the Motor Control Center shall meet the requirements set forth by U.L. 845, NEMA number ECS-2-322 and the N.E.C. The enclosure shall in accordance with NEMA standards type 12. Wiring shall be Class II Type B. Terminal blocks shall be conventional track mounted.

2.4 NAMEPLATES

- A. Pursuant to Section 260000, Paragraph 2.05, provide nameplates permanently attach (with screws on NEMA 1 enclosures) on each controller, nameplates with the following information: Load served, voltage, phase, short circuit rating, panel/circuit number and where applicable fuse size and type.

2.5 FAN SHUTDOWN RELAYS

- A. The Contractor shall provide relay(s) with sufficient contacts to shut down all fans over 2000 cfm upon receipt of Fire Alarm. See Section 283100. Coordinate coil voltage with Fire Alarm System Supplier.

2.6 POWER FACTOR CORRECTION

- A. Provide power factor correction capacitors for all motors 25-horsepower and above. Capacitor size when indicated on the drawings is an approximation only. Final size shall be determined by the Contractor based on the recommendations of the motor manufacturer to bring the power factor to between 0.9 and 0.95. All capacitors are to be fused, with blown fuse indicators mounted on the front of the unit. Provide discharge resistors when required by code.

PART 3 - EXECUTION

3.1 FINISHED AREAS

- A. In finished areas, mount motor protection switches flush and install suitable coverplates.

3.2 HEATERS

- A. Install heaters co-related to the full-load current of motors provided.

3.3 OVERLOADS

- A. Set overload devices to suit motors provided.

3.4 SUPPORTS

- A. Securely mount to equipment, wall or acceptable mounting frame.

3.5 FAN SHUTDOWN WIRING

- A. Provide wiring interlock connections for all (over 2000 cfm) fan starter control circuits via Division 23 furnished fan shutdown relay to shutdown fans upon receipt of Fire Alarm.

3.6 FAN SHUTDOWN WIRING

- A. Provide wiring interlock connections for all (over 2000 cfm) fan starter control circuits via a relay to shutdown fans upon receipt of Fire Alarm.

3.7 CONNECTION TO MECHANICAL EQUIPMENT ON ROOFS

- A. The Contractor shall coordinate all roofing penetrations with the general contractor and roofing contractor to assure that the roofing warranty is maintained.
- B. Attachment of conduits to the roof to serve mechanical equipment and devices shall comply with Section 260533.

3.8 MECHANICAL EQUIPMENT NAMEPLATE RATINGS

- A. The Division 26 Contractor shall verify that the nameplate ratings of the mechanical equipment, when they arrive on site, are consistent with the ampacity called out on the drawings. The Contractor shall bring any discrepancies to the Engineers attention prior to installation of conduit and wiring.

END OF SECTION 262419

SECTION 262726 - SWITCHES AND RECEPTACLES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all wiring devices and plates.
- B. No push-in terminals allowed.
- C. All device colors shall be white, unless otherwise noted.
- D. All device plates shall be stainless steel, unless otherwise noted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Hubbell
- B. Pass & Seymour
- C. Leviton
- D. Eaton

2.2 SWITCHES

- A. Emergency Push-Button Switches: Provide a red emergency push-button, momentary contact, yellow enclosure with clear plastic cover. Reset shall be by twisting the push-button.
 - 1. For Shut-Down of Boilers: Switch shall be connected through an auxiliary contact tied to the boiler power supply. Label shall read: "Boiler shut-down". The switch shall be located adjacent to an exit door.
 - 2. Approved Manufacturer: STI – Safety Technology International.
- B. "Industrial Specification Grade", quiet type, rated 277-volt, 20 amp, unless noted, with plastic handle. Single pole, double pole, 3-way, or locking type as required. Meets Fed. Spec. WS-896 Provide matching styles and colors in other devices as required for the conditions of installation. Hubbell CSB120, Eaton CSB120, Leviton 1221, and P&S 20AC1.
- C. LED Dimmer: LED 0-10V dimmer switch shall be compatible with supplied LED board and driver. Dimmer switch shall have vertical slide with a positive "on/off" button. Dimmer shall have high and low end, field adjustable trim setting. Provide with associated power pack for control. Lutron Diva or approved equal.

- D. Momentary Contact Switches: Single pole, double throw, 2-wire, normally open, 20A, quiet type, rated 277V. Leviton 1257 or equal.
- E. Toggle Pilot Switch: Leviton 5628-2W for 120V/20A and 5629-2W for 277V/20A (or equal).
- F. Timer Switch: Provide electronic light timer switch, where indicated on drawings. The timer switch shall be connected to the room lighting and fan. The timer switch shall be programmable for time-out from 5 minutes to 2 hours. Set timer for standard 20 minutes time-out period, time scrolls up, flash off, beeper on. Manufacturer: Watt Stopper – Intelli-switch Digital Time Switch.
- G. Motor rated switches: Switches serving as motor disconnecting means shall be horsepower rated with overload relays and meet requirements as stated above. See manual starters in Section 262419, 'Manual Starters'.
- H. Device plates shall be Hubbell and Cooper Type 302 stainless steel.

2.3 RECEPTACLES

- A. In All Unfinished Areas & Non-Occupy Able Spaces: Provide "Industrial Specification Grade", Duplex NEMA 5-20R configuration (20-Amp, 120-Volt) unless shown otherwise. Must have "rivetless ground" contact manufactured as an integral component of the external ground screw terminal. Meets Fed Spec. WC-596 Hubbell HBL5352W, Eaton 5362W, P&S 5362AW, and Leviton 5362-W.
- B. In All Finished Areas: Provide heavy duty specification grade; general purpose 20 amp. 125-volt, NEMA 5-20R, 2P, 3W decora plus duplex receptacle, straight blade, commercial grade, self-grounding, back & side wired. Leviton 16352-W or equal.
- C. Self-Testing Ground-Fault Circuit-Interrupter (GFCI) Duplex Receptacles: 20A. 125V AC; 2-pole, 3 wire grounding; 10,000 amps current interrupting; green light indicator when power is 'on'; red light indicator when device is in the tripped position; Red "EOL" (end of life) indicator with rapid flash when the unit has reached end of life and/or cannot provide GFCI protection. Provide GFI receptacles where required by code. Leviton G5362-TW or equal.
- D. Faceless Self-Testing Ground-Fault Circuit-Interrupter Device: 20A. 125V AC; 2-pole, 3 wire grounding; 10,000 amps current interrupting; green light indicator when power is 'on'; red light indicator when device is in the tripped position; Red "EOL" (end of life) indicator with rapid flash when the unit has reached end of life and/or cannot provide GFCI protection. Provide faceless self-testing ground fault device ahead of switched receptacles that require GFI protection per code. Mount device in same backbox as the device it is protecting. Leviton GFRBF-W or equal.
- E. Switched/Controlled Receptacle: Switched/Controlled receptacles shall be 'green' in color, smooth nylon face, with permanently marked for use with automatic control systems, back and side wired, decora style. Hubbell DR20C2GN or equal.
- F. Tamper Resistant Receptacle: Duplex, Decora Plus, 20Amp, 125V, NEMA 5-20R. Leviton TDR20-W or equal.

- G. Special Purpose Receptacles: For special purpose receptacles, see drawings for voltage, amperage, and phase. Provide with matching plug, delivered to the Owner. Coordinate NEMA plug configuration with equipment prior to ordering.
- H. Industrial Power Cord Reels: (2) Duplex, NEMA 5-20R, 20Amp, 125V. Hubbell-Bryant BRY45123R220 or equal.

2.4 OCCUPANCY SENSORS (STAND-ALONE)

- A. Provide occupancy sensor switch(es) for control of lighting in all rooms and offices shown on the drawings. Sensors shall be ceiling or wall mounted to provide adequate coverage. Occupancy sensors shall be "Watt Stopper" or approved equal. Wall mounted sensors shall be Model DT-300, complete with power pack and associated mounting hardware. Wall mounted sensors shall be model DT-200 complete with power pack and associated mounting hardware. Sensors shall be wired to maintain switching and circuits shown on drawings. Provide momentary contact switch for vacancy/manual mode application. Provide with auxiliary dry contact output for mechanical HVAC controls.
- B. Combination occupancy sensor/switch shall be WA200. Combination occupancy sensor/switch, dual circuit shall be WA300. Sensors shall be wired to maintain switching and circuits shown on drawings.

2.5 DEVICE PLATES

- A. Interior: Plates for recessed boxes shall be Hubbell and Cooper Type 302 stainless steel. Attachment screws shall match the finish of plate. Plates for surface mounted boxes shall be of pressed stainless steel with size to fit exactly the box used.
 - 1. Where a device plate is noted to be black, provide a commercial grade decora style thermoplastic cover.
- B. Exterior: Intermatic # WP1010MC, for vertical mount and # WP1010HMC for horizontal mount, or equivalent for receptacles. Metal cover shall be raintight while-in-use.

2.6 LABELING

- A. For NEMA 5-2R receptacles, each device shall be identified with a clear label with black typing stating the panel & circuit number.
- B. For receptacles other than NEMA 5-20R, the coverplate shall have ampere rating, voltage and phase engraved on a phenolic label and attached to the cover plate.

2.7 MULTIOUTLET ASSEMBLY (WHEN SHOWN)

- A. Provide assemblies complete, including necessary fittings and hardware with circuits as indicated on Plans and outlet spacing as indicated. All assemblies shall contain ground wire. Wiremold or equal.

2.8 SPARE DEVICES

- A. Provide the following spare devices:

<u>Device</u>	<u>Quantity</u>
Single-pole switch	3
GFCI receptacle	5
Dedicated duplex receptacle	5
Switched/Controlled receptacle	5
20A, single-phase equipment connection	5
20A, three-phase equipment connection	5

- B. Each spare device shall include 100 feet of conduit, wire, faceplate and labor; all as required for a complete installation. Location of these units to be determined by the Owner's representative at the site. Unused devices shall be turned over to the Owner.

PART 3 - EXECUTION

3.1 MOUNTING

- A. Rigidly fasten each device to the outlet box at proper position with the wall to bring receptacle flush with plate or switch handle the proper distance through the plate.
- B. Occupancy sensors that are ceiling mounted shall be located a minimum of 4'-0" away from a mechanical equipment diffuser.

3.2 ORIENTATION

- A. Set Switches vertical with handle operating vertically, up position "ON" at +48" above finished floor.
- B. Set Receptacles vertical with ground slot down at +18" above finished floor.
- C. Set Exterior Receptacles horizontal at +18" above finished grade.

3.3 DEVICE PLATES

- A. Shall be stainless steel for each new wiring device and for each telephone and signal equipment outlet, except where equipment mounted thereon covers the outlet box completely.

3.4 DIMMER SWITCHES

- A. Provide 0-10V (purple/gray) low voltage dimming conductors to each controlled LED drivers.

3.5 RECEPTACLE GROUNDING

- A. Provide bare bonding wire between receptacle grounding terminal and box. Plaster ear screws connecting frame to the box will not be acceptable for grounding.
- B. Provide green insulated grounding conductor in all branch circuits supplying isolated ground and ground-fault circuit-interrupter type receptacles.

3.6 POWER CORD REELS

- A. Industrial Power Cord Reels: Receptacle circuit shall be fed from a 1P-20A GFCI circuit breaker.
- B. Provide additional Unistrut support between structures as required to match location shown on the drawings.
- C. Rack mounted Power Cord Reels: When indicated on the drawings to be installed on lube rack, coordinate mounting, location and routing of conduit with the lube and air compressor contractor. Power cord reel shall be fed from overhead. Provide additional Unistrut support from the lube rack to the roof structure to support the conduit.

3.7 HANDICAPPED ACCESS

- A. Comply with requirements of Washington State Handicapped Access Code.

END OF SECTION 262726

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SECTION 262813 – FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.2 WORK INCLUDED

- A. Provide all fuses as required. Provide three (3) spares of each size and type required. Fuses shall not be installed until equipment is ready to be energized. This measure prevents fuse damage during shipment of the equipment from the manufacturer to the jobsite or from water that may contact the fuse before the equipment is installed. Final tests and inspections shall be made prior to energization of the equipment. This shall include thorough cleaning, tightening, and review of all electrical connections and inspection of all grounding conductors. All fuses shall be furnished by the Electrical Contractor. All fuses shall be of the same manufacturer.

PART 2 - PRODUCTS

2.1 MAINS, FEEDERS, AND BRANCH CIRCUITS

- A. Circuits 601- to 6000-Amperes shall be protected by current-limiting BUSSMANN Low-Peak Time-Delay Fuses KRP-C. Fuse links shall be pure silver (99.9% pure), delay, and must hold 500% of rated current for a minimum of 4 seconds, clear 20 times their rated current in 0.01 seconds or less and be listed by Underwriters Laboratories Inc., with an interrupting rating of 200,000 Amperes RMS.
- B. Circuits 0- to 600-Amperes shall be protected by current-limiting BUSSMANN LOW-PEAK Dual-Element Fuses LPN-RK (250 volts) or LPS-RK (600 volts). All dual-element fuses shall have separate overload and short-circuit elements. The fuse shall incorporate a spring activated thermal overload element having a 284 °F. melting point alloy and shall be independent of the short-circuit clearing chamber. The fuse must hold 500% of rated current for a minimum of 10 seconds and be listed by Underwriters Laboratories, Inc., with an interrupting rating of 200,000 Amperes RMS. symmetrical. The fuses shall be UL Class RK1 to maintain the Engineered protection of the system components.
- C. Motor Circuits: All individual motor circuits with full load Ampere ratings (FLA) of 480-Amperes or less shall be protected by BUSSMANN LOW-PEAK Dual-Element Fuses LPN-RK (250-volts) or LPS-RK (600-volts). Larger horsepower motors shall be protected by BUSSMANN Type KRP-C Low-Peak Time-Delay Fuses of the ratings shown on the drawings. All other motors, (such as 1.0 service factor motors) shall be protected by BUSSMANN LOW-PEAK Dual-Element Fuses LPN-RK (250-volts) or LPS-RK (600-volts) installed in ratings of approximately 115% of the motor full load current, except as noted above. The fuses shall be UL Class RK1 Dual Element Time Delay or Class L.

2.2 SPARE FUSES

- A. Spare fuses shall be provided with a minimum of (3) of each Ampere rating. See Section 265000, for quantities of spare fusing required for ballasted light fixtures.

2.3 ACCEPTABLE MANUFACTURERS

- A. Bussman
- B. Little Fuse

2.4 SPARE FUSE CABINET

- A. Provide a spare fuse cabinet for the above-required spare fuses. Cabinet front and lock shall match panelboard equipment specified in Section 262416.

2.5 NAMEPLATE

- A. Provide Nameplate "Spare Fuse Cabinet." Construct and attach in accordance with Section 262416, Paragraph 2.06.

PART 3 - EXECUTION

3.1 FUSES

- A. Install in all fusible devices provided under this Contract.

3.2 SPARE FUSE CABINET

- A. Locate in Main Electrical Room or as shown on drawings.

END OF SECTION 262813

SECTION 262816 - DISCONNECTS AND FUSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.2 WORK INCLUDED

- A. Provided all disconnects, fused and unfused, required by code for equipment furnished under this and other divisions of these specifications and as shown on the drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. General Electric
- B. Square-D
- C. Siemens
- D. Cutler-Hammer

2.2 DISCONNECTS

- A. Switch shall be heavy-duty type, shall be quick-break and shall be horsepower rated. Switch shall have blades as required to open all ungrounded conductors and shall be single throw unless noted.
- B. Enclosure shall have an interlocking cover to prevent opening door when switch is closed. Door interlock shall include a defeating scheme, shall be padlockable in the "Off" position.
- C. Enclosure shall be suitable for environment in which mounted. All exterior enclosures shall have a minimum raintight rating.

2.3 FUSED SWITCHES (OR FUSED DISCONNECTS)

- A. Shall be as above with addition of fuse space and clips to accept only fuses as noted in Section 262813.
- B. Fuses shall be provided in all fused disconnects.

- C. Fuses shall be sized in accordance with the manufacturer's requirements for protected equipment.

2.4 ELEVATOR POWER MODULE SWITCH

- A. Provide Elevator Control Switch in a single NEMA enclosure with all necessary relay(s), control transformer and other options (as listed below), and as shown on drawings. The Elevator Control Switch shall have an ampere rating to accommodate the inrush current associated with the rated horsepower and include a fusible switch with shunt trip capabilities. The switch shall utilize Class J Fuses (provided separately under Section 262813). The following shall be included in the switch:
 - 1. 100 VA control power transformer with primary and secondary fuses.
 - 2. Isolation relay (3PDT, 10 amp, and 120V). The coil of the isolation relay shall be 120 Vac or 24 Vdc.
 - 3. Normally open dry contact shall be provided for the Fire Alarm Safety System to energize the isolation relay and activate the shunt trip solenoid (140 VA inrush at 120V).
 - 4. The switch shall include a 120-volt key to test switch and a 1-NO/1-NC mechanically interlocked auxiliary contact rated 5A, 120 Vac as standard.
 - 5. "ON" Pilot Light (Green, Red or White).
 - 6. Isolated Full Capacity Neutral Lug.
 - 7. Fire Alarm Voltage Monitoring Relay (Needed to comply with NFPA 72).
 - 8. Main Switch Auxiliary Contacts (1 NO/1 NC).
- B. The module shall have been successfully tested to a short circuit rating with Bussmann® Low-Peak® Class J fuses at 200,000 amps RMS Symmetrical.
- C. All switches shall have shunt trip capabilities at 120 Vac from remote fire safety signal.
- D. Branch feeders shall be selectively coordinated and fed with an upstream supply over-current protective device at a minimum of 2:1 size ratio utilizing LOW-PEAK® (Class J, RK1, or L) fuses.
- E. Approved Manufacturers: Cooper – Bussman; Eaton

2.5 NAMEPLATES

- A. Provide nameplates on all enclosures and include the following information: Load served, voltage, phase, panel and circuit number. Construct and attach in accordance with Section 260000, Paragraph 2.05.

PART 3 - EXECUTION

3.1 SUPPORTS

- A. Secure solidly to wall or approved mounting frame. Disconnects supported only by Raceway are not acceptable.

3.2 SPLICES

- A. Wiring space within enclosure shall not be used as a junction box.

3.3 INSTALLATION

- A. All material installation shall be in accordance with manufacturers' recommendations and the provisions of applicable codes.
- B. Fuses shall not be installed until equipment is ready to be energized.

END OF SECTION 262816

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SECTION 263100 - PHOTOVOLTAIC GRID INTERFACE SYSTEM (NO STORAGE BATTERIES)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.2 GOAL

- A. The design-build contractor is to provide, design and install a solar photovoltaic grid interface system as described within this specification.
- B. The system is desired to be at a minimum system wattage indicated on the electrical drawings. Quantity and wattage of the PV solar panels shall provide the required 2018 Washington State Energy Code C411.1 On-Site Renewable Energy requirements and the C406.2.5 On-Site Renewable Energy for 3-Points of Photovoltaic System.
- C. The system shall feedback on a 3-phase 480/277V distribution system.
- D. The distribution and inverter equipment shall be located so as to be visible to students but protected from physical contact. This can be achieved with a vented enclosure with lockable clear plexiglass cover for visual interface to equipment, wire and connections.

1.3 GENERAL

- A. The design-build contractor shall provide the design, procurement, installation and electrical work for the complete installation of the solar photovoltaic grid interface system as described herein and on the contract documents.
- B. This specification defines the electrical and mechanical characteristics and requirements for a photovoltaic grid interface system. The system consists of solar panels, mounting hardware for solar panels, photovoltaic inverters, DC disconnect switches, AC disconnect switches, over current protection, connections to Owner furnished AC distribution system and web-based software program with graphics.
- C. The design of the on-site solar PV system will be the responsibility of the Design-Build Contractor. This specification delineates the minimum technical and installation specifications required for this Project.
- D. At least one major component of the solar photovoltaic system shall meet Washington State 5101 Program for renewable energy incentives.
- E. The design-build contractor is under contract with the Owner through the building general contractor. The design-build contractor shall adhere to the State of Washington General Conditions & Supplementary Instructions in Division 1 of the building contract documents.

- F. The Contractor shall notify the building electrical engineer of any requirements that are not already accommodated for in the building contract documents that affects the installation of the PV system.

1.4 STANDARDS

- A. It is the intent of these specifications to insure that the PV system installed adheres to any and all of the following:
 - 1. Washington State Building Codes and standards
 - 2. Washington State Solar Initiative program
 - 3. Applicable utility rules and tariffs
 - 4. Any and all technical and installation specifications and guidelines recommended by the manufacturers.
- B. Bidders are advised to be familiar with all rules, requirements and specifications as they pertain to the installation of solar PV systems.
- C. The systems shall be designed in accordance with applicable portions of the following standards:
 - 1. American National Standards Institute (ANSI C62.41).
 - 2. Institute of Electrical and Electronic Engineers (IEEE 519).
 - 3. National Electric Code (NEC 2008) 690 Solar Photovoltaic Systems” and Article 705 – “Interconnected Electrical Power Production Sources”.
 - 4. UL 1703 – “Flat-Plate Photovoltaic Modules and Panels”.
 - 5. UL 1741 – “Standard for Static Inverters and Charge Controllers for use in Photovoltaic Systems”
 - 6. Federal Communications Commission (FCC Part 15 A&B).
 - 7. Systems must be designed and installed using UL or ETL listed components, including mounting systems.
 - 8. IEEE 929-2000 – “Recommended Practice for Utility Interface of Photovoltaic Systems”

1.5 SUBMITTALS

- A. The design-build contractor shall supply product documentation for the system to be installed, including wiring diagrams and cabinet outlines showing dimensions, weights, BTUs, input/output current, input/output connection locations and required clearances.
- B. The manufacturer of the components for the system shall be a United States based manufacturer with 5 years’ experience or greater in design and fabrication of photovoltaic panels and inverters.
- C. The Contractor shall furnish six (6) equipment submittal copies. Submittals shall be specific to the equipment furnished and shall include as-built information.
- D. All documents and existing facility construction shall be reviewed by the design-build contractor. Any and all modifications necessary for the installation of the system shall be brought to the attention of the electrical engineer for the project.

PART 2 - PRODUCTS

2.1 MODULES

- A. PV modules must comply with IEEE 1262 “Recommended Practice for Qualifications of Photovoltaic Modules”.
- B. Panels shall be polycrystalline silicon type with tempered glass, EVA lamination and weatherproof backskin in black frame.
- C. Provide all mounting hardware needed for the installation of the solar PV arrays.
- D. Modules shall be high power, high efficiency and suitable for commercial application.
- E. Approved Manufacturers: Sharp, Evergreen Solar

2.2 DC/AC INVERTERS

- A. The inverter shall utilize real sine-wave technology and high frequency PWM.
- B. Inverter Specifications:
 - 1. AC Input voltage: 480V AC
 - 2. AC Input frequency: 60 Hz
 - 3. DC Input Voltage: 250-600V DC
 - 4. Peak Efficiency: >95%
- C. Provide with LCD Display, RS485 communications, integrated web server for remote online access to all current data from any PC and integrated FTP server for data storage.
- D. Provide the size and quantity of inverters necessary to achieve maximum performance and accommodate the PV arrays.
- E. Provide a separate DC/AC inverter to accommodate the PV array on the tilt table.

2.3 COMBINER PANEL

- A. Fuse/Breaker disconnect means for PV array strings.
- B. Provide with NEMA 3R enclosure.
- C. Provide quantities as required to accommodate quantity of PV arrays.

2.4 METERS

- A. Provide revenue grade Interval Data Recording (IDR) meters complete with industry standard telemetry for communication with Ethernet, cellular or other common output capabilities.

- B. Provide connection to the building Energy Management System (EMS) for the purposes of metering, monitoring and data collection of solar production.
- C. Meters must connect to a monitoring/data collection recording solar production through Time of Use (TOU) increments applicable to the local utility standards, with a minimum 15-minute intervals.

2.5 MONITORING

- A. Provide fat spaniel technologies, Inc. Smart Monitoring. The system shall include:
 - 1. Web-based views of how the solar electric system is working.
 - 2. Automatic calculation on the reduction of greenhouse gas emissions.
 - 3. Revenue-grade metering and reporting for Performance Based Incentives.
 - 4. Provide with optional full weather station, that includes measuring of the following:
 - a. Sunlight strength
 - b. Air temperature
 - c. Solar module temperature
 - d. Wind speed and direction
 - 5. Lobby kiosk display with web-based views implemented in flash.

2.6 PHOTOVOLTAIC PANEL(S) MOUNTING

- A. Provide roof mounted PV array racking system with adjustable legs to optimize degree of tilt for maximizing PV array input.
- B. Racking system shall be compatible with a membrane style roof and shall not void the manufacturer roofing warranty.
- C. Provide ballasted mounting system including all supporting rails and legs, module mounting rails, mounting clips, grounding terminations, brackets, ballast and materials as required for a complete mounting system for all the PV modules:
 - 1. Polar Racking PR2
 - 2. Unirac RM Series
 - 3. Or approved equal
- D. Provide protective TPO pads installed between final roof assembly and every point of contact with the photovoltaic roof mounting system that rests on the roof.
- E. The racking system shall be suitable for the PV array to be provided.
- F. Provide one (1) tilt table with remote control on roof. Table shall accommodate three (3) photovoltaic panels.

2.7 STRUCTURAL REQUIREMENTS

- A. All structures and structural elements, including array structures, shall be designed in accordance with all applicable International Building Codes and standards pertaining to the erection of such structures.
- B. The Contractor shall provide structural calculations, stamped by a licensed professional structural engineer in good standing with the State of Washington.
- C. All structural components, including array structures, shall be designed in a manner to attain a minimum 30-year design life. Particular attention shall be given to the prevention of corrosion at the connections between dissimilar metals.
- D. The structural design should provide for easy and cost-effective repair or replacement of the roof.
- E. Any roof penetrations must be designed and constructed in collaboration with the roofing professional or manufacturer responsible for the roof and roofing material warranty for the specific site, to ensure that the roof warranty is not invalidated by the installation of the PV system.
- F. Provide a 6' safety zone from the roof edge to the PV system. A 3' clear path of travel must be maintained to and around all rooftop equipment.

PART 3 - EXECUTION

3.1 MANUFACTURERS WARRANTY

- A. The manufacturer shall guarantee the systems to be free from material defects and workmanship for a period of 1 year from installation. The solar panels shall have the following power output warranty:
 - 1. 1st 10 years at 90% minimum output
 - 2. Remaining 15 years at 80% minimum output
- B. DC/AC power inverters shall have a minimum 10-year warranty.

3.2 INSTALLATION

- A. All Balance of Systems (wiring, component, wiring, conduits, and connections) must be suited to the conditions for which they are to be installed. It is preferred that inverters are located inside out of the weather in a minimum NEMA 12 enclosure. If inverters are in exterior locations, they shall be installed in all-weather NEMA 4X enclosures. An interval data meter must be installed to measure the AC output of the inverter. This meter should be located in a location accessible to facilities personnel.
- B. Interconnection must comply with Tacoma Power, Interconnection Standards for non-Utility Generation". Contractor will assist the Owner in preparing and submitting appropriate interconnection agreements with the utility. This shall be done at no cost or liability to the Owner.

3.3 ELECTRICAL CONNECTIONS TO BUILDING ELECTRICAL DISTRIBUTION SYSTEM

- A. This Contractor is responsible for all labor, materials & installation up to the building electrical distribution system connection point. The building electrical contractor will provide the final connections to the electrical distribution system.

3.4 OPERATION & MAINTENANCE

- A. As part of the acceptance of the solar PV system the Contractor shall instruct and provide operations manuals on how to shut down the solar PV system in the event of an emergency. The Contractor shall insure that campus staff and fire department can easily identify what to do in the event of an emergency and able to perform these tasks quickly and safely.
- B. The Contractor shall provide technical assistance and hands-on training to the Owner for operation of the monitoring system.

END OF SECTION 263100

SECTION 264300 - SURGE PROTECTIVE DEVICE (SPD)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the materials and installation requirements for Surge Protective Devices (SPD). SPD devices are used for the protection of all AC electrical circuits from the effects of lightning induced currents, substation switching transients, and internally generated transients resulting from inductive and/or capacitive load switching.
- B. This Specification also describes the mechanical and the electrical requirements for the SPD devices. The SPD shall be suitable for application in both category A, B and C environments as described in ANSI/IEEE C62.41- 2002.
- C. The SPD shall be of parallel design and provide individual protection components connected Line to Ground and Line to Line for Delta and High Resistance Grounded systems and Line to Ground, Line to Neutral and Neutral to Ground for Wye and Single-Phase distribution systems.
- D. Systems not providing discreet protection components in the above configuration will be rejected. A schematic diagram showing the configuration and technology of all internally connected components must be provided with submittals.
- E. The SPD devices will be used both near electrical service entrance locations and at locations distant from service entrance locations (panels, MCCs, equipment disconnects, etc.). For the purposes of this Specification, it should not be assumed that on wye-connected systems, a neutral-to-ground bond will not be located electrically close to the suppressor location, thus, discreet neutral-to-ground suppression and filter components are required.
- F. The Manufacturer/Vendor shall furnish all of the necessary SPD products and related hardware (i.e., flush mounting kits, mounting brackets, etc.) as required for the installation of the Surge Protective Devices (SPD) system suitable for the application.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 260000 – Electrical General Conditions
- B. Section 260519 - Wire and Cable
- C. Section 260526 - Grounding
- D. Section 260532 – Outlet and Pull Boxes
- E. Section 260533 – Raceways
- F. Section 262413 - Switchboards

G. Section 262416 – Panelboards

1.3 SUBMITTALS

- A. The Vendor/Manufacturer shall submit (3) copies of all related SPD Specifications, product data, electrical and mechanical shop drawings, installation requirements/instructions, maintenance manuals (if applicable), and performance/warranty information requested in this document for the actual proposed SPD device(s) to the Project Engineer. All information shall be submitted in a PDF indexed by response and test. The Project Engineer reserves the right to select or reject any vendor response or product.
- B. In order for the SPD device to be considered for this project, all responses to information requested in this Specification must be provided in writing and must reference each Specification section and sub-section. Written submittal responses shall be signed by the Manufacturer's VP of Engineering. Attach information as necessary to provide compliance with specification response requirements. If a manufacturer cannot fully comply with a section of the Specification, this must be stated in the response and the reason for non-compliance shall be provided.

1.4 QUALITY ASSURANCE AND PERFORMANCE

- A. Each complete suppression unit shall be UL1449 4th Edition Listed as a Surge Protective Device. UL 1449 test data for proposed SPD devices, including UL let through voltage classification, shall be provided with submittal. Units shall bear suppressed voltage rating issued by UL.
- B. The Engineer reserves the right to have an employee, or a representative designated by the Firm witness any testing required by this document. Vendor/Manufacturer shall provide written notice of intent to test and shall coordinate testing with the Engineer, should the Engineer desire to witness tests.
- C. Performance & Durability Testing: Units shall be tested by an independent test agency in accordance with test procedures outlined in ANSI/IEEE C62.45, NEMA LS1 & UL1449. The following test data shall be provided:
 - 1. Provide Maximum Surge Current (Single Pulse Rated, 8/20 μ S, by mode, Amperes) as per NEMA LS1-1992 – 2.2.9 with submittals document. Maximum surge current rating shall not be less than 120kA (60kA per mode including N-G) for branch panel models in low exposure areas, high exposure areas and for IEEE C62.41.1-2002 - Category B Switchboard and Motor Control Center Locations. Maximum surge current rating (per phase in applicable modes other than Neutral to Ground) shall not be less than 240kA (120kA per mode including N-G) for IEEE C62.41.1-2002 - Category C Locations, including all Electrical Equipment located at Service Entrance location. Provide proof of completion of such tests and test data with submittal data. Provide surge current ratings for each applicable protection mode (L-L, L-N, L-G & N-G) with submittals.

2. Provide durability test data utilizing the ANSI/IEEE C62.41-1991, Category C3, 20kV/10kA, 1.2 x 50 S - 8x20S combination waveform. Provide test data with submittals. Let through voltages shall be provided for all applicable protection modes (L-N, L-G & N-G) from zero reference. All SPD devices (including branch panel) shall withstand a minimum of 5,000 hits delivered at a rate of one pulse per minute. Unit shall not fail or suffer let through voltage degradation of more than 7%. Lead length for testing and let through measurements shall be 6". Provide lead length used for testing with submittals.
3. Provide performance test data utilizing the ANSI/IEEE C62.41.2-2002, Exposure - High, 10kV/10kA, 1.2 x 50 μ S - 8x20 μ S combination waveform. Provide test data with submittals. Let through voltages shall be provided for all applicable protection modes (L-N, L-L & L-G) from zero reference. Lead length for testing and let through measurements shall be 6". Provide lead length used for testing with submittals.
4. Provide let-through voltage test data and test waveforms used for (N-G) with the submittals for units intended for grounded Wye systems.
5. Provide let through voltage test data for the ANSI/IEEE C62.41.2-2002, Category B, 0.5 μ S-100 kHz 6kV/.5kA ring wave (L-L, L-N & L-G) with the submittals. Let through voltages shall be provided for all applicable protection modes and shall be measured from zero reference.
6. Provide let through voltage test data for the ANSI/IEEE C62.41.2-2002, Neutral grounded at service entrance – Far Category, 0.5 μ S-100 kHz 3kV ring wave (N-G) with the submittals for units intended for grounded systems.
7. If available, test data shall be provided for the ANSI/IEEE C62.41.2-2002 level three category of the 5/50 nS EFT Burst waveform as a part of this submittal package. Let through voltages shall be provided for all applicable protection modes (L-L, L-N, L-G & N-G).
8. All SPD tests must provide let through voltages using a positive polarity pulse at the 90-degree phase angle location on the sine wave for Category B and C waveforms and 180-degree for Category A waveforms. Let through voltages must be measured from the zero-voltage reference line for the tests.
9. All let through voltage test results must be provided with a minimum of six inches of lead length as measured from the point where the wire would normally exit the SPD enclosure (standard installation) to the point of termination. Wire used for test must be of the type of building wiring material recognized by the latest adopted version of the NEC and must be readily available for wiring commercial buildings, unless permanently attached to and supplied with suppressor. Conductor's sizing used for test shall be based on manufacturer's installation instructions for the proposed product.
10. The above test results, including oscillographs, test conditions, identity of the testing lab and the test technicians and engineers shall be provided as part of the submittal package. The manufacturer shall provide the contact phone number for a readily available factory engineer responsible for answering questions about this product and the tests performed. Information shall be provided in a format that is easy to analyze and review.

11. Maximum Let Through Voltages based on above requirements:

Peak Voltage Let Through Table						
Peak Let Through Voltages (measured from zero reference per NEMA LS-1) shall not exceed:						
Voltage & Configuration	Test / Wave	L-L	L-N	L-G	N-G	Phase Angle
480/277 Wye - Grounded	C3 – 20 kV/10ka	2500	1600	1900	1700	90
480/277 Wye - Grounded	B3 – 6 kV/3kA	1700	1000	1100	1000	90
480/277 Wye - Grounded	A1 – 2kV – 67A	150	150	150	150	180
480/277 Wye - Grounded	UL1449 Rev2 Update	1500	800	800	800	----
480 Delta	C3 – 20 kV/10ka	2400	N/A	2400	N/A	90
480 Delta	B3 – 6 kV/3kA	2000	N/A	1900	N/A	90
480 Delta	A1 – 2kV – 67A	75	N/A	1200	N/A	180
120/208 Wye	C3 – 20 kV/10ka	1400	1100	1300	1150	90
120/208 Wye	B3 – 6 kV/3kA	950	550	600	550	90
120/208 Wye	A1 – 2kV – 67A	100	75	120	100	180
120/208 Wye	UL1449 Rev2 Update	800	400	400	400	----
120/240 Split Phase	C3 – 20 kV/10ka	1400	1100	1250	1200	90
120/240 Split Phase	B3 – 6 kV/3kA	1000	600	600	600	90
120/240 Split Phase	A1 – 2kV – 67A	100	75	120	95	180

- D. Manufacturers' Qualifications: Only firms regularly engaged in the manufacture of SPD products for category C locations (ANSI/IEEE C62.41.1-2002), and whose products have been providing satisfactory service for not less than five years, shall be considered. A customer reference list, with a minimum of five contact names and current phone numbers shall be provided with the submittals. All manufacturer qualifications shall be provided as part of the submittal.
- E. The successful manufacturer/vendor shall assign a technical contact person for SPD application, installation and warranty questions. This contact shall be available to provide a response to a technical question within a maximum of two business days.
- F. The Engineer reserves the right to accept or reject any or all submittals, to request additional information as deemed necessary or to request submittals for a different unit that may be deemed more appropriate for this installation.
- G. Engineer reserves the right to have an employee, or a representative designated by firm witness any testing required by this document. Vendor/manufacturer shall provide written notice of intent to test and shall coordinate testing with Engineer, should Engineer desire to witness tests.

1.5 CODES AND STANDARDS

- A. UL compliance and labeling: Listed per UL 1449, 4th Edition.

- B. SPD and Enclosures proposed and submitted shall be safety agency listed for all intended installations, meeting or exceeding all of the following: NEMA 1, 3R, 4, 12 & 13.
- C. SPD device shall be designed to allow installation in accordance with latest adopted version of the National Electrical Code (NEC), National Electrical Safety Codes (NESC) and applicable OSHA 1910 requirements.
- D. NEMA LS1 (latest revision)
- E. IEEE Standard C62.41.1, IEEE Standard C62.41.2 & IEEE Standard C62.45 (latest revisions)

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. The SPD shall be compatible with the electrical system voltage, current, system configuration and intended applications.
- B. The SPD maximum continuous operation voltage (MCOV) shall be capable of sustaining 115% of the nominal RMS voltage (with the associated peak voltage of $1.414 \times \text{RMS}$) continuously without degradation and heating.
- C. The SPD shall only use clamping components connected in parallel with the supply to limit the surge voltages.
- D. Arc Discharge components, such as Gas Tube Arresters shall not be used as the sole protection component in any protection mode. Gas Tube Arresters may be used in conjunction with other components, such as MOVs and SADs to provide protection. Where Gas Tube Arresters are installed, the circuit shall be specifically designed to prevent power follow current.
- E. Internal Fusing – If provided, shall be component level style:
 - 1. Component Level Fusing:
 - a. Each Metal Oxide Varistor, or other primary suppression component, shall be individually fused for safety and performance to allow the SPD to withstand the full rated single pulse peak surge capacity per mode without the operation or failure of the fuses. Overcurrent fusing that limits the listed peak surge current of the SPD is not acceptable. Replaceable cartridge type per phase or per mode overcurrent fusing is not acceptable.
 - b. For arc quenching capability, minimization of smoke and contaminants in the event of a failure, and to ensure the safest possible design, all surge components, current carrying paths and fusing shall be packed in fuse grade silica sand.
 - c. Fusing shall be present in every mode, including Neutral-to-Ground.
 - d. The fusing shall be capable of interrupting up to a 200kA symmetrical fault current with 600VAC applied, providing a listed 200kAIC Short Circuit Current Rating (SCCR) without additional over-current protection.

- F. Status Indication & Monitoring: The suppressor shall include individual Phase Status LEDs, a red Service Required LED, an integrated Audible Alarm with silence button and Form C dry contacts (N.O. or N.C.) for remote monitoring capability. The form C contacts must be rated a minimum of 65VDC/150VAC with a load of 30WDC/60VA AC and must be isolated and insulated from the ground plane and the power system to prevent Surges from reaching the monitoring system. The system shall provide insulation and isolation against any impressed voltages. Contacts shall be designed to change state upon device failure or loss of power.
- G. The protection should be housed in the appropriate NEMA rated; heavy duty powder coated steel enclosure. This enclosure must provide complete protection against personnel hazards and damage to equipment should a failure of the SPD protection device occur. This enclosure shall also be designed to allow connection of the SPD device without sharp bends in the conductors and lead lengths of less than 18" from the SPD Lugs (or enclosure opening for devices with leads attached) to the final point of attachment to the power system for the application (assuming connection point is 12" from the exterior of the enclosure).
- H. Manufacturer shall provide a comprehensive warranty that provides for unlimited full replacement of a suppressor that is damaged or that fails to meet manufacturers published specifications and specifications provided within, without pro-rating value. Warranty shall provide coverage for a minimum period of 20 years for individual units (standard warranty) and. Series SPDs shall be covered for 10 years. These Unlimited Replacement Warranties cannot exclude system overvoltages or direct lightning strike events. Warranty shall not require any factory or third-party testing. Warranty shall apply to installed unit(s) for the duration of the warranty period no matter who owns the facility or equipment. All warranty information and copies of warranty documents must be provided with this response.
1. All replacements shall be of the same make, model and configuration as the original unit unless otherwise requested or approved by the customer.
 2. The manufacturer/vendor shall provide a warranty replacement unit at the facility within 5 days of receipt of written notification that the SPD unit has failed, at no cost to the customer.
 3. If the manufacturer/vendor requires inspection of the installed unit to validate warranty claim, the manufacturer/vendor must visit the site where the failed SPD device(s) are located within 3 days of notification. This visit will be performed at no cost to the customer. This section does not modify the requirement for the SPD replacement to be within 5 days of written notification as described in section G, above.
 4. The replacement unit shall be sent to the facility without shipping, handling, examination or other fees.
- I. Complete, comprehensive installation instructions shall be provided for the SPD systems proposed. Installation instructions must provide for compliance with latest adopted NEC requirements and UL listing requirements, while not degrading performance of SPD device as tested. Provide copies of installation instructions for the models proposed with the specification response. Successful vendors/manufacturers shall provide a complete, comprehensive installation checklist.
- J. If manufacturer claims SPD device to have filtering capabilities, provide complete information on filtering performance of SPD device with specification response. This information must include attenuation across a stated frequency range. If the SPD is a UL 1283 listed device, the manufacturer shall provide all performance specifications for filter attenuation.

- K. Provide complete enclosure dimensions (H*W*D) and cutsheets indicating dimensions including locations of terminations and wire entry locations with specification response.
- L. Provide UL Short Circuit Current Ratings (SCCR). The minimum ratings shall be 200kAIC without additional/external over-current protection.
- M. Manufacturer shall make available metal flush plates for distribution and branch panel SPDs. The flush plate shall provide for a clean architectural finish and be utilized where the attached panel is mounted flush.
- N. Manufacturer must have knowledgeable local representation and distribution within 100 miles of the project location and must be willing to provide technical support, warranty claim support, and installation support for the project.
- O. Successful manufacturer/vendor must be capable of supplying SPD for project within 20 days of receipt of order for orders of 25 units and less for models submitted in response to this specification.

2.2 SERVICE ENTRANCE

- A. Surge Protective Devices shall be installed at all service entrances of each building and as shown on the riser / one-line diagram. Suppressors shall be listed in accordance with UL 1449 4th Edition, Standard for Surge Protective Devices.
- B. For 3-phase, 4-wire plus ground configurations, suppressors shall provide suppression and filter elements between each phase conductor and the system neutral, each phase conductor and the system ground and between the neutral conductor and ground.
- C. Suppressors shall include a passive circuit that allows the suppressor to actively follow the voltage waveform and provide a clamping envelope that follows the sine wave to limit low level IEEE C62.41 A1 ring waves (of either polarity) at all locations on the sine wave. This circuit shall also perform in the Neutral to Ground Mode where a sine wave does not exist. Details of circuit used to provide this function and information detailing and quantifying the performance of this circuit (in all modes with Category A1 ring wave) shall be provided with specification response. All Let Through Voltage (LTV) values shall not exceed those stated in section 1.04.C.11.
- D. Indication of proper suppressor connection and operation shall be provided, consisting of status LEDs for each phase, a Red Service Required LED and an internal Audible Alarm with silence/mute button. Dry contacts (NO/NC) are required for external monitoring.
- E. SPD shall exhibit fully redundant protection for each phase.
- F. The surge suppressor shall be of parallel design and shall be capable of being removed and replaced without disrupting electrical service to the facility.
- G. Suppressors shall consist of solid-state components and shall operate bi-directionally.
- H. All surge protective devices shall be of the same manufacturer.

- I. The minimum single impulse current rating (as per NEMA LS-1) shall not be less than 240,000 amperes per phase (120KA per mode). Provide proof of compliance by supplying certified test results from independent test lab with submittals.
- J. Maximum size of SPD units for Primary, Service Entrance applications is 15.5"x12.3"x8.25".

2.3 SECONDARY SUPPRESSORS FOR MCC, DISTRIBUTION & BRANCH PANELS

- A. Surge Protective Devices shall be installed at all service entrances of each building and as shown on the riser / one-line diagram. Suppressors shall be listed in accordance with UL 1449 4th Edition, Standard for Surge Protective Devices.
- B. For 3-phase, 4-wire plus ground configurations, suppressors shall provide suppression and filter elements between each phase conductor and the system neutral, each phase conductor and the system ground and between the neutral conductor and ground.
- C. Suppressors shall include a passive circuit that allows the suppressor to actively follow the voltage waveform and provide a clamping envelope that follows the sine wave to limit low level IEEE C62.41 A1 ring waves (of either polarity) at all locations on the sine wave. This circuit shall also perform in the Neutral to Ground Mode where a sine wave does not exist. Details of circuit used to provide this function and information detailing and quantifying the performance of this circuit (in all modes with Category A1 ring wave) shall be provided with specification response. All Let Through Voltage (LTV) values shall not exceed those stated in Section 1.04.C.11.
- D. Indication of proper suppressor connection and operation shall be provided, consisting of status LEDs for each phase, a Red Service Required LED and an internal Audible Alarm with silence/mute button. Dry contacts (NO/NC) are required for external monitoring.
- E. SPD shall exhibit fully redundant protection for each phase.
- F. The surge suppressor shall be of parallel design and shall be capable of being removed and replaced without disrupting electrical service to the facility.
- G. Suppressors shall consist of solid-state components and shall operate bi-directionally.
- H. All surge protective devices shall be of the same manufacturer.
- I. The minimum single impulse current rating (as per NEMA LS-1) shall not be less than 120,000 amperes per phase (60KA per mode). Provide proof of compliance by supplying certified test results from independent test lab with submittals.
- J. Maximum size of SPD units for Secondary Suppressors for MCC, Distribution & Branch Panel applications is 15.5"x12.3"x8.25".

2.4 PRIOR APPROVALS

- A. The following manufacturer(s) have submitted the required information and have been reviewed and approved for this project:

Total Protection Solutions SPD by Thomas & Betts Power Solutions						
Voltage Location	<u>480Y277v</u> 3 Phase Bonded Wye	<u>480v</u> 3 Phase Delta	<u>208Y120v</u> 3 Phase Bonded Wye	<u>208v</u> 3 Phase Delta	<u>120/240v</u> Single / Split Phase	<u>120v</u> Fire Alarm, Security, PLC, etc.
Main Services	ST240-3Y480-FL	ST240-480NN-FL	ST240-3Y208-FL	ST240-240NN-FL	ST240-1S240-FL	N/A
Distribution MCC & Branch Panels	LP120-3Y480-FL	ST120-480NN-FL	LP120-3Y208-FL	ST120-240NN-FL	LP120-1S240-FL	N/A
Dedicated Equipment	N/A	N/A	N/A	N/A	N/A	LTE120-30A
SPD Applications Notes: <ol style="list-style-type: none"> 1. Use <u>60 Amp</u> Circuit Breakers for Service Entrances and <u>30 Amp</u> Circuit Breakers for Distribution, MCC & Branch Panel applications. 2. Use Delta units for unbonded/ungrounded and high resistance ground Wye applications. 						

Innovative Technology Protector by Eaton/Cutler Hammer						
Voltage Location	<u>480Y277v</u> 3 Phase Bonded Wye	<u>480v</u> 3 Phase Delta	<u>208Y120v</u> 3 Phase Bonded Wye	<u>208v</u> 3 Phase Delta	<u>120/240v</u> Single / Split Phase	<u>120v</u> Fire alarm Security, PLC, etc.
Main Services	PTE240-3Y201-L-SD	PTE240-NN400-L-SD	PTE240-3Y101-L-SD	PTE240-NN201-L-SD	PTE240-1S101-L-SD	N/A
Distribution MCC & Branch Panels	PTE120-3Y201-L-SD	PTE120-NN400-L-SD	PTE120-3Y101-L-SD	PTE120-NN201-L-SD	PTE120-1S101-L-SD	N/A
Dedicated Equipment	N/A	N/A	N/A	N/A	N/A	LTE120-30A

PART 3 - EXECUTION

3.1 GENERAL

- A. Suppressors shall be installed per the manufacturer's installation instructions and the requirements of the NEC, the local authority having jurisdiction and the project engineer.

- B. Size overcurrent protective device and conductors per manufacturer's recommendations and NEC requirements.
- C. Project Engineer or their appointed representative may perform inspection of the installed suppressors and reserves the right to require corrections to the installation to comply with manufacturer's installation requirements and project specifications.
- D. The SPD supplier must provide on-site installation training for the electrical contractor.

3.2 SERVICE ENTRANCE

- A. Install one primary suppressor at each utility service entrance to the facility as indicated on the drawings.
- B. Suppressors shall be installed on the load side of the service entrance disconnecting means in accordance with NEC requirements.
- C. Provide a 60 Amp circuit breaker (with a safety clip to ensure the circuit breaker cannot be inadvertently turned off) in the switchboard as over-current protection for the wire and as a disconnecting means for the SPD (or as specified by the manufacture).
- D. Use minimum #6 AWG wire for connecting the SPD.
- E. Conductors between suppressor and point of attachment shall be kept as short and straight as possible. Lead length of connecting conductor shall not exceed two (2) feet without written permission of the specifying Engineer. If length is exceeded, Contractor may be required to relocate SPD at no cost to the Owner.
- F. Over-length SPD leads (greater than 24") must be twisted together (1 twist/foot) and securely tie-wrapped once per foot to reduce impedance of the leads.
- G. SPD leads may not be spliced.
- H. Suppressor's ground shall be bonded to enclosure frame and the service entrance ground bus, and conduit between the SPD and the switchboard must provide secure electrical/mechanical connections.

3.3 SECONDARY SUPPRESSORS FOR MCC, DISTRIBUTION & BRANCH PANELS

- A. Install one secondary suppressor at each MCC, Distribution Panel, Branch Panel & Sub-Panel location as indicated on the drawings.
- B. Provide a 30 Amp circuit breaker (with a safety clip to ensure the circuit breaker cannot be inadvertently turned off) in the panel being protected as over-current protection for the wire and as a disconnecting means for the SPD (or as specified by the manufacture).

- C. Conductors between suppressor and point of attachment to the panelboard shall be kept as short and straight as possible. Mount the SPD directly adjacent to the circuit breaker closest to the neutral bus, such that the maximum length of connecting wiring is kept as short as possible, not exceed 18 inches for all phase and neutral leads (24" for ground lead on IG panels). If length is exceeded, Contractor may be required to relocate SPD at no cost to the Owner.
- D. Over-length SPD leads (greater than 18") must be twisted together (2 twists/foot) and securely tie-wrapped once per foot to reduce impedance of the leads. Quality compression butt-splice connections are required when extending SPD leads (wire nuts are not acceptable).
- E. Grounding for all non-IG installations: Suppressor's ground lead shall be bonded to the panel enclosure with a small ground lug as close as possible to the SPD mounting point. Conduit between the SPD and the switchboard must provide secure electrical/mechanical connections.
- F. Multiple "Feed-Through" Panels with shared SPD units must be immediately adjacent to each other (side by side) with short tie cables not to exceed 36". Sub-panels must feed from a primary panel with a "lug-out", lug-in" tie connection, and the tie connection lugs must be at the same end of the primary and sub-fed panel. i.e., bottom to bottom or top to top to ensure short tie "sub-feed" cables.
 - 1. Dual Panel Configurations: One SPD per two panels
 - 2. Three and Four Panel Configurations: One SPD installed on both outside panels of the multi-panel configuration, i.e., Install SPD on first (primary) and another one on the third or fourth sub-fed panel for a total of two SPDs.

END OF SECTION 264300

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SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide the lighting system complete and operational.
- B. Recessed fixtures installed in fire-resistive ceiling construction shall have the same fire rating as the ceiling or shall be provided with fireproofing boxes having materials of the same fire rating as the ceiling.

1.2 RELATED DOCUMENTS

- A. Section 260000 – Electrical General Conditions

1.3 FIXTURE SCHEDULE MANUFACTURER'S SERIES NUMBERS

- A. The design series reference does not necessarily represent the number, size, wattage, lumen output, or special requirements as specified hereinafter.

1.4 SUBMITTALS

- A. Shall be neatly and clearly marked to indicate the fixtures, performance, efficiency, and mounting methods complying with contract documents.
- B. When substitute fixtures are submitted (if permitted) the data shall clearly cross reference (written or highlighted) that the substitute fixture complies with every detail of the specified fixture. The substitute fixture must be supplied with an IES file for verification of the fixture performance and lumen output.
- C. The Manufacturer's representative will be required to provide the photometric reports for various areas with the substituted fixture to prove the foot-candle level is adequate and meets the design intent.
- D. The Engineer has the right to request a working sample of the substituted light fixture to verify quality and style meet the design intent.
- E. Fixtures not fully complying with the intent of the contract documents and design criteria will be rejected.

PART 2 - PRODUCTS

2.1 DLC COMPLIANCE

- A. Light fixtures are required to be DLC 4.0 Compliance and be on a DLC Compliance listing to accommodate energy rebate.

2.2 METAL PARTS

- A. Interior Fixtures: Steel or aluminum with manufacturer's standard color and finish as indicated on the Lighting Fixture Schedule, unless specified otherwise.
- B. Exterior Fixtures: Corrosion resisting metal, a (non-ferrous, stainless steel or special finish) and in all cases suitable for outdoor service without tarnishing or other damage due to exposure; manufacturer's standard colors unless specified otherwise; cadmium plate all metal parts concealed by canopies, including screws, plates and brackets. All exposed fasteners shall be tamperproof.

2.3 LIGHT TRANSMITTING COMPONENTS

- A. When not otherwise independently secured by other means the lens of any fixture shall be contained in a captive metal frame that remains attached to the fixture when door is in open position.

2.4 SPECIAL PARTS

- A. Adapters, Plates, Brackets and Anchors: Provide where required by construction features of the building to suitably mount lighting fixture. All such appurtenances and mounting methods shall be approved by the Architect/Engineer prior to fabrication and installation.
- B. Low Voltage Transformers: Provide and install where required to power individual or linear runs of low voltage light fixtures.

2.5 LAMPS

- A. Solid-State Lighting: Fixtures shall have a lumen maintenance life expectancy (L70) of > 50,000 hours, a CRI of > 80, and a CCT of 3500K or as shown on the panel schedule. Each solid-state fixture model shall be tested in accordance with IES LM-79 & LM-80 requirements.

2.6 LED DRIVERS/POWER SUPPLIES

- A. The LED drivers/power supplies shall meet the following criteria:
 - 1. Drive mode: Constant Current or Constant Voltage depending on the LED configuration for the light fixture.
 - 2. Output currents: 250 mA – 1000 mA

3. Output voltages: 6VDC – 48VDC
4. Input voltages: 110 to 277 VAC; 50/60 Hz.
5. Power factor at >0.90 @ full load
6. Line regulation accuracy: +/- 2%
7. Load regulation accuracy: +/- 3%
8. Greater than 85% efficient
9. Output over-voltage, output over-current and output short circuit protection with auto recovery
10. Provide each driver with onboard transient voltage suppression (TVS)
11. Limited power source output to allow for class 2 wiring.
12. Flicker Free 0-10V Dimmable to 10% light output.
13. 5 Year Warranty.

2.7 GENERATOR TRANSFER DEVICE

- A. Transfer device shall be installed integral to each light fixture and shall automatically transfer power from the normal power source to the emergency circuit upon loss of normal power. Bodine #GTD
- B. Where the transfer device cannot be mounted in the light fixture and the transfer device is indicated to control more than (1) light fixture on the same switch leg, provide Bodine #GTD20A.
- C. The device shall be capable of bypassing the local switching means when normal utility power has been lost. The device shall consist of a test switch, a normal power indicator light and an alternate power indicator light. The unit shall be contained within its own enclosure, suitable for mounting on the wall and above accessible ceilings. The device shall be able to accommodate up to 20 amps of lighting load.

2.8 EMERGENCY BATTERY BACK-UP IN FIXTURES

- A. Emergency lighting shall be provided by using an LED fixture equipped with a Bodine BSL17C emergency driver. This emergency driver shall consist of a high-temperature, maintenance-free nickel-cadmium battery, charger and electronic circuitry contained in one 12" x 2 3/8" x 1 1/2" metal case.
- B. Provide with an illuminated test switch (ITS) to monitor charger and battery and installation hardware.
- C. The unit shall be suitable for indoor and damp locations and for sealed & gasketed fixtures, including fixtures rated for wet locations.
- D. The emergency driver shall be capable of delivering up to 7.5 Watts to an LED load (30-130VDC) for a minimum of 90 minutes. The unit shall have a 15.0 Watt-hour battery capacity and shall comply with emergency standards set forth by the current NEC.
- E. The emergency driver shall be UL Listed for field or factory installation.
- F. Provide with a 5-year manufacturer warranty.

2.9 HANGING FOR PENDANT FIXTURES

- A. Rigid type, with not less than 5 thread engagement at each end, consisting of iron pipe, with brass or aluminum tubing casing, or painted tubing not less than 0.040 inches thick.
- B. Aircraft cable, stainless steel, sized appropriately by manufacturer for weight and seismic zone.
- C. Provide a canopy for each fixture hanger except where the fixture conceals the outlet box directly without a canopy.
- D. Provide a safety chain for all glass pendant fixtures and for all fixtures mounted in gymnasiums.
- E. Provide Unistrut and mounting hardware above the ceiling to bridge structure, piping, and ductwork in order to mount the fixture centered in the space per the drawings.

2.10 OUTDOOR LIGHTING STANDARDS

- A. Provide watertight insulating fuse in the base of lighting standards to individually protect each lighting fixture; buss Style "HEB" or approved, waterproof fuse holder with Buss fuse of appropriate capacity and voltage. Provide fuse for each hot circuit wire; do not fuse neutral.
- B. Provide concrete preformed round poles with base plate for bolting to concrete foundation. Natural exposed aggregate finish. Height as noted on drawings.
- C. Provide concrete foundations as shown on drawings. Field verify locations with Architect prior to installation of bases.

2.11 OUTDOOR GROUND MOUNTED LIGHTING FIXTURES

- A. Provide concrete foundations for the mounting of ground mounted lighting fixtures. Foundation shall be a minimum of 6" deeper than the light fixture and a minimum of 6" all around the base of the fixture. Provide #4 rebar with 3" minimum ring ties at 8" on center. The #4 rebar shall be vertically spaced approximately 6" apart. Field verify locations with Architect prior to installation of bases.

2.12 EXIT SIGNS

- A. The signs shall be thermoplastic impact-resistant or as indicated on the panel schedule, scratch resist and corrosion proof. Faceplate and back cover shall be interchangeable on the housing.
- B. Battery shall have a low-voltage disconnect to prevent excessively deep discharge.
- C. LED – less than one watt of power consumption. The fixture shall operate in normal (AC mode) and emergency (DC input) modes.

2.13 INTEGRAL PHOTOCELLS

- A. Where daylight harvesting photocells are mounted integral to light fixtures, the manufacturer shall provide a diode (or similar means) on the low voltage dimming control bus to ensure that the photocell dimming signal does not propagate to other light fixtures. If the manufacturer does not provide a means to keep the photocell dimming signal from propagating outside of the fixture, it is the responsibility of the Electrical Contractor to install the required diodes in a junction box outside of the fixture at no additional cost to the owner.

PART 3 - EXECUTION

3.1 LIGHTING FIXTURES - GENERAL

- A. Size and mounting height from finished floor to bottom of fixture as indicated on the drawings. Verify mounting provisions prior to the ordering of fixtures. Fixtures shall be UL listed for the location, and application in which they are installed.
- B. Ceiling fixtures shall be coordinated with and suitable for installation in, on or from the ceiling as shown. Installation and support of fixtures shall be in accordance with NFPA 70 and manufacturer's recommendations.
- C. Recessed fixtures installed in seismic areas shall be installed utilizing specially designed seismic clips.
- D. Suspended fixtures installed in seismic areas shall have 45° swivel hangers and shall be located with no obstructions within the 45° range in all directions. The stem, canopy and fixture shall be capable of 45° swing.

3.2 DIFFUSERS AND ENCLOSURES

- A. Install lighting fixture diffusers only after construction work, painting and clean up are completed. Prior to final acceptance, remove all lamps, reflectors and diffusers, wash, rinse and reinstall.

3.3 ADJUSTMENT OF FIXTURES

- A. Make all final spotlight and adjustable light settings under the direction of the Architect/Engineer during a scheduled period of time prior to the completion of the project. Include costs for all equipment and personnel expenses required for adjustment.
- B. For fixtures with indirect lighting, notify Engineer prior to installation of any circumstance where the fixture lamp source will be within 12" of ceiling.

3.4 SUPPORT OF FIXTURES

- A. Recessed Troffer Type: For fixtures supported by the ceiling suspension system, provide integral tabs, which rotate into position after fixture is lifted into the ceiling cavity. Provide two safety chains secured to structural members above suspended ceiling. Circuit connection shall be through use of 60-inch flexible conduit from a rigidly supported junction box. For plaster or GWB ceilings, provide a plaster frame compatible with light fixture.
- B. Recessed Downlight Type: Mount in frames suitable for the ceiling, with the recessed portion of the fixture securely supported from the ceiling framing. For fixtures supported by a ceiling suspension system, provide two safety chains secured to structural members above suspended ceiling.
- C. Surface and Pendant Mounted Type:
 - 1. Where mounted on accessible ceilings, hang from structural members by means of hanger rods through ceiling or as approved.
 - 2. Where ceiling is of insufficient strength to support weight of lighting fixture, provide additional framing to support as required. Fixtures shall be supported from structure with seismic bracing independent of ceiling.
 - 3. For Pendant Mount Type: Provide a unistrut channel for mounting fixtures entire fixture length unless light fixture is designed specifically for supporting itself. Provide 3/8-inch thread rod secured to structural members for support of unistrut channel.
 - 4. Continuous Runs of Fixtures: Straight when sighting from end to end, regardless of irregularities in the ceiling. Where fixtures are installed, omit ornamental ends between sections.
 - 5. Provide Unistrut and mounting hardware above the ceiling to bridge structure, piping and mechanical ductwork in order to mount the fixture per the Contract Documents.
- D. Drivers/Power Supplies shall be accessible.

3.5 LOCATION

- A. Mount to the dimensions shown in the drawings. Mount at quarter points where no dimensions appear. Architect shall specify mounting locations where no dimensions appear, and quarter point mounting is impractical or not indicated on the drawings.
- B. Refer to details, structural drawings, mechanical drawings, and coordinate with mechanical Contractor for equipment and ductwork mounted in ceilings to prevent conflict with light fixtures prior to installation. If conflicts cannot be resolved with the Mechanical Contractor, notify Architect/Engineer.

3.6 SPARE FIXTURES

- A. Self-Luminous Exit Sign: Provide (2) Self-Luminous Exit Signs Lithonia # DSW1X Green or Red to match EX1. Install at locations as directed by the Architect.

3.7 CONCRETE FOUNDATIONS

- A. Install at locations shown taking care to provide soil compaction same as required under paving to avoid settling and tilting of pole. Provide for all steel, concrete or aluminum poles shown. Concrete foundations shall have a minimum raceway sweeps of 90 degrees and anchor bolts shall be accurately set in foundations using a template supplied by the pole manufacturer. Concrete work and grouting; see Division 3 of the Specifications. When concrete work has cured, base plates shall be leveled and grouted in place. Pole anchor bases shall then be set on base plates, leveled plumb on foundations, and secured with holding nuts.

3.8 FIXTURE TENTING

- A. Contractor shall coordinate ceiling types with the architectural drawings and Specifications and provide equivalent fire rated enclosures above all light fixtures which penetrate rated ceilings.
- B. Light fixtures that are not IC rated and are to be installed within 3" of insulation shall be provided with an EZ Barrier #EZB 16-24-9 protective cover designed for recessed light fixtures.

END OF SECTION 265000

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SECTION 270000 - LOW VOLTAGE SYSTEMS GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions and Divisions 0 and 1 Specification Sections, apply to work of this Section.
- B. Specification Section 260000 Electrical General Conditions.

1.2 SCOPE AND RELATED DOCUMENTS

- A. The work performed under this specification shall be of good quality and performed in a workmanlike manner. In this context "good quality" means the work shall meet industry technical standards and quality of appearance. The Owner reserves the right to reject all, or a portion of the work performed, either on technical or aesthetic grounds. The Installing Vendor/Contractor shall make all corrections as needed, to the satisfaction of the Owner.
- B. Provide system documentation and Owner training as specified below.
- C. An important item of the construction process for this project is the Pre-Construction Kick Off Meeting, which shall take place PRIOR to submittal of equipment data sheets.
 - 1. The General Contractor shall coordinate the scheduling of the meeting.
 - 2. The Owner's Representative and the Owner's IT Department Representative will be present for the meeting.
 - 3. The General Contractor, Electrical Contractor, and a representative from EACH Section shall attend this coordination meeting.
 - 4. The estimated time is approximate and shall be extended for each Installing Vendor/Contractor as necessary.
 - 5. EACH Installing Vendor/Contractor shall submit their list of coordination items through the construction channels a minimum of 14 days in advance of the meeting for Owner review.
 - a. Review EACH specific Section for the sub-section titled "Coordination" for a minimum list of items to be discussed during the Pre-Construction Kick Off Meeting.

- D. The requirements of the conditions of the Contract, Supplementary Conditions, General Requirements, or other work specified to provide a fully functional system for EACH specific low voltage Section listed below includes, but is not limited to the following sections:

			Pre-Construction Kick Off Meeting	
			Estimated time for EACH Section	Submit questions 14 days in advance
1.	Section 260000	Electrical General Conditions	30	
2.	Section 270000	Low Voltage System General Requirements	15	
3.	Section 272000	Data and Voice Infrastructure	30	

- E. Applicable Standards: All work shall be performed in accordance with the latest revisions of the following standards:

1. International Building Code
2. International Fire Code
3. NEC (National Electrical Code)
4. Telecommunications Architectural Standards - In Washington State Government
5. ANSI-J-STD-607-A - Commercial Building Grounding and Bonding Requirements for Telecommunications

- F. EACH Installing Vendor/Contractor for their Section shall possess a current and valid Washington State 06 Electrical Low Voltage License.

1.3 QUALITY ASSURANCE

- A. The device or wiring arrangement shown on the drawings represents the intent of the system. If additional equipment (that may not be shown) is required to make a fully functional system, then provide such equipment as required.
- B. Each specification Section that is governed by these specifications shall be provided, installed, commissioned, and warranted by a local Installing Vendor/Contractor that meets the following requirements for the equipment manufacturer that is being submitted for:
1. All equipment for EACH specification Section shall be provided and installed by a single supplier.
 2. Have installed a minimum of three (3) systems within the past five (5) years.
 3. Maintain a 24-hour emergency service program using manufacturer trained technicians. Shall respond to service calls within 24 hours during and after the warranty period.

4. The Installing Vendor/Contractor shall be manufacturer approved to purchase the equipment, have a local office staffed with manufacturer-certified installers that are capable of maintaining, servicing, and warranting the equipment being installed; who are full-time employees and are capable of programming, testing, inspecting, maintaining, warranting, and inventorying parts for the life of the system; and shall be located within a 100-mile radius of the project site.
5. Offices that require staff from another “branch office and/or company office” outside of this radius are not acceptable.

C. Prior to completion of the installation, the Installing Vendor/Contractor shall provide:

1. A preventative maintenance agreement which shall, at the Owner’s option, become effective at the end of the warranty period.
2. A proposal for off-site monitoring services where applicable.

1.4 SUBSTANTIAL COMPLETION

A. In addition to the “Substantial Completion” requirements, when applied to EACH of the specification Sections identified in “Scope and Related Documents”, Substantial Completion shall be defined as follows;

1. The stage in the progress of work where the work or designated portion is sufficiently complete in accordance with the Contract Documents, so that the Owner can utilize the work for its intended use.
2. ALL of the requirements listed in “Testing & Complete System Functionality” shall be met. Once all conditions have been met, this shall be deemed Substantial Completion. These requirements shall be completed on or before the Substantial Completion date listed in the Contract Documents.

1.5 DOCUMENTATION

A. Document Format:

1. All documents shall be generated on a PC. Provide these documents electronically, with the As-Built Documentation (where applicable).
 - a. Data sheets, installation manuals, technical documents, brochures, and user manuals may be in PDF format.
 - b. Power Point presentation(s) shall be in MS-Power Point.
 - c. Test forms and other project-specific documents shall be in an editable format, either MS Word or MS Excel.
 - d. Drawings and details shall be in AutoCAD 2013 or newer.

1.6 SUBMITTALS AND SHOP DRAWINGS

A. Submittals and Shop Drawings shall be provided for EACH low voltage system specification section number and shall contain, but not be limited to the items listed below:

- B. Submittals – Prior to installation of any equipment, the Installing Vendor/Contractor shall provide the Owner with seven (7) copies of submittals for approval. With the approval of the Owner, electronic submittals in PDF format may be substituted for hard copy. Provide the following:
1. A complete materials list of the quantity of each device, the manufacturer, model number, description of the equipment for each individual system component, or device that will be provided. This list shall precede the data sheets.
 - a. Each system component or device data sheet shall have an indicating arrow next to each component or device that is being submitted.
 - b. Each submittal shall be by EACH low voltage system specification section number and each submittal shall have its own list of data sheets. Combined submittal sections are not authorized.
- C. Additional Shop Drawing Requirements:
1. For additional shop drawing requirements, refer to EACH low voltage system specification section number, in addition to what is listed below.
- D. Shop Drawings – Prior to installation of any equipment, the Installing Vendor/Contractor shall provide the Owner with seven (7) copies of submittals for approval.
1. Shop Drawing Requirements: The Installing Vendor's/Contractor's complete and full-size set of Shop Drawings shall be issued in the following format:
 - a. They shall be clear and legible.
 - b. The same sheet size as the Contract Drawings (i.e., 30" x 42").
 - c. A minimum of 1/8" text height shall be used for all text, symbol text, and subscript text.
 - d. Scale of Drawings:
 - 1) Site plan drawings shall be the same scale as issued in the Contract Documents.
 - 2) Floor plan drawings shall be 1/8" = 1'-0", unless directed to do otherwise.
 - e. The Electrical Legend, Wire Legend, Load and Battery Calculations, Riser Diagram, Sequence of Operation Info, Wiring Details, and Mounting Details shall precede the Site Plans and Floor Plans.
 - f. All sheets, including the cover, shall include a title block along the edge of each of the drawings that, when the drawings are rolled up, the following information shall be visible:
 - 1) The system-specific sheet number
 - 2) Project name, specification section number and section title name
 - 3) Floor name, area, and/or section of the building (Use the name of the area and/or floor description that is on the Contract Drawings.)
 - g. Architectural information on the Contract Drawings shall be included on the Installing Vendor's/Contractor's Shop Drawings, including, but not limited to match lines, grid lines, grid bubbles, key plan, and enlarged floor plans.

- h. Electrical information on the Contract Drawings shall be included on the Installing Vendor's/Contractor's Shop Drawings, including, but not limited to all applicable general notes and applicable construction notes for each of the floor plans. Where enlarged plans are shown on the Contract Drawings, include this in the Installing Vendor's/Contractor's Shop Drawings to show the room and ALL equipment within the room to help facilitate and coordinate the installation of the low voltage equipment for all systems.
- 2. Cover Sheet: The first page of the shop drawings shall be a cover sheet to include the following items:
 - a. Owner's project information:
 - 1) Site Information
 - a) Name of site, address, city, and zip code of where the installation shall take place.
 - b. Installing Vendor's/Contractor's project information:
 - 1) Business name
 - 2) Local office address of the Installing Vendor/Contractor
 - 3) Primary contact person's name, phone number, and email address who is responsible for the long-term management of the Owner's System.
 - c. Provide a Sheet Index which assigns a sheet number and unique name for each sheet that is included in the shop drawing submittal package. As part of the sheet index, list every sheet that is part of the system shop drawing package. On the left side of the Sheet Index, provide two columns: "Included" and "Not Included". Include a check box and provide a check in each box for all sheets that are included or not included in each submittal.
 - 1) Each sheet shall have a system-specific sheet number and shall match the Contract Drawing sheet numbering system (i.e., E4.02 shall be FA-4.02 [for Fire Alarm], E4.02 shall be LAN-4.02 [for Local Area Network]).
- 3. Legend Information: From left to right, provide the following information for EACH device:
 - a. Use the symbol on the legend of the contract drawings
 - b. List the manufacturer's name
 - c. List the manufacturer's model number
- 4. Provide a logical description of the device.
 - a. Provide the back box requirements and related information. At a minimum, this shall include:
 - 1) The height, width, and depth of each required back box for each symbol in the legend.
 - 2) If the device is a back box or comes with a back box (e.g., control panel, power supply, enclosure, etc.) then provide the height, width, and depth of the dimensions.
 - 3) Indicate if this device's back box is going to be installed flush, semi-flush, or surface mounted.

5. Wire Legend: Provide a listing of the cable manufacturer, model number, cable rating, size of conductors, quantity of conductors, and color of each conductor. Use the format in the sample "Wire Legend" as it applies to each system (see the sample at the end of this specification). Provide a cable identification naming scheme (as defined within these specifications).
 - a. The Wire Legend shall include the cable manufacturer and model number for EACH of the following types of cables (as applicable to the project):
 - 1) Conduit/Raceway Cable
 - 2) Open Cabling
 - 3) Wet Rated Cable
 - 4) Aerial Rated Cable
 - 5) EACH cable and EACH cable type shall have a different letter designation.
6. Riser Diagram: Provide a system one-line Riser Diagram that shows the entire system. List the following:
 - a. The head-end equipment and IP addressed devices. Show the connection to the WAN (where applicable).
 - 1) Show each location (the MDF and EACH designated IDF separately).
 - 2) Show each cable type, size, and quantity between the MDF and each designated IDF location.
 - 3) Show EACH device in the MDF and each designated IDF location (control panel, CPU, DVR, server, power supply and terminal cabinet) for each applicable system, the room name that each major system component is located in, and the connection to the headend equipment.
 - 4) Show all field devices with their respective room names and/or numbers and connections to their associated equipment.
 - 5) Show all field devices with their respective address point (where applicable).
7. Provide all mounting details and mounting heights for:
 - a. All headend equipment
 - b. Racks (where applicable)
 - c. Devices
8. Detailed Wiring Information:
 - a. Show each individual conductor color for all wiring on the point-to-point wiring diagrams for each device.
 - b. Show complete scale drawings of equipment, devices, wiring diagrams, and terminations of:
 - 1) Each control panel, CPU, DVR, etc.
 - 2) Power supply and/or amplifier
 - 3) Rack equipment (where applicable)
 - 4) EACH device type
 - 5) EACH terminal cabinet (where applicable)

9. Rack Layout:
 - a. Show the intended equipment layout within the racks.
 - b. Show blank filler plates in spaces where equipment is not installed.
 - c. Indicate the rack unit size of each device or filler plate in the rack.
 - 1) If rack equipment is installed on the rear side of the rack, show the rear view of the rack also.
10. The matrix as defined in the "System Device Naming Matrix" of each system specification (where applicable).
11. On the shop drawings, include a letter signed by the System Designer that is responsible for the design depicted in the submittals and on the shop drawings. The letter shall state that the equipment and shop drawings design conform to national, state, and local codes as adopted by the local Authority Having Jurisdiction and meet or exceed all of the performance requirements as outlined in the specifications.
 - a. Designers shall provide the following:
 - 1) A "signature" line and signature of the designer
 - 2) A "printed name" line below (or to the right of) the signature line and the printed name of the designer
 - 3) A "date" line below (or to the right of) the printed name line and date of the design.
 - b. For fire alarm shop drawings, include the above information and the system shall be designed by one of the following (provide a copy of the supporting documentation):
 - 1) NICET Level III Certified Designer
 - 2) Registered Professional Engineer
12. Labels and Labeling:
 - a. On the drawings, label each rack, control panel, CPU, DVR, power supply, and terminal cabinet in a logical numeric sequence (e.g., for fire alarm power supplies, list them as FAPS-1, FAPS-2, etc.).
 - b. Cables: Generate an alpha-numeric label for each cable type and cable run.
 - c. For projects with multiple sites, all labeling shall be consistent for all sites.
13. Show floor plan layout of devices and the anticipated routing of cable runs in parallel with all structural framing in a neat and orderly fashion.
14. EACH device at EACH location shall be shown on EACH floor plan. The cabling for EACH device shall be shown from EACH device to the device that it shall be connected to. EACH cable shown on the floor plan shall be identified as described in the "Wire Legend" portion listed within this specification.
 - a. Floor Plans: show all system related devices and all equipment that the system specific shop drawings will interface to, on each of the floor plans. Provide cabling for each device and the related wire type (as shown on the "Wire Legend") shown for each of the devices. Where multiple devices are on the same circuit or an addressable data cable is used, show all devices and their related cables.

15. All drawing submittals shall be a complete and full set of the system. If drawings are required to be re-submitted, a full and complete set must be re-submitted. Partial system drawing sets will be rejected and the Installing Vendor/Contractor shall reissue a full set of drawings. Any re-submittals shall be provided at the Installing Vendor's/Contractor's expense.
16. The Installing Vendor/Contractor is responsible for assuring that the conduit size, wire quantity, wire size, and wire type is suitable for the equipment supplied. The Installing Vendor/Contractor shall review the proper installation method(s) for each type of device/equipment with the manufacturer's representative, and the AHJ, prior to rough-in.
17. Provide shop drawings that are usable for trouble-shooting purposes showing equipment/device locations, conduit routing, junction boxes, and connection wiring of entire system.

- E. Contract Drawings shall not be used as Shop Drawings.
- F. The Shop Drawings shall be system specific. For example: only fire alarm equipment and connections to other equipment that will be interfaced to the fire alarm shall be shown on the fire alarm drawings.
- G. Floor plans for the project have been developed by the Engineer using AutoCAD software. These drawing files will be made available to the Installing Vendor/Contractor for development of Shop Drawings and/or As-Builts for a fee of \$20.00 per sheet.

1.7 GOVERNING CODES AND CONFLICTS

- A. If the requirements of this section, related sections, or the Project Drawings exceed those of the governing codes and regulations, then the requirements of this section, related sections, and the drawings shall govern. However, nothing in this section, related sections or the drawings shall be construed to permit work not conforming to all governing codes and regulations.

1.8 PROJECT CONDITIONS – CIVIL PLANS

- A. The Installing Vendor/Contractor shall carefully coordinate the various symbols utilized on the drawings and shall consult the civil plans to determine site conditions in the various areas.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide all equipment as defined in each specification and on the drawings.
- B. All equipment, panels, power supplies, and devices shall be manufactured under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the UL label.

- C. All equipment for each system shall bear the UL label. Partial or pending listings shall not be acceptable. It shall be the Installing Vendor's/Contractor's responsibility to ensure that these requirements are met and replace any and all equipment up to and including the entire system, if these requirements are not met.
- D. EACH of the specified Low Voltage Systems identified in PART 1 of these specifications including the design, devices and/or wiring arrangement shown on the drawings, represent that based on various equipment manufacturers. Any changes resulting from differences between the specified product and other manufacturers or substitute manufacturers, shall be the responsibility of the Installing Vendor/Contractor.
 - 1. Substitutions of the specified equipment and/or supplier will be considered provided that sufficient documentation is provided to the Engineer which certifies that the equipment and/or supplier qualification meets the requirement of these specifications. Any request for substitution shall be submitted by the Installing Vendor/Contractor in writing so as to be received by the Owner not later than (10) ten days prior to the bid due date. Equipment that is approved by the Engineer will be issued by addendum prior to the bid date.
- E. Refer to PART 1 for any equipment that is not specifically defined.

2.2 CONDITION OF MATERIAL

- A. All equipment shall be new, in un-opened boxes, and be the most current model available for each component and/or device that is provided for this project. For products that use firmware, the most current version available shall be downloaded and installed at each component and/or device, prior to any programming being performed. Outdated or used equipment, as determined by the Owner, shall be removed and replaced by the Installing Vendor/Contractor at no cost to the Owner.
- B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturers' installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation. All materials shall be in working order as intended by the manufacturer, at the completion of the project.

2.3 WIRE GUARDS

- A. Provide at locations where designated on the drawings. Provide wire guards to protect the device from damage. At a minimum, all field devices located in the gymnasium(s) and multipurpose room(s) shall have wire guards installed.
- B. Provide and install wire guards that are sized appropriately to protect each device at locations indicated on the drawings but will not interfere with the operation of any device. The device shall operate as intended by the manufacturer after the wire guard has been installed.
- C. Wire guards shall be made using seven (7) gauge welded steel and be chrome plated.
 - 1. Use Space Age Electronics, HSG Series or PSG Series, or approved equal. Size as required.

2.4 TERMINAL CABINETS, TERMINAL STRIPS, ENCLOSURES AND OUTLET
BACKBOXES

- A. On-Site System Information Binder and Enclosure: EACH specification section identified on the first page of this specification shall have an Information Binder that shall be housed in a System Information enclosure. The enclosure shall have a hinged door with the text “(Section Title here) Information”, with each specific system name silk screened onto the enclosure door and shall bear the Underwriters Laboratories “UL” label. A “T-Turn” cam lock shall be used to keep the enclosure door closed, and a key shall NOT be required to open the enclosure. Use the following Space Age Electronics model number, or approved equal:
1. All systems (other than fire alarm): Model # YD9048DBXAA. Verify with the Owner the color of the enclosure(s) prior to ordering the enclosure. There shall be no additional charge to the Owner for changes to the color of the enclosure.
 2. For the fire alarm: Model # YD9049DBXAA shall be red in color, have a hinged door, and have “Fire Alarm System Documentation” silk screened on the enclosure door.
- B. Terminal Cabinets (TC):
1. See EACH Specification for terminal cabinet requirements (where applicable).
- C. Terminal Strips:
1. See EACH Specification for terminal strip requirements (where applicable).
- D. Enclosures:
1. Each systems control panel, power supply, TC, and other metal enclosures shall have the following:
 - a. Use key operated locks to secure the enclosure (keyed so that a single key can lock and unlock all enclosure locks for the entire system) and provide ten (10) keys.
 - b. Use some form of wire management that uses permanently secured fasteners (no double-back tape) and uses reusable and adjustable Velcro-style cable straps, which shall be installed approximately every four (4) inches within each enclosure.
- E. Backboxes:
1. Each system backbox, with the exception of specific backboxes, shall be metal and installed specific to the system it is being used on.
 - a. Provide Red Randl Industries Inc., 5 Square boxes or equal for all fire alarm devices.
 - b. Provide Blue Randl Industries Inc., 5 Square boxes or equal for all A/V locations. Provide single gang mud ring for all A/V locations only requiring single gang faceplate and provide double gang mud ring for all A/V locations requiring double gang faceplate. See A/V schedule for more information.
 - c. Provide Blue Randl Industries Inc., 5 Square box or equal for all telecom workstation locations with single gang mud ring unless noted otherwise.

2.5 LABELS AND LABELING

- A. The alpha-numeric labeling shall be developed by the Installing Vendor/Contractor.
- B. Label all equipment and cables in an identical fashion of a sequential manner.
- C. The Installing Vendor/Contractor-proposed alpha-numeric labeling that is intended to be used to identify all components of the system shall be submitted for approval by the Engineer, with the submittal of equipment data sheets.
- D. All labeling information shall be recorded on the As-Built drawings and all test documents shall reflect the appropriate labeling scheme.
- E. Phenolic name plates shall be used for identification of the racks, control panel, power supply, terminal cabinet, and other appurtenances of each system in a logical numeric sequence. Use an alpha-numeric name of each device for each location (created by the Installing Vendor/Contractor) to identify the equipment on the Shop Drawings.
 - 1. The size of the plate shall be two (2) inches high by approximately eight (8) inches wide. Different colors of backgrounds may be used for each system (but Red shall only be used for fire alarm).
 - 2. The text color shall be white letters that are 3/4inch high and are 1/2inch in width.
- F. Labeling of cables must be provided in the following locations: EACH system control panel, power supply, terminal cabinet, terminal strip, rack, other system related appurtenances, and all junction boxes. Label all cables as shown on the Installing Vendor's/Contractor's Shop Drawings.
- G. All label printing shall be machine generated using indelible ink ribbons or cartridges, self-laminating labels shall be used on cable jackets, appropriately sized to the outside diameter of the cable, and placed within view at the termination point on each end.
 - 1. Temporary Labels: Shall consist of the following:
 - a. Using a fine point permanent style marker, Sharpie or equivalent, to write directly onto the outer jacket of the cable or use temporary tags.
 - b. The Installing Vendor/Contractor shall take all precautions to use care when pulling the cable to insure the integrity of the temporary label.
 - c. Remove all temporary labels and tags prior to installing the permanent label.
 - 2. Permanent Labels: Labels shall be produced using an electronic labeler. Cabling shall be marked with a permanent, electronic printed label with a self-laminating clear wrapping to cover the printed label and shall be secured to the outer jacket of the cable.
 - 3. Provide Brady Model # XSL-116-427 or approved equal.

2.6 SYSTEM CABLES

- A. All cables shall be new.

- B. All cable types shall be UL listed and rated to meet all code requirements for site conditions, including, but not limited to; underground, wet, plenum, and aerial requirements as mandated per N.E.C. and local AHJ requirements. The Installing Vendor/Contractor shall be responsible for ensuring that all cables meet all national codes, state codes, local codes, AHJ requirements, and each equipment manufacturers' requirements for a reliable, fully functional, and warrantable system, as intended. Do not exceed the wiring distance limitation of the equipment, devices, cables and/or conductors as recommended by the manufacturer of either the equipment and/or the cables for each installation application.
1. Use the manufacturer recommended cables for EACH application and as required by code (e.g., raceway, open cabling, wet, and/or aerial).
 2. All cables that run through wet locations shall be UL listed for wet locations and be run in EMT wherever re-entering the building to the device location and the headend location to include ground floor box locations in slab and under slab, aerial locations and any location that it may be exposed to moisture.
 3. All cables shall be stranded unless otherwise noted and/or recommended in writing by the manufacturer.
 - a. CAT5 through CAT7 cables are excluded.
 4. See PART 3 of this section, and of each system specification for more information.

2.7 PROOF OF DELIVERY FORM

- A. When providing equipment to the Owner, the Installing Vendor/Contractor shall provide the following transmittal document and obtain the necessary signatures.
1. The Installing Vendor's/Contractor's Transmittal Document is defined as:
 - a. Company logo
 - b. Name
 - c. Address
 - d. Telephone number
 - e. Delivery date
 - f. Installing Vendor's/Contractor's representative name that is making the delivery
 - g. Quantity of each item
 - h. Manufacturers' name and model number
 - i. The exact same description of the device (as used on the Shop Drawings)
 - j. Provide a "signature" line for the Owner's Representative
 - k. Provide a "printed name" line for the Owner's Representative
 - l. Provide a "date" line for the Owner's Representative

PART 3 - EXECUTION

3.1 WORK ENVIRONMENT

A. General:

1. The Installing Vendor/Contractor shall have implemented an OSHA approved safety plan at their place of business. All staff should adhere to it in their daily practice.
 - a. Avoiding injury is the primary concern for this project. Use OSHA industry standards to avoid accidents.
2. Coordination With Other Trades:
 - a. It is the responsibility of the Installing Vendor/Contractor to coordinate with all trades for this project. Maintain all requirements for project schedule deadlines, rough-in, installation, programming, training, and ensuring that the Owner receives a fully functional system as defined in this specification.

3.2 APPROVED EQUIPMENT AND PERMITS

- A. No equipment shall be delivered to the job site until Shop Drawings have been reviewed and approved by the Owner.
- B. An approved set of Shop Drawings shall be continuously available at the job site during construction, for review by the Owner.
- C. Obtain all permits as required, prior to installation of any equipment. They shall be continuously available at the job site during construction, for review by the Owner.

3.3 CABLE INSTALLATION – GENERAL

- A. Open Cable installation methods are acceptable for this project when they are above accessible ceilings or in attic spaces, provided that all requirements identified in this specification are met.
- B. All cable types shall be rated to meet all code requirements for site conditions, including, but not limited to underground, wet, and aerial requirements as mandated per N.E.C. and local AHJ requirements.
- C. Do not exceed the wiring distance limitation of the equipment, devices, cables and/or conductors as recommended by the manufacturer of either equipment and/or cables for each installation application. The Installing Vendor/Contractor shall be responsible for ensuring that all cables meet all equipment manufacturers' requirements for a reliable, fully functional, and warrantable system, as intended.
- D. Wiring insulation shall be one of the types required by NEC 725-16.

- E. Cable Supports: Clamps, "D-Rings", "J-Hooks", Hangers, and Velcro tie-wraps are all acceptable ways to support cable. However, installation of these supports must be done with care so as not to cause crushing or distortion of the cable, nor cause tighter bends than the minimum radius permitted for each type of cable.
1. See each specific section requirements that shall be applied to this project in addition to these requirements.
- F. Allowable Cable Bend Radius and Pull Tension: In general, all cables cannot tolerate sharp bends or excessive pull tension during installation. The minimum radius bend shall be ten (10) times the cable outer diameter with no tensile load applied, and twenty times the cable outer diameter with a maximum tensile load of 25ft/lbs applied during installation. The Installing Vendor/Contractor is responsible for maintaining the cable manufacturers' end Radius and Pull Tension at all times. Corrections to cable installation shall be made to the satisfaction of the Owner at no additional cost to the Owner.
- G. Service Loops and Cable Management:
1. Comb all wires for the duration of the cable run so they are neat, orderly, do not have excessive slack, and are not tangled, prior to any service loop, continuing through any service loop, or continuing into EACH enclosure and/or system rack.
 - a. Provide a 10'-0" service loop of EACH device cable (a minimum of 2'-0" above the accessible ceiling, within 5'-0" of plan view) above EACH device.
 - b. For ceilings that are open to structure, do NOT provide a service loops, except for the following locations:
 - 1) MDF rooms
 - 2) IDF rooms
 - 3) Electrical rooms
 - 4) Storage rooms
 - 5) Designated system equipment locations that are NOT in view of the public
 - 6) Prior to rough-in, obtain Owner's approval.
 2. Cable Management shall be used to bundle all cables of the like kind, separated by system type.
 3. See Systems Plywood Backboard Cabling, listed elsewhere in this specification, for more information.
- H. The Installing Vendor/Contractor shall ensure that communications cable is installed with care, using techniques which prevent kinking, sharp bends, scraping, cutting, deforming the jacket, or other damage. During inspection, evidence of such damage will result in the material being declared unacceptable. The Installing Vendor/Contractor shall replace all unacceptable cabling at no additional expense to the Owner.

- I. The Installing Vendor/Contractor shall order and install the exact cables as specified on the Installing Vendor's/Contractor's Shop Drawings. If at any time during the installation and through the warranty period, it is discovered that any cable other than what is called for on the Installing Vendor's/Contractor's drawings has been installed, the Installing Vendor/Contractor shall remove all effected cables and shall provide and install the correct cable, as required. The Installing Vendor/Contractor shall also provide the staff to monitor the building during the cable replacement period until the system is fully operational to the satisfaction of the Owner, without any additional cost to the Owner.
- J. All horizontal cables shall be supported at a maximum of 4'-0" intervals with UL approved devices. At no point shall cables rest on, be tied to, or otherwise secured to electrical conduit, plumbing, ventilation ductwork, accessible ceiling and/or light fixture hangers, or any other equipment. Cable shall be secured to building supports or wire hangers (at the structure's ceiling) specifically designed to support cables and/or to additional blocks or anchors specifically installed for this purpose.
- K. All open cabling and/or conduit shall be installed parallel or perpendicular to the structure. Open cable installations shall use insulated mounting supports or rings approved for such use. Wiring shall be installed near or on structural members as to minimize risk of physical damage by other trades or maintenance personnel servicing the equipment.
- L. Installing open cabling and/or conduit on an exposed area of wall that could have been installed in a less conspicuous manner, especially where art or murals are to be painted, is NOT acceptable. Any installation that does not meet this requirement will be required to be removed, and to patched and painted to match adjacent surfaces to the satisfaction of the Owner. Then install the conduit, fasteners, and wire as required by the project, at no additional cost to the Owner in an acceptable manner that meets with the Owner's approval. Obtain direction from the Owner prior to rough-in, for areas that need clarification.
 - 1. In some cases, it may be more aesthetically appealing to install conduit down the wall to the floor and either through the floor or along the floor, to be less conspicuous. Contact the Owner for further clarification.
- M. Conduit type and areas where conduit will be required for this project are:
 - 1. Provide EMT metal raceway in the following areas:
 - a. Always conceal conduits within walls and/or ceiling spaces wherever possible.
 - b. Where required by code. Provide conduit in all areas required by code, but no less than the following locations:
 - c. To accessible ceiling spaces. Provide conduit from the device to accessible ceiling space where:
 - 1) Devices are wall mounted
 - 2) Devices re located on hard lid ceiling
 - 3) Devices are in an inaccessible area. An inaccessible area is defined as less than 2'-0" from an accessible ceiling tile.
 - d. Unoccupied areas exposed to view. Unoccupied areas are defined as places where staff or the public will be in the room or area for only a few minutes, with the exception of service/maintenance personnel.

- e. This includes, but is not limited to:
 - 1) Mechanical rooms
 - 2) Electrical rooms
 - 3) Storage rooms
 - 4) Utility rooms
 - 5) Janitorial closets
 - 6) Other unoccupied rooms
 - f. Install conduits to an accessible ceiling space, as defined above.
 - g. Consult with the Owner for further clarification.
- 2. Provide conduit, conduit sleeves, junction boxes, couplers, connectors, cabling and terminations as recommended by the manufacturer and as required by code.
 - 3. Provide conduit sleeves through all spaces to accommodate all low voltage cabling. EZ path fire-rated and non-rated devices are approved substitutions for conduit sleeves.
 - 4. Fill Requirements: Conduit, conduit sleeves, raceways, floor boxes, device boxes, mud rings, etc., shall be furnished and installed per Division 26 requirements. Maintain all conduit code fill requirements and provide no less than an additional 40% spare capacity for future growth.
 - 5. Conduit and Raceway Usage: All communications cable shall be dedicated for communications purposes, and not to be shared with other electrical wiring when required by code. Obtain written approval from EACH of the manufacturers if more than one system type is going to be installed in a single conduit.
 - a. Fire alarm cabling shall be in a separate, dedicated raceway (where indicated in the drawings).
 - 6. Pull Cords: Provide nylon-type pull cords in EACH conduit raceway.
 - 7. Provide surface-mounted raceway in the following areas (for retrofit/remodels or as directed by the drawings or Owner):
 - a. Occupied areas exposed to view. Occupied rooms. Generally, occupied areas are defined as places where staff or the public will be in the room or area for more than a few minutes.
 - 1) This includes, but is not limited to:
 - a) Administrative areas
 - b) Office spaces
 - c) Other occupied rooms
 - b. Install conduits to an accessible ceiling space, as defined above.
 - c. Size conduits as required.
 - d. Consult with the Owner for further clarification.
 - 8. Surface-mounted conduits of any kind may only be installed after every attempt has been made to conceal wiring and/or conduits specified within this document. Obtain prior approval from the Owner, before installing surface-mount conduit.
 - 9. Prior to installation, contact the Owner if these instructions are not clear, or field conditions require further clarification of the intent of the installation.

- N. Cable Lubricants: Lubrications specifically designed for installing cables may be used to reduce pulling tension as necessary when pulling cable into conduit. After installation, exposed cable and other surfaces must be cleaned of lubricant residue.

1. Recommended Products:

- a. Dyna-Blue
- b. American Polywater

O. Horizontal Cabling:

- 1. Horizontal cable terminations shall be made at the appropriate patch panel and labeled as noted on the Outlet Schedule. At each outlet box, a sufficient length of spare cable shall be provided for terminating outlet devices such that the outlet can be easily removed and inspected. In addition, each cable shall be terminated as indicated below:
 - a. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturers' recommendations and/or best industry practices.
 - b. Bend radius of the cable in the termination area shall not be less than four (4) times the outside diameter of the cable.
 - c. The cable jacket shall be maintained as close as possible to the termination point.

P. Systems Plywood Backboard Cabling:

- 1. Cable shall be routed as close as possible to the ceiling, floor, or corners to ensure that adequate backboard space is available for current and future equipment and for cable terminations. Cables shall NOT be tie-wrapped to existing electrical conduit, existing cables, or other equipment. Minimum bend radius shall be observed.
- 2. Install cables via the shortest route directly to the nearest edge of the backboard from the mounted equipment or block. Lace, plastic or Velcro tie wrap all similarly routed cables together and attach to the outside edge(s) of the backboard vertically and/or horizontally, then route via "square" corners over a path that will offer minimum obstruction to future installations of equipment and/or other cables.
- 3. See "Service Loops and Cable Management" listed within this specification for additional information.

3.4 SYSTEMS PLYWOOD BACK BOARDS

- A. Systems plywood back boards shall be used to mount enclosures of any kind, to any wall or surface. The systems' plywood back boards shall be securely fastened to the walls to accommodate no less than ten times the total weight of the equipment to be mounted. The systems plywood back boards shall be a minimum of 3/4", APA exterior-grade Douglas Fir A-C, and fire retardant with a flame spread rating not more than 25 when tested according to ASTM E-84. Provide the systems plywood back boards from the floor up to ceiling height (not exceeding 12'-0") on all walls shown, unless otherwise noted. The entire back board shall be painted with three (3) coats of fire-retardant paint (the color shall match the adjacent surface). EACH enclosure, when mounted, shall bear a minimum of 150 pounds weight on the enclosure.

- B. Mounting of equipment shall be logically placed, and shall be located at the top, bottom, left, or right portion of the systems plywood back boards to accommodate future growth of the system. Under no circumstances will the equipment be allowed to be mounted in the middle of the back boards.

3.5 GROUNDING

- A. Ground all equipment per the manufacturers' recommendations, per Division 26 and as required by code.
- B. Provide grounding and bonding per ANSI-STD-J-607-A, which includes, but is not limited to cable trays, racks, conduit sleeves, and other equipment connected to the TMGB/TGB.
- C. The minimum conductor size shall be # 6 green insulated copper grounding conductor. However, the size of each conductor shall be based on the actual cable length as defined in ANSI-STD-J-607-A. See Section 272000 "TMGB and TGB (Telecommunication Grounding Busbars)" for additional grounding requirements.

3.6 DEVICE RELOCATIONS

- A. Device location may be changed prior to installation, within 15'-0" without extra charge, if so desired by the Owner.

3.7 INSTALLATION

- A. Provide all equipment, wiring, conduit, and outlet boxes required for the installation of a complete, fully functioning, operating system in accordance with applicable local, state, national codes, AHJ requirements, the manufacturers' recommendations, these plans and specifications. All circuits not in conduit must be wired with UL listed power limited cable under NEC 725, Class II wiring. Plenum cable shall be utilized in all return air plenum ceilings.
 - 1. Color-coded wires shall be used throughout.
 - 2. Wiring shall conform to the National Electrical Code Article 725.
- B. Provide 120VAC wiring and connections to the control panels, EACH amplifier, CPU, DVR, and power supply as required for a fully functional system, while maintaining all of the design requirements described elsewhere within each system specifications. At a minimum, this shall include the following:
 - 1. Multiple power supplies and/or the control panel may be placed on the same circuit, while maintaining all code mandated load calculations, but shall be on circuits that are dedicated for EACH system.
 - a. Consult with the Owner to verify load calculations meet all code requirements.
 - b. Install 120VAC wiring and conduit as specified in Division 26.

- c. Show on the As-Built Drawings the location of each panel board that is being used to power any system equipment, and, at the panelboard, list each panelboard circuit for each system (e.g., panelboard "x", circuit 12=FAPS-3; Circuit 14=IACP).
- C. Maintain all fire wall ratings as required.
- D. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.
- E. EACH manufacturers' authorized representative shall provide on-site supervision of the installation for EACH of the systems equipment for the duration of the project. This includes programming, training, and the Owner's ability to use the Complete System Functionality as it was designed.
- F. Install wire guards at locations as shown on the drawings and as described elsewhere within these specifications.
- G. Every attempt shall be made to avoid running telecommunications close to (less than 2'-0") and/or parallel to other communication cables in the building, all lighting, and conduits containing 120VAC (or greater). This shall be to avoid interference with any other service or system, operation, or maintenance purposes such as access boxes, ventilation-mixing boxes, access hatches to air filters, switch or electrical outlets, electrical panels, fire alarm equipment, clock systems, and lighting fixtures. Avoid crossing areas horizontally just above or below any conduit and/or riser. Route cables in such a manner to allow other cables to enter the conduit and/or riser without difficulty at a later time by maintaining maximum distance from these openings. Maintain all recommended distances from other cables, as required by the manufacturer. Install cable to whichever of these two requirements are more stringent.
- H. Room numbers shown on plans are architectural designs numbers for construction purposes. These numbers are NOT to be used for programming. Final system programming shall reflect the final room numbering plan and actual room signage, unless directed otherwise in writing or as specified in another specification section. Update the As-Built Drawings to reflect the final room numbering plan and actual room signage.

3.8 MOUNTING HEIGHTS, LOCATIONS, AND SETTINGS

- A. Install all equipment as recommended by the manufacturer.
- B. The installation of EACH device, enclosure, and/or control panel shall be installed so that the maintenance staff will be able to access, test and/or replace any component of the system. If this installation does not meet this requirement to the satisfaction of the Owner, it will not be accepted. The Installing Vendor/Contractor shall be required to remove the item, patch and paint the area to the satisfaction of the Owner, and reinstall the device, enclosure, or control panel as required to make the system easily maintainable and acceptable, at no additional cost to the Owner.

C. Control Panels, Power Supplies, and Locations:

1. Mount control panels, power supplies, and enclosures (provide quantities as required) with approximately two (2) inches of separation between the enclosures.
2. Each enclosure, when mounted, shall meet the following criteria:
 - a. Conduit shall not enter any enclosure or panel, except where conduit entry is approved by the manufacturer.
 - b. Chase nipple the enclosures together. At a minimum, use two (2) 1½" conduits. Size and/or provide additional conduits as required. Provide conduits between enclosures to accommodate an additional 100% conduit fill while maintaining all NEC requirements. Avoid installing chase nipples where batteries are to be installed (contact the manufacturer and/or the Installing Vendor/Contractor prior to drilling any holes). Any chase nipples installed where batteries are to be located will be rejected, and require the reinstallation as specified, up to and including installing new enclosures.
 - c. The bottom of the chase nipples shall be a minimum of two (2) inches above the location where any batteries are to be installed.
 - d. EACH enclosure door shall be able to open no less than 105°.
 - e. The top of each enclosure shall be mounted at the same height of 60 inches above the finished floor and shall be level.
 - f. If changes to the above requirements are preferred, contact the Owner for approval prior to rough-in.

D. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (i.e., devices shall not be supported solely by suspended ceilings). Fasteners and supports shall be able to support the no less than four (4) times the weight of the equipment and/or device.

E. Rack Equipment: EACH rack shall be securely attached to the floor and/or wall using the manufacturers' recommended mounting hardware.

F. See each system specification for additional mounting information.

3.9 FLUSH MOUNT AND SURFACE MOUNT EQUIPMENT AND ENCLOSURE LOCATIONS

A. Prior to rough-in, consult the Owner for clarification for flush mount and surface mount locations.

B. Flush mounted equipment and enclosures shall be installed in areas where the rooms are finished such as administrative areas, offices, work rooms, break room and corridors. Provide the appropriate finish work around each enclosure as required. This type of equipment includes, but is not limited to the following:

1. Enclosures: Typically, are control panels, power supplies, etc.
 - a. Provide the manufacturers' flush mount trim rings, adapters, and/or brackets for this type of equipment.

- C. Surface mounted equipment and enclosure shall be installed in areas where the rooms are NOT finished such as electrical rooms, MDF/IDF rooms, mechanical rooms, or utility rooms. Unless otherwise noted, this equipment shall be installed on the system's plywood back boards. This type of equipment includes, but is not limited to the following:
1. Enclosures: Typically, are control panels, power supplies, etc.
 2. Punch Blocks: Typically, are used with telephone PBX and intercom equipment.
 3. Wall-mounted and floor -mounted racks.

3.10 NUMBERING AND LABELING

A. Phenolic Plates:

1. Install phenolic plates at each of the control panels, power supplies, terminal cabinets, and racks.
 - a. All phenolic plates shall be secured to each enclosure with rivets.
 - b. Install each plate 1" from the top of the enclosure and centered on the door. Relocate as required to avoid interfering with equipment or components within the enclosure or prevent the enclosure door from closing properly. The location of the phenolic plates shall be consistently installed in the same location on each system enclosure, at EACH location.

B. Terminal Cabinets:

1. Label each termination point on the inside of EACH enclosure door. All information shall be legible, as defined by the Owner.

C. Addressable Devices/Address Point Labels (where applicable):

1. Install the address label for each addressable device on or near the device. Verify with the Owner, prior to installation.
2. Clean the surface of dust, grease, or lubricants as recommended by the manufacturer of the label.
3. The addressable label shall be able to be viewed by the general public when standing on the ground.
 - a. Prior to installation, coordinate with the Owner's Representative for exact location of how and/or where to mount the address label for EACH device type to fulfill this requirement, prior to installation.
4. Provide the following address label format:
 - a. The background shall be clear (see through).
 - b. The text shall be black in color, and a minimum of 1/2" tall.
 - c. Use Brothers or P-Touch models to produce the label.

3.11 WIRING

- A. For consistency of wiring throughout the entire system equipment, if specific conductor colors are not called out in EACH system specification, then the following colors shall apply:
1. Red is (+) positive voltage or data bus (+) positive.
 2. Black is (-) negative voltage or data bus (-) negative.
 3. White is common.
 4. Green is normally open or normally closed.
- B. Wiring within EACH enclosure shall have the outer jacket of the cable removed to within three (3) inches of the cable entering the enclosure. Individual conductors from each jacketed cable shall be spirally twisted to keep them together, until they are routed into each appropriate individual terminal. Route all conductors parallel with the walls of the enclosure, make 90° turns within the enclosure, and always keep a two (2) inch minimum spacing from any circuit board and/or terminals.
1. Labeling of Cables:
 - a. Prior to installing any label, clean each cable with the appropriate cleaner to remove any pulling compound residue, grease, oil, dirt, etc., in order for the label to properly adhere to the cable jacket.
 - b. The label shall indicate the device or outlet and the area or wing of the building that the cable is being routed from. The label shall also indicate the MDF room or designated IDF location that the cable is being routed to.
 - c. Each label shall be located on each cable that enters any enclosure or junction box and shall be easily visible and readable.
 - d. The cable numbering system shall be consistent with shop drawings.
- C. The telephone dialer connections and Ethernet WAN connections shall be made by the Installing Vendor/Contractor. Coordinate with the Owner for scheduling the Owner's IT Department to supervise all terminations and connections.
- D. All wiring routed under slab or underground shall be suitable for wet locations.
- E. The Installing Vendor/Contractor shall clean all dirt and debris from the inside and the outside of EACH enclosure after completion of the installation, and prior to any testing being performed.
- F. All circuits shall be identified in accordance with the table below and all labels shall include wire type, quantity and circuit number. Wire code shall match approved shop drawings' wire code.

Table

Example: C2HX3

C = Signal circuit wire

2 = Signal circuit number

H = LCD Keypad wire

X = Addressable initiating device circuit wire

3 = Addressable initiating device circuit number

3.12 SPLICE CONNECTORS AND CONNECTIONS

- A. All references to splices are for cables that are 50 volts or less.
- B. A continuous cable run without any splices is the preferred method. When a splice is required, the following information shall apply.
 - 1. Cable splices are only allowed in accessible, dry locations, in a junction box or terminal cabinet suitable for the purpose. The only exception is for field devices that have wire leads (e.g., pigtail) and require a connection of two (2) wires at the device.
 - a. Each cable end that is spliced must be labeled, as specified. (e.g., at the splice point, “From FACP in MDF Room XXX” on one cable, and “To the East Wing RCAP” on the other cable).
- C. All conductors, if spliced, shall be ONLY spliced to the same gauge size and color of conductor. Changing of gauge size or color at any point within any cable run is strictly prohibited, and all cables will be replaced at no additional cost to the Owner, and to the satisfaction of the Owner.
 - 1. If the field device has wire leads, then wire as necessary at the device for proper operation. Indicate the color code change on the shop drawings per point wiring diagrams. Update any and all changes to the drawings, for accurate As-Builts.

3.13 ON-SITE SYSTEM INFORMATION BINDER ENCLOSURE

- A. The Installing Vendor/Contractor shall install the wall mount enclosure that is labeled “(Section Title here) information”. The enclosure shall be located in the administrative area or the MDF room. Verify the exact location with the Owner, prior to installation.
- B. The enclosure shall have a site-specific manual, in a “D” style 3-ring binder with an 18-inch heavy-duty chain securely fastened to the inside of the enclosure.
- C. See “As-Built Documentation” for more information.

3.14 TESTING & COMPLETE SYSTEM FUNCTIONALITY (FOR ALL SYSTEMS THAT IDENTIFY THIS TESTING REQUIREMENT)

- A. The warranty shall NOT begin until the following conditions have been met:
 - 1. Obtain the AHJ signature, printed name, date, and telephone number on the permit(s) and other required documentation. Provide this documentation with the As-Built documents.

2. The Installing Vendor/Contractor shall provide a copy of the (Section Number and Section Title here) - Operational Test Form that has been performed and submitted to the Owner for review. The purpose of this document is to show that the Installing Vendor/Contractor has in fact performed a complete test. In some cases, every device may not pass the test. This shall serve as the Installing Vendor's/Contractor's own punch list, to make corrections prior to the Acceptance Test. This must be completely filled out and have an original signature of the representative of the Installing Vendor/Contractor. Allow for a minimum of ten (10) business days for the Owner to review this document.
3. After the Owner's review of the System Operational Test Form, the Owner will discuss the results of the test with the Installing Vendor/Contractor.
4. The Installing Vendor/Contractor shall coordinate with the Owner to witness the Performance Test. Allow for a minimum of ten (10) business days to schedule this testing.
5. System Testing:
 - a. The Installing Vendor/Contractor shall provide two-way communication devices for their own staff, each Owner's Representative, and the Owner, so that all parties can communicate as required to perform all tests.
 - b. The Installing Vendor/Contractor shall demonstrate the testing of each device to the Owner's Representative and the Owner, and document this information on the (Section Number and Section Title here) - Performance Test Form.
 - c. Upon the completion and passing the Performance Test with 100% positive results, the Acceptance Test Form shall be signed by the Installing Vendor/Contractor, the Owner's Representative, and the Owner.
 - 1) If the Installing Vendor/Contractor fails this test by NOT passing the test with 100% positive results, the following shall occur:
 - a) The Installing Vendor/Contractor shall make all of the necessary corrections to provide 100% positive results.
 - b) The Installing Vendor/Contractor shall document the corrective action taken for each item that failed the Test and submit it to the Owner for review. Upon approval by the Owner, the Acceptance Test shall be rescheduled.
 - 2) The Installing Vendor is subject to the Close Out requirements as specified in Section 200000, Schedule of Values.
6. As-Built:
 - a. Refer to the "As-Built Documentation" of this specification for more information.
7. Training:
 - a. Refer to EACH specific section for the training requirements as described in "Training Materials and Programming Survey".

8. Complete System Functionality:

- a. After ALL of the above conditions have been met, deemed by a "Pass" on the Governing Acceptance Form - (Section Name and Section Title here), and the required signatures have been received, Complete System Functionality shall be deemed complete, as the Owner has the ability to use the system as it was designed.

9. Warranty:

- a. The warranty period shall now begin, and the initiating date of the warranty period shall commence on the date of the Owner's ability to use the Complete System Functionality as it was intended. Refer to the "Warranty" section of this specification for more information.

3.15 WARRANTY

- A. See "Testing & Complete System Functionality", listed elsewhere in these specifications, to establish the requirements and confirm when the actual warranty period shall begin.
- B. The Installing Vendor/Contractor shall include in the pricing of their bid that they will honor and provide EACH of the manufacturers' full-term warranty period for the provision of replacement equipment for EACH individual device and/or component provided for this project. The completed and fully functional system, including wiring, installation, and all equipment shall be free from inherent mechanical and electrical defects. At a minimum, this shall be no less than one (1) year from the date of Complete System Functionality as defined in "Testing & Complete System Functionality" portion of this specification. Warranty service for the on-site replacement of equipment shall be provided by the system supplier's manufacturer trained representative during normal working hours, Monday through Friday, excluding holidays, and response for service shall be delivered no later than the following business day after the call was received.
- C. When the manufacturers' warranty exceeds one year, the Installing Vendor/Contractor shall be responsible for replacing the actual component or device for the full duration of the manufacturers' warranty, if the Owner or their representative chooses to take the item to the Installing Vendor's/Contractor's place of business. If the Owner chooses to have the Installing Vendor/Contractor provide on-site service, then the Installing Vendor/Contractor is entitled to their standard published (or negotiated) labor rates and miscellaneous material items to replace the damaged warranty item.
- D. The Installing Vendor/Contractor who is authorized to provide warranty service for this project is defined in "Quality Assurance" located in Part 1 of this specification.

3.16 AS-BUILT DOCUMENTATION

- A. The following documentation must be completed to the satisfaction of the Owner, in order to fulfill the Close Out requirements as specified in Section 260000, Schedule of Values.

- B. All electronic and hard copy information submitted to the Owner shall immediately become the Owner's property to use as best determined by the Owner, without any compensation to any party.
- C. All labeling shall match the final room number identification at completion of the project (not the room number that is indicated on the Bid Set of drawings).
- D. Operation and Maintenance Manuals: The Installing Vendor/Contractor shall provide three (3) sets of detailed Operation and Maintenance Manuals in a "D" style 3-ring binder. The binder shall be sized to allow for 20% additional documentation. The spine of the binder shall have a clear cover with an insert clearly typed with the following label: "(Project Name, Section Number, and Section Title here) Operation and Maintenance Manual". The binder shall have a clear front cover with an insert clearly typed with the title of the spine on the binder, located at the top of the page, and centered. The following information shall also be included on the front sheet of the binder: Project Name and Project Number, Specification Section Number and Section Title, Owner's name, Site Name and Site Address, Installing Vendor's/Contractor's Name, Address, and Contact Name. These O&M Manuals shall include the following:
 - 1. Use color-coded numbered tabs to separate each item defined below and for each device that was installed.
 - a. Provide these items in the following order.
 - 1) Provide an 8½" x 11" clear heavy plastic sheet in front of a table of contents page as the first page of the binder indicating each of the equipment or device documents contained in each tab section.
 - 2) The System Software User Guide
 - 3) The Web Server "Web-based" Software User Guide
 - 4) The System Control Panel LCD Display User Guide
 - 5) The Remote LCD Display User Guide (where applicable)
 - 6) Provide step-by-step instructions for typical basic operation of EACH system.
 - 7) Warranty information. The Installing Vendor/Contractor shall provide warranty information in the form of a matrix from left to right, that lists the following information:
 - 8) Use the symbol on the legend of the contract drawings.
 - 9) List the actual manufacturer's name of each device shown on the Installing Vendor's/Contractor's shop drawings.
 - 10) List the actual manufacturer's model number of each device shown on the Installing Vendor's/Contractor's shop drawings.
 - 11) Provide the description of the device that is used for each symbol on the legend.
 - 12) On the matrix, indicate recommended testing frequency for each item.
 - 13) State the manufacturer's full term of the warranty for EACH control panel, EACH power supply, and EACH device provided.
 - 14) Indicate where the Owner may purchase each of these devices. Provide the Business Name, Address, City, State, Zip Code, Phone Number, and list two (2) contact names.
 - 15) A reduced copy (11"x17") of record drawings. Enlarge all notes, text, and symbols to a legible (as defined by the Owner) reading format.

- 16) Provide one (1) original and two (2) copies of the "Spare Parts Proof of Delivery" form that was signed by the Owner's Representative.
- 17) A printed copy of the final completed version of the "(Section Number and Section Title here) Technical Configuration". This document shall be dated.
- 18) A printed copy of the final completed version of the "(Section Number and Section Title here) Software 'Point Status Report'" (where applicable). This document shall be dated.
- 19) Update the matrix as defined in the "System Device Naming Matrix" for each specification section, to correct any changes that may have occurred through the course of this project. This list shall follow the above equipment list.
- 20) The technical data sheet for each control panel, power supply, terminal cabinet, field device and component installed. Use a separate tab for each of these that were supplied and/or installed.
- 21) Include all testing documentation and the procedure to properly test each device. Put this document immediately behind the respective technical data sheet.
- 22) Include the installation manual for each device that was installed. Put this information immediately behind the testing documentation.
- 23) Provide one (1) original and two (2) copies of the AHJ approved documents.
- 24) Provide one (1) original and two (2) copies of the completed documents:
- 25) The (Section Number, and Section Title here) - Operational Test Form.
- 26) The (Section Number, and Section Title here) - Performance Test Form.
- 27) The approved Governing Acceptance Form - (Section Number, and Section Title here).
- 28) If the Governing Acceptance Form has not been approved, accepted, and signed by the Owner, this binder will be rejected.
- 29) Each binder shall not exceed three (3) inches in width. Use multiple binders as required. Indicate Volume 1 of X, Volume 2 of X, etc.
- 30) Provide the above information on six (6) CDs and label each one (with a PC-generated label) "(Owners Name, Project Name, Section Number, Section Title, and the current date goes here) - Operation and Maintenance Manuals, Data Sheets, Documents, and As-Built Shop Drawings". Organize the manuals, data sheets, documents, and drawings into separate folders.
- 31) Include on EACH system CD provided, the AutoCAD As-Built Drawings, located elsewhere in these specifications.
- 32) EACH of the three (3) Operation and Maintenance Manuals shall have one CD securely fastened inside.
- 33) Provide three (3) CDs for general As-Built documentation for the project.

- E. On-Site System Information Binder: The Installing Vendor/Contractor shall provide an Individual Site Manual, in a “D” style 3-ring binder with an 18inch heavy-duty chain securely fastened to the inside of the “(Section Title here) information” enclosure. See the “On-Site System Information Binder Enclosure” listed elsewhere in these specifications, for the enclosure information and location. The binder shall be sized to allow for 20% additional documentation. The spine of the binder shall have a clear cover with an insert clearly typed with the following label: “(Section Title here) information”. The binder shall have a clear front cover with an insert clearly typed with the title of the spine on the front sheet, located at the top of the page, and centered. The following information shall also be included on the front sheet of the binder; the Project Name and Project Number, Specification Section Number and Section Title, Owner’s name, Site Name and Site Address, Installing Vendor’s/Contractor’s Name, Address, and Contact Name. Each binder shall include the following:
1. Use color-coded numbered tabs to separate each item defined below and for each device that was installed.
 - a. Provide these items in the following order:
 - b. Provide an 8½” x 11” clear heavy plastic sheet in front of a Table of Contents page as the first page of the binder indicating each of the equipment or device documents contained in each tab section.
 - c. The Installing Vendor/Contractor shall coordinate with the Owner to obtain the information listed below. A single sheet shall list the following items:
 - d. The Site Name and Site Address.
 - e. State “In case of emergency during regular business hours: (list the appropriate name and telephone number)”. List the Owner’s Representative who should be contacted during regular business hours.
 - f. State “In case of emergency after regular business hours: (list the appropriate name and telephone number)”. List the Owner’s Representative who should be contacted after regular business hours.
 - g. List the following information (where applicable): State “The monitoring of the (Section Title here) is being monitored by (list the name of the central monitoring station here), Phone Number: (list the central station phone number here), Account # (enter the account number here)”.
 - h. Provide each of the items identified in the Operation and Maintenance Manuals, with the following exceptions. Do NOT provide:
 - i. Spare Parts Proof of Delivery Form.
 - j. As-Built Operation and Maintenance CDs of the project.
- F. As-Built Drawings: The Installing Vendor/Contractor shall provide three (3) sets of hard copy As-Built Drawings. Drawings shall be the same size that were issued for the shop drawings and clearly indicate the following:
1. Update the Shop Drawings:
 - a. To address any changes, including but not limited to the riser, point-to-point wiring diagrams, and mounting details.
 - b. To accurately reflect the final installation of equipment and devices that were relocated, added or removed.

- c. Update the matrix as defined in the "System Device Naming Matrix" of the specification, to correct any changes that may have occurred through the course of this project.
 - d. Actual routing of all raceways
 - e. Actual routing of all open cables
 - f. Actual cable type, color, and numbers
 - g. Actual splice locations
 - h. Actual system wiring diagrams, connection diagrams, and interface of all components in the system.
 - i. Provide scale drawings of the internal components of the main panel, and each power supply. Show each circuit number coming from the terminals of each control panel and/or power supply.
 - j. Actual room number and programming addresses (where applicable) for all components in the system.
 - k. Show on the As-Built Drawings the location of each panel board that is being used to power any system equipment and list each panel board circuit used (at the device that is connected to that circuit, e.g., FACP or FAPS).
 - l. Indicate on the As-Built Drawings where EACH of the End-Of-Line Resistors is located.
 - m. Provide all updated As-Built Drawings in AutoCAD 2013 format (or newer) and put these electronic files on the Operation and Maintenance Manuals CD, as described elsewhere in these specifications.
- G. Provide all As-Built documentation to the Owner prior to any training and no less than ten (10) business days prior to project completion.
- H. Any re-submittal(s) shall be provided at the Installing Vendor's/Contractor's expense.

Sample WIRE LEGEND													
CONDUIT/RACEWAY SINGLE CONDUCTOR								OPEN CABLE					
LETTER	FUNCTION	CONDUCTO R COLOR	AWG	QTY	TYPE	CABLE MFR	CABLE MFR PART #	CONDUCTO R COLOR	AWG	QTY	TYPE	CABLE MFG	CABLE MFR PART #
A	ADDRESSABLE INITIATING CIRCUIT	- BLACK	#16	1	THWN- SOLID				#16/2	1	16/2 – FPLP		
		+ RED	#16	1									
B	ADDRESSABLE INITIATING CIRCUIT LOOP	- BLACK	#16	2	THWN- SOLID				#16/2	2	16/2 – FPLP		
		+ RED	#16	2									
C	HORN/STROBE CIRCUIT	- BLUE	#14	1	THWN- SOLID				#14/2	1	FPLP		
		+ WHITE	#14	1									
D	HORN/STROBE CIRCUIT LOOP	- BLUE	#14	2	THWN- SOLID				#14/2	2	FPLP		
		+ WHITE	#14	2									
E	CONVENTIONAL INITIATING CIRCUIT	- BLACK	#16	1	THWN- SOLID				#16/2	1	16/2 – FPLP		
		+ YELLOW	#16	1									
F	CONVENTIONAL INITIATING CIRCUIT LOOP	- BLACK	#16	2	THWN- SOLID				#16/2	2	16/2 – FPLP		
		+ YELLOW	#16	2									
G	24V DC POWER CIRCUIT	- BLACK	#14	1	THWN- SOLID				#14/2	1	FPLP		
		+ RED	#14	1									
H	SPEAKER CIRCUIT	RED	#14/2	1	TWISTED SHIELDED FPLP W/ DRAIN				#14/2	1	TWISTED SHIELDED FPLP W/ DRAIN		
I	SPEAKER CIRCUIT LOOP	RED	#14/2	2	TWISTED SHIELDED FPLP W/ DRAIN				#14/2	2	TWISTED SHIELDED FPLP W/ DRAIN		

Sample WIRE LEGEND													
CONDUIT/RACEWAY SINGLE CONDUCTOR								OPEN CABLE					
LETTER	FUNCTION	CONDUCTOR R COLOR	AWG	QTY	TYPE	CABLE MFR	CABLE MFR PART #	CONDUCTOR R COLOR	AWG	QTY	TYPE	CABLE MFG	CABLE MFR PART #
J	ANNUNCIATOR CIRCUIT	BROWN BLUE	#16 #16	1 1	THWN- SOLID				#16/2	1	16/2 – FPLP		
		- BLACK	#14	1				FPLP					
		+ RED	#14	1									
K	FIREMANS PHONE CIRCUIT	RED	#18/2	1	18/2 TWISTED SHIELDED FPLP W/ DRAIN				#18/2	1	18/2 TWISTED SHIELDED FPLP W/ DRAIN		
L	FIREMANS PHONE CIRCUIT LOOP	RED	#18/2	2	18/2 TWISTED SHIELDED FPLP W/ DRAIN				#18/2	2	18/2 TWISTED SHIELDED FPLP W/ DRAIN		
M	CONTROL CIRCUIT	- PURPLE	#14	1	THWN- SOLID				#14/2	1	FPLP		
		+ ORANGE	#14	1									
N	SPARE CONDUCTORS	- PURPLE	#14	2	THWN- SOLID				#14/4	2	FPLP		
		+ ORANGE	#14	2									
ADD PROJECT SPECIFIC NOTES HERE								ADD PROJECT SPECIFIC NOTES HERE					

END OF SECTION 270000

SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions and Divisions 0 and 1 Specification Sections apply to work of this Section.
- B. Specification Section 260000 - Electrical General Conditions.

1.2 SCOPE

- A. The installation shall include innerduct, fire-rated and non-fire-rated penetration assemblies, conduit, cable tray, and wire management.
- B. The bonding of metallic raceways.
- C. The work performed under this specification shall be of good quality and performed in a workmanlike manner. In this context "good quality" means the work shall meet industry technical standards and quality of appearance. The Owner reserves the right to reject all, or a portion of the work performed, either on technical or aesthetic grounds. The Installing Vendor/Contractor shall make all corrections as needed, to the satisfaction of the Architect.
- D. The system shall meet ALL of the requirements listed in Section 270000 - Low Voltage Systems General Requirements, PART 3 "Testing & Complete System Functionality", prior to "Substantial Completion".
- E. Contractual information, guidelines, requirements, or other work specified to provide a fully functional system for Section 270528 includes but is not limited to the sections identified in Section 270000.

1.3 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections apply to work specified in this Section.
- B. Applicable Standards: All work shall be performed in accordance with the latest revisions of the following standards:
 - 1. National Electrical Manufacturers Association:
 - a. NEMA FG 1 - Fiberglass Cable Tray Systems
 - b. NEMA VE 1 - Metal Cable Tray Systems
 - c. NEMA VE 2 - Cable Tray Installation Guidelines
 - 2. NFPA 70 - National Electrical Code

3. ANSI/TIA-568-C.0 - Generic Telecommunications Cabling for Customer Premises
4. ANSI/TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces
5. ANSI-J-STD-607-A - Commercial Building Grounding and Bonding Requirements for Telecommunications.

1.4 QUALITY ASSURANCE

A. Installing Contractor Qualifications:

1. Work in this section shall be performed by a licensed and bonded low voltage Installing Vendor/Contractor with a minimum of five (5) years' experience in the installation and maintenance of high-speed data and voice networks. Only Installing Vendors/Contractors whose primary business is that of installing, maintaining, troubleshooting, and testing telecommunication infrastructures shall perform this work.
2. License Classification: Installing Vendor/Contractor must possess a valid Washington State 06 Electrical Low Voltage License.

1.5 GOVERNING CODES AND CONFLICTS

- ##### A.
- If the requirements of this section or the Project Drawings exceed those of the governing codes and regulations, then the requirements of this section and the Drawings shall govern. However, nothing in this section or the Drawings shall be construed to permit work not conforming to all governing codes and regulations.

1.6 PROJECT CONDITIONS ARCHITECTURAL PLANS

- ##### A.
- The Installing Vendor/Contractor shall carefully coordinate the various symbols utilized on the drawings and shall consult the architectural plans to determine ceiling and floor types in the various areas.

1.7 SUBMITTALS

- ##### A.
- Refer to specification 270000 - Low Voltage Systems General Requirements, for additional data sheet submittal requirements and the shop drawing submittal requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- ##### A.
- See Section 270000 - Low Voltage Systems General Requirements, for additional requirements.
- ##### B.
- The Installing Vendor/Contractor shall review the Site Plans, Floor Plans, Riser Diagrams, and Detail Sheets for additional work that is required to be performed by the Installing Vendor/Contractor of this section.

2.2 COORDINATION

- A. Refer to “Installation of Owner Furnished Equipment” for additional coordination and installation requirements.
- B. Refer to “Submittals” listed elsewhere in this specification for additional coordination requirements.

2.3 ADDITIONAL REQUIREMENTS.

- A. Refer to “As-Built Drawings” listed elsewhere in this specification for additional equipment required for this project.

2.4 SEISMIC BRACING

- A. Provide Seismic Bracing as required by the Authority Having Jurisdiction (AHJ).
- B. This includes, but is not limited to:
 - 1. Racks
 - 2. Cable trays
 - 3. Cable supports

2.5 INNERDUCTS AND CONDUIT SEALS

- A. Innerduct (Fabric Mesh):
 - 1. The Installing Vendor/Contractor shall provide the proper type of fabric mesh innerduct for the application in which it is being used.
 - 2. Provide flexible multi-cell fabric mesh innerduct consisting of white polyester and nylon resin polymer.
 - 3. EACH cell shall contain a factory-installed pull tape, which shall be a different color for EACH cell.
 - 4. Manufactured by MaxCell: Model # MXC3456BK (black), or approved equal. Provide quantities as required where shown on plans.
 - a. This shall be the default color for one (1) 3-Cell innerduct.
- B. Inflation Bags (for 3” Conduits and 4” Conduits):
 - 1. Inside EACH hand hole and inside EACH man hole, install inflation bags in 3” Conduits and 4” Conduits that comes into the building. Provide inflation bags in EACH conduit at the opposite end (in the MDF and designated IDF locations).
 - 2. Provide inflation bags.
 - 3. Locate inflation bags in EACH 3” underground conduit and in EACH 4” underground conduit (at each end of the conduit) that is routed between the MDF and EACH designated IDF location.

4. Manufactured by MaxCell: Model # MXCITB3 (for 3" conduits), or approved equal. Provide quantities as required.
 - a. Seal each conduit as described above using the manufacturer approved inflation seal method at the completion of the project.
 - b. Provide six (6) 3" conduit inflation bags (when this sized conduit is used on this project) to the Owner at the completion of the project.
5. Manufactured by MaxCell: Model # MXCITB4 (for 4" conduits), or approved equal. Provide quantities as required.
6. Seal each conduit as described above using the manufacturer approved inflation seal method at the completion of the project.
7. Provide six (6) 4" conduit inflation bags (when this sized conduit is used on this project) to the Owner at the completion of the project.
8. Inflation Tool.
 - a. Provide one (1) new (unopened package) inflation tool to the Owner at the completion of the project.
 - b. Manufactured by MaxCell: Model # MXCITT, or approved equal.
9. Gas Cartridges.
 - a. Provide 12 new (unopened packages) gas cartridges to the Owner at the completion of the project.

C. Duct Seal (for conduits that are 2.5" or less):

1. Inside EACH hand hole and inside EACH man hole, install a water-tight seal in EACH conduit that comes into the building. Provide a water-tight seal in EACH conduit at the opposite end (in the MDF and designated IDF locations).
2. In addition to the above locations, provide duct seal that includes, but is not limited to other conduits such as:
 - a. Reader boards
 - b. Portables
 - c. Hand holes for future equipment
3. Manufactured by Ideal: Model # 31-601, or manufactured by Gardner Bender: Model # DS-130, or approved equal.

2.6 OPEN CABLING SUPPORT & HARDWARE

- A. Each cable support shall be UL listed for the application and meet the TIA requirements for structured cabling systems.
- B. Provide manufacturer approved mounting brackets and fasteners.
- C. Do not exceed the cable support manufacturer's cable fill capacity for each type provided for this project.

- D. Do not exceed the cable manufacturer's recommendations for cable suspension in open cabling environments.
- E. J-Hooks shall have a galvanized finish.
 - 1. Manufactured by Erico CADDY: Model # CAT32HP, or approved equal. Provide quantities as required.
 - 2. Manufactured by Erico CADDY: Model # CAT48HP, or approved equal. Provide quantities as required.
- F. Mounting Tree:
 - 1. Manufactured by Erico CADDY: Model # CATHPTM, or approved equal. Provide quantities as required.
- G. Adjustable Cable Support:
 - 1. Manufactured by Erico CADDY: Model # CAT425 Series, or approved equal. Provide quantities as required.
- H. Conduit Waterfalls:
 - 1. Conduit waterfalls shall be used where conduits empty into cable trays.
 - 2. Manufactured by Panduit: Model # CWF400, or approved equal. Provide quantities as required.
- I. Conduit Bushings:
 - 1. Conduit bushings shall be used to protect communications cabling where conduits terminate in accessible ceiling space.
 - 2. Bushings shall be non-metallic to reduce cable abrasion.
 - 3. Manufactured by Arlington: Model # EMTXXX, or approved equal. Provide quantities as required.

2.7 CABLE TRAY – LADDER STYLE:

- A. Chatsworth Products (CPI) is the basis of design for all ladder-style cable. Equivalent manufacturer's solutions may be submitted for prior approval no less than two (2) weeks before bid date closing. Products not submitted for prior approval shall be rejected.
- B. Provide seismic bracing where required by the AHJ.
- C. The cable tray shall be UL Classified.
- D. The cable tray shall be 1.5" high x 18" wide (unless otherwise noted) with 9" rung spacing in steel construction that has been painted by the manufacturer.
 - 1. Manufactured by Chatsworth Products Inc (CPI): Model # 11275-718, or approved equal. Provide quantities as required.

E. Butt Splice Rack Mount Plate:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 16301-701, or approved equal. Provide quantities as required.

F. Junction Splice:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 16302-701, or approved equal. Provide quantities as required.

G. Swivel Butt Splice:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 16487-701, or approved equal. Provide quantities as required, where applicable.

H. Swivel Junction Splice:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 16488-701, or approved equal. Provide quantities as required, where applicable.

I. Wall Mount Bracket:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 11746-718, or approved equal. Provide quantities as required.

J. Rack Mount Plate:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 12730-718, or approved equal. Provide quantities as required.

K. Ground Strap:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 40164-001, or approved equal. Provide quantities as required.

L. Cable Runway Dividers:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 13392-721, or approved equal. Provide quantities as required.

M. Cable Radius Drop:

1. Manufactured by Chatsworth Products Inc (CPI): Model # 12100-718, or approved equal. Provide quantities as required.
2. Manufactured by Chatsworth Products Inc (CPI): Model # 12101-702, or approved equal. Provide quantities as required.

2.8 FIRE RATED AND NON-FIRE RATED PENETRATIONS

- A. Provide fire rated penetration equipment for EACH wall that is rated for fire-rated walls.

- B. Provide industry standard penetration methods for EACH wall that is not a fire rated wall.
- C. A firestop system shall be comprised of the item or items penetrating the fire rated structure; the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise of an effective block for fire, heat, vapor, and pressurized water stream.
- D. All penetrations through fire rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating items (e.g., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc.) shall be properly firestopped.
- E. Firestop systems shall be UL Classified to ASTM E814 (UL 1479).
- F. Indicate on the Shop Drawings EACH location showing the proposed system location for approval, prior to installing the penetration system.
- G. All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local authorities prior to cabling system acceptance.
- H. For EACH penetration, the following requirements shall apply:
 - 1. Provide pathway assemblies for EACH low voltage system cables for each individual assembly opening.
 - 2. Provide the quantity of pathway assemblies required for the horizontal cables, while maintaining all code requirements. Additionally, provide one (1) pathway assembly opening for EACH system listed on the Electrical Legend (This includes, but is not limited to: Fire Alarm System, Intrusion Alarm System, Intercom System, Access Control System, CCTV System, etc.), and no less than two (2) spare empty assembly openings, which shall remain empty at the completion of the project.
 - 3. Manufactured by Specified Technologies, Inc (STI): EZ Path Model # 33 Series and/or EZ Path Model # 44 Series for fire rated walls. Provide quantities as required for all rated installations.
 - a. For EACH penetration, provide the stud wall attachment (for either series provided), filling the entire stud wall space with cable pathways for all cabling required and future cabling. Maintain all spare capacity requirements.
 - b. For EACH EZ Path Model # 33 Series provided, provide one (1) pair of radius control modules.
 - c. Manufactured by Specified Technologies, Inc (STI): EZ Path Model # RCM33.
- I. Manufactured by Specified Technologies, Inc. (STI): EZ Path Model # NEZ33 Series. Provide quantities as required for all non-rated firewall installations.

2.9 ADDITIONAL SYSTEM EQUIPMENT

- A. See Part 3 of this specification for additional provision of system equipment and/or labor.

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 270000 - Low Voltage Systems General Requirements, for additional information.
- B. Prior to rough-in, coordinate with the Architect for the exact installation location(s) and areas to avoid.
- C. Install all equipment per the manufacturer's recommendation.

3.2 PRODUCT INSPECTIONS

- A. The Installing Vendor/Contractor shall inspect all cables prior to installation to verify that it is identified properly on the reel identification label, that it is of proper gauge, containing correct number of pairs, and is the material ordered. Any physical damage to the cable and wire must be noted; un-uniform jacket thickness and jacket tightness should also be identified. Note any buckling of the jacket, which would indicate possible problems.

3.3 GROUNDING AND BONDING

- A. Provide grounding and bonding per ANSI-STD-J-607-A, which includes, but is not limited to cable trays, racks, conduit sleeves, and other equipment connected to the TMGB/TGB.
- B. The minimum conductor size shall be #6 green insulated copper grounding conductor. However, the size of each conductor shall be based on the actual cable length as defined in ANSI-STD-J-607-A.

3.4 HORIZONTAL PATHWAYS

- A. It is the responsibility of the contractor to ensure that ALL PATHWAYS for the permanent link of each balanced twisted pair cable shall not exceed 295' in length from work area outlet to telecommunications room patch panel.
- B. To ensure this length, all pathways shall be coordinated and installed prior to pouring of any slabs or the installation of any permanent structure which would inhibit a conduit or cable tray run from being installed after the structure is complete.
- C. See Section 272000 for horizontal cabling types and additional requirements.

3.5 FIRE RATED AND NON-FIRE RATED PENETRATIONS

- A. Install as per manufacturer's recommendations.
- B. Maintain all code and AHJ requirements.

3.6 PLENUMS

- A. Provide metallic conduit through building plenum spaces for all cables which do not bear a CMP rated label.

3.7 2-HOUR FIRE RESISTANT DUCT FOR ANTENNA CONDUITS

- A. Installation:
 - 1. All factory-fabricated 2-hour fire resistant duct assemblies shall be supplied and installed by sheet metal contractor, providing the complete fire-resistant duct assembly.
 - 2. Install "zero clearance to combustibles" fire resistant duct assemblies in accordance with their UL listings and the manufacturer's installation instructions.
 - 3. Use fire resistant duct mounting methods and systems in accordance with the manufacturer's UL listings.
 - 4. Provide Tremco Fyre-Sil Sealant at joints, cover strips and wall ceiling/floor connections.
 - 5. Firestopping at fire separations:
 - a. UL listings to include firestopping procedures for the penetration of fire rated wall and floor assemblies.
 - b. Comply with all applicable installation details provided by the manufacturer.
- B. Installation shall be in strict accordance with the manufacturer's instructions and recommendations and the requirements of the UL listing.

3.8 WARRANTY

- A. The warranty shall be direct to the end user, from the manufacturer, supported through the certified Installing Vendor/Contractor, and shall cover both materials and labor costs for any claims related to the warranty program. If the Installing Vendor/Contractor were to default, the manufacturer will assume responsibility of employing another certified installer to maintain the existing warranty. Bids from installers or Installing Vendors/Contractors who are not certified by the connecting hardware manufacturer and wire manufacturer at the time of project bid will be rejected.

3.9 OPERATION & MAINTENANCE MANUALS (O&M'S)

- A. Provide all Operation & Maintenance Manual (O&Ms) documentation as defined in Section 270000 - Low Voltage Systems General Requirements and listed elsewhere in this specification.

3.10 AS-BUILT DRAWINGS

- A. Provide all As-Built documentation as defined in Section 270000 - Low Voltage Systems General Requirements and listed elsewhere in this specification.
- B. All labeling shall match the final room number identification at completion of the project (not the room number that is indicated on the Bid Set of drawings).

- C. Update all documents provided in the Submittal and Shop Drawings to accurately reflect the actual equipment that was provided for this project, and the actual locations of the installed equipment.
- D. The Installing Contractor shall provide As-Built Drawings to the Architect, which clearly indicate:
 - 1. The floor plan of the building showing the As-Built location of conduit runs, cable tray, and terminal cabinets.
 - 2. Provide three (3) sets of complete As-Built Drawings.

3.11 DEMONSTRATION AND TRAINING

- A. Upon completion of the system installation, the installation representative shall conduct a system test for the Owner, Owner's Representative, Architect, and Engineer.
- B. Upon completion of the installation, after test and demonstration, the Installing Vendor/Contractor shall provide to the Architect a signed written statement substantiating the:
 - 1. "System has been completely tested, demonstrated to the Owner's Representative, and accepted by the appropriate authority."

END OF SECTION 270528

SECTION 272000 - DATA AND VOICE INFRASTRUCTURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions and Divisions 0 and 1 Specification Sections, apply to work of this Section.
- B. Contractual information, guidelines, requirements, or other work specified to provide a fully functional system for Section 272000 includes but is not limited to the sections identified in Section 270000.
- C. Specification Section 260000 - Electrical General Conditions.

1.2 SCOPE

- A. The Installing Contractor shall furnish and install all materials for a complete, fully functional data and voice Telecommunications Infrastructure system in accordance with this specification and the contract drawings. The system shall be in full compliance with a "25 Year Application Assurance Warranty". The Installing Contractor shall be responsible for providing a complete, functional system including all necessary components, whether included in this specification or not.
- B. The installation shall include Fiber Optic Cable and Copper Category Rated Cables, interconnect equipment, connectors, jumpers punch blocks, fiber optic patch panels, copper patch panels, patch cables, telecommunication outlets, wire management, and racks.
- C. The Installing Contractor is required to coordinate with the Owner so that the telephone system can be patched into the Data and Voice infrastructure by the Installing Contractor.
- D. All copper Horizontal Cables shall be terminated on patch panels in the Telecommunication Rooms (MDF and designated IDF locations) and on Telecommunications Outlets. All copper backbone cables shall be terminated on punch blocks at main cross connects and on patch panels at the horizontal cross connect end, unless noted otherwise.
- E. Upon completion of installation, the Installing Contractor shall test all fiber and copper cables. All cables shall be tested as defined elsewhere within this specification.
- F. The work performed under this specification shall be of good quality and performed in a workmanlike manner. In this context "good quality" means the work shall meet industry technical standards and quality of appearance. The owner reserves the right to reject all, or a portion of the work performed, either on technical or aesthetic grounds.
- G. The system shall meet ALL the requirements listed in Section 270000 - Low Voltage Systems General Requirements, PART 3 "Testing & Complete System Functionality", prior to "Substantial Completion".

- H. Contractual information, guidelines, requirements, or other work specified to provide a fully functional system for Section 272000 includes but is not limited to the sections identified in Section 270000.
- I. See "Horizontal Cable" and "Racks" located in this specification for additional work and equipment. This includes but is not limited to; CAT6 Cabling for ALL Local Area Network (LAN) based Systems as shown on the plans, detail sheets, and riser diagrams.

1.3 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to work specified in this Section.
- B. Applicable Standards: All work shall be performed in accordance with the latest revisions of the following standards:
 - 1. BICSI Information Technology Systems Installation Methods Manual, 6th Edition
 - 2. BICSI Telecommunications Distribution Methods Manual, 13th Edition
 - 3. ANSI/TIA 606-A (2002) Administration Standard for Commercial Telecommunications Infrastructure.
 - 4. ANSI/TIA 607-B Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - 5. EIA/TIA-455-61 (latest edition). "FOTP-61, Measurement of Fiber or Cable Attenuation Using An OTDR".
 - 6. TIA-526-7. Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant OFSTP-7.
 - 7. ANSI/TIA 568-C.0. "Generic Telecommunications Cabling for Customer Premises."
 - 8. ANSI/TIA 568-C.1. "Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements."
 - 9. ANSI/TIA 568-C.2. "Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components."
 - 10. ANSI/TIA 568-C.3. "Optical Fiber Cabling Components Standard."
 - 11. EIA/TIA 569-B. "Commercial Building Standard for Telecommunications Pathways and Spaces."
 - 12. IEEE 802.3 (latest edition) "Carrier Sense Multiple Access With Collision Detection."
 - 13. International Building Code (latest edition).
 - 14. International Fire Code (latest edition).
 - 15. NEC (National Electrical Code) (latest edition).
 - 16. Telecommunications Architectural Standards - In Washington State Government (latest edition).

1.4 QUALITY ASSURANCE

- A. Installing Contractor Qualifications:
 - 1. The Installing Contractor project manager shall hold a valid and current Registered Communications Distribution Designer (RCDD) certification issued by Building Industry Consulting Service International (BICSI). The project manager shall have a minimum of five years' experience with projects of similar size and scope.

2. The Installing Contractor field staff installers shall hold valid and current Installation certifications issued by Building Industry Consulting Service International (BICSI) or hold documented certification of training from the manufacturer of the cabling and equipment that is being installed. The field staff shall have a minimum of five years' experience with projects of similar size and scope.
3. The Installing Contractor shall be an Authorized Premier Network Installer Certification Only Partner of the Manufacturer of the equipment being installed and shall furnish documentation showing that the Installing Contractor is trained and certified. The Installing Contractor shall be capable of providing the Owner with a documented 25 Year Application Assurance Warranty for the equipment being installed at the time of project bid, to be approved for bidding.
4. Work in this section shall be performed by a licensed and bonded low voltage Installing Contractor with a minimum of five years' experience in the installation and maintenance of high-speed data and voice networks. Only Installing Contractors whose primary business is that of installing, maintaining, troubleshooting, and testing Telecommunication Infrastructures shall perform this work.
5. In order to qualify for installation of the Telecommunications Infrastructure Installing Contractor must possess the required license classification, a performance history, experience in the installation and termination of copper and optical fiber cable systems, and proof of time in business.
6. License Classification: Installing Contractor must possess a valid Washington State 06 Electrical Low Voltage License.

1.5 GOVERNING CODES AND CONFLICTS

- A. If the requirements of this section or the Project Drawings exceed those of the governing codes and regulations, then the requirements of this section and the Drawings shall govern. However, nothing in this section or the Drawings shall be construed to permit work not conforming to all governing codes and regulations.

1.6 PROJECT CONDITIONS - ARCHITECTURAL PLANS

- A. The Installing Contractor shall carefully coordinate the various symbols utilized on the drawings and shall consult the architectural plans to determine ceiling and floor types in the various areas. It is the responsibility of the Installing contractor to verify all plenum spaces prior to running any cabling. Any cabling installed by the contractor that is not rated for the space the cabling is installed in shall be replaced at the expense of the installing contractor.

1.7 SUBMITTALS

- A. Refer to specification 270000 Low Voltage Systems General Requirements, for additional data sheet submittal requirements and the shop drawing submittal requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See Section 270000 - Low Voltage Systems General Requirements for additional requirements.
- B. The Installing Contractor shall review the Site Plans, Floor Plans, Riser Diagrams, and Detail Sheets for additional work that is required to be performed by the Installing Contractor of this section.
- C. Leviton/ Berk-Tek manufactures the products that are used for the basis of design of this specification.
 - 1. The Leviton/ Berk-Tek solution is the standard for this project. Substitutions must receive approval prior to the bid.
 - 2. Belden/Eaton and Ortronics/Superior Essex solution are approved substitutions for this project.
- D. All products shall be new and brought to the job site in the original manufacturer's packaging. Electrical components shall bear the Underwriter's Laboratories label. All Telecommunications cable shall bear the manufacturer's label in accordance with NEC 800 based on flammability testing as follows:
 - 1. CMR General Purpose Communications Riser Cable.
 - 2. CMP Plenum-rated Communications Cable.
 - 3. And other cable ratings to comply with the National Electrical Code requirements for the installation.
- E. All products shall meet the certification requirements of the warranty. All device products and all cabling products shall be of a single manufacturer.
- F. Provide all equipment as defined in the specification(s) and shown on the drawings.
- G. Refer to PART 1 for any equipment that is not specifically defined.

2.2 MATERIALS NOT INCLUDED (PROVIDED & INSTALLED BY OTHERS)

- A. Telephone switching equipment and related appurtenances.
- B. Telephones.
- C. Switchers, routers, network hubs, data concentrators and other similar active electronic equipment for data communications.
- D. Computers, printers, facsimile machines, modems and other similar utilization equipment.

2.3 COORDINATION

- A. Refer to “Installation of Owner Furnished Equipment” for additional coordination and installation requirements.
- B. Refer to “Submittals” for additional coordination requirements.

2.4 INSTALLATION OF OWNER FURNISHED EQUIPMENT

- A. The Installing Contractor shall install the following Owner Furnished equipment:
 - 1. Wireless Access Points (WAP’s). Coordinate with the Owner as required.
 - a. Install each WAP where indicated on the plans.

2.5 ADDITIONAL REQUIREMENTS.

- A. Refer to “As-Built Drawings” listed elsewhere in this specification for additional equipment required for this project.

2.6 SEISMIC BRACING

- A. Provide Seismic Bracing as required by the AHJ.
- B. This includes, but is not limited to:
 - 1. Racks
 - 2. Cable Tray
 - 3. Cable Supports

2.7 TELECOMMUNICATIONS SYSTEM DESCRIPTION

- A. Provide Horizontal Cabling from each Telecommunication port to the nearest IT room location. Each Telecommunication Outlet type and style shall contain the quantity of Horizontal Cables identified on the Legend, unless noted otherwise.
- B. Horizontal cables are to be terminated on rack-mounted patch panels of the same data speed transfer rating. Horizontal Cabling shall be to Patch Panels within each designated rack. Horizontal Cabling shall be cross connected to backbone cables.
- C. A fiber optic backbone shall be installed between the new IT room and existing telecom space as noted on the plans for data connectivity. Within the IT room and existing telecom space, the backbone fiber strands shall be terminated and housed in rack-mounted fiber optic enclosures. Both ends of EACH fiber shall be terminated.
- D. Modems, fax machines, wall mount voice outlets for telephone handsets, etc. shall be connected to the data and voice infrastructure via Horizontal Cabling.

2.8 LABELING

- A. See Section 270000 for additional label type and additional requirements.
- B. The alpha-numeric labeling shall be developed by the Installing Contractor, under the direction of the Owners IT Department at the Pre-Installation project kick-off meeting.
- C. The Installing Contractor shall label all equipment and cables in an identical fashion of a sequential manner to the satisfaction of the Owner.
- D. All label printing shall be machine generated using indelible ink ribbons or cartridges, and self-laminating labels shall be used on cable jackets appropriately sized to the outside diameter of the cable.
- E. All labeling shall match the final room number identification at completion of the project (not the room number that is indicated on the Bid Set of drawings). This includes, but is not limited to; the Outlets, Port Addresses, Patch Panels, As-Built Drawings, and Test Results.
- F. Patch panels shall have each port labeled to identify each outlet port.
- G. Racks shall have phenolic labels installed at the Top and Centered of EACH Rack installed on this project. Phenolic labels shall be size 36 font.
- H. Cable Identification Labels shall be places in the following locations:
 - 1. Horizontal Cables. Each cable shall be identified and marked with the outlet port identification near the cable termination point at the rear of the patch panel and placed within view.
 - 2. Backbone Cables. Each cable shall be identified and marked on all backbone cables (at both ends of the cable) with an identifier as to the location of the beginning and termination of each cable. Labels shall be attached to each cable at the point of entrance and exit to the MDF and each designated IDF location.
- I. Where telecommunications outlets are located above accessible ceiling space, provide a label directly on the ceiling tile grid indicating "TELECOM OUTLET ABOVE".

2.9 TELECOMMUNICATION OUTLETS

- A. Review the Site Plan(s), Floor Plan(s), Riser Diagram(s), and Detail Sheet(s) for all cable types and quantities required for this project.
- B. Each Telecommunication Outlet type and style shall contain the quantity of Horizontal Cables identified on the Electrical Legend, unless otherwise noted.
- C. Provide Horizontal Cabling from EACH Telecommunication Outlet port to the nearest MDF or designated IDF location.

D. Telecommunication Outlet:

1. Each Outlet shall accommodate individual modular ports, and each modular port shall be individually removed without affecting any other port within the outlet.
2. Coordinate the labeling requirements with the Owner's IT department.
 - a. Outlet label identification information shall be typed text and indicate patch panel and port for each jack and shall comply with the Owners Labeling Standards. Handwritten information will not be acceptable.
 - b. The Installing Contractor shall match the color and finish of the devices specified in Section 262726. Modify the model number if a different color or finish is identified in Section 262726.
 - 1) Building A shall utilize black telecommunications faceplates. All other buildings shall utilize the equivalent stainless finish telecommunications faceplate.
 - c. 1-Port Black Telecommunication Outlets, where shown on the plans, shall be manufactured by Leviton: Model # 42080-1ES, or approved equal. Provide quantities as required.
 - d. 2-Port Black Telecommunication Outlets, where shown on the plans, shall be manufactured by Leviton: Model # 42080-2ES, or approved equal. Provide quantities as required.
 - e. 4-Port Black Telecommunication Outlets, where shown on the plans, shall be manufactured by Leviton: Model # 42080-4ES, or approved equal. Provide quantities as required.
 - f. 6-Port Black Telecommunication Outlets, where shown on the plans, shall be manufactured by Leviton: Model # 42080-6ES, or approved equal. Provide quantities as required.
3. Surface Mount Outlet Locations shall only be installed above accessible ceiling spaces, the MDF Room, and designated IDF locations. They are not to be installed below the ceiling surface or exposed to view, unless approved in writing by the Engineer.
 - a. Provide modular single-port or dual port Surface Mount Outlet where indicated on the Plans. This includes, but is not limited to:
 - 1) Wireless Access Points.
 - 2) Projector Mounts.
 - 3) CCTV Cameras.
 - 4) Intrusion Alarm Control Panel.
 - 5) Access Control Panel.
 - 6) Energy Management Panels.
 - b. 1-Port Surface Mount Telecommunication Outlet, where shown on the plans, shall be manufactured by Leviton: Model # 41089-1IP, or approved equal. Provide quantities as required.
 - c. 2-Port Surface Mount Telecommunication Outlet, where shown on the plans, shall be manufactured by Leviton: Model # 41089-2IP, or approved equal. Provide quantities as required.

E. Modular Inserts:

1. 8-position, 8-conductor (8P8C). Individual workstation port and patch panel port modules shall be Category 6 rated, 8-position, 8-conductor (8P8C) for termination of conductors and shall be approved by the manufacturer.
2. 8-position, 8-conductor (8P8C). Individual Wireless Access port and patch panel port modules shall be Category 6A rated, 8-position, 8-conductor (8P8C) for termination of conductors and shall be approved by the manufacturer.
3. EACH workstation port shall be Category 6 rated.
4. Each Wireless Access port shall be Category 6A rated.
5. Cables shall be wired in accordance with TIA/EIA-T568B, unless noted otherwise.
6. Each individual insert shall be fully compatible with the Face Plates provided.
 - a. The Installing Contractor shall match the color and finish of the devices specified in Section 262726 for the workstation modules. Modify the model number if a different color or finish is identified in Section 262726. The Installing Contractor shall match the color of the horizontal cabling as called out in this specification for the patch panel modules.
 - b. Manufactured by Leviton: Model # 61110-R(X)6 Series for Category 6 applications, or approved equal for all workstation outlets. Provide quantities as required. (X) Indicates color.
 - c. Manufactured by Leviton: Model # 6110G-R(X)6 Series for Category 6A applications, or approved equal for all Wireless Access point outlets. Provide quantities as required. (X) Indicates color.
7. Blank inserts. Fill all remaining unused ports with a blank filler insert that is approved by the manufacturer.
 - a. The Installing Contractor shall match the color and finish of the devices specified in Section 262726. Modify the model number if a different color or finish is identified in Section 262726.
8. Manufactured by Leviton: Model # 41084-BB, or approved equal. Provide quantities as required.

2.10 FIBER OPTIC CABLE

- A. See "Testing of Cables" listed elsewhere within this specification for Testing Requirements to be documented and submitted at the completion of this project.
- B. All cables shall be UL listed and suitable for indoor and outdoor installation. Provide other cable types where required by Code and the AHJ.
- C. EACH Cable installed shall be rated for the appropriate application, such as; Riser Rated, Plenum Rated, Wet Rated, etc.

D. Multi-Mode Fiber Optic Cable:

1. Fiber optic cables shall be utilized to provide backbone connectivity between the Main Distribution Frame (MDF) and EACH designated Intermediate Distribution Frame (IDF) location.
2. Fiber optic cables shall be 50/125-micron, graded index, tight-buffered indoor/outdoor riser rated, unless otherwise noted. The core fiber shall have a diameter of 50 microns, and a cladding diameter of 125 microns.

E. The Installing Contractor shall provide OM3 Multi-Mode Fiber Optic Cable (where applicable) as shown on the plans.

F. Attenuation shall be measured in accordance with EIA fiber optic test procedures (FOTP's) 46 or 53, 57 and 30. Information transmission capacity shall be measured in accordance with the following ETA FOTP's 51 or 30, 54 and 57. Submit all test results to the engineer for review and approval.

G. All fiber optic cable shall be installed in inner duct with no splices in the fiber unless noted otherwise.

H. All Inside Plant (ISP) Cables shall be PLENUM rated unless noted otherwise.

I. Provide a minimum of (1) 12-Strand Fiber Optic Cable to EACH location, unless noted otherwise.

J. Provide the following cables as shown on the plans and where required to provide the connectivity of equipment listed in this specification.

1. OM3 - Multi-Mode Indoor/Outdoor Tight Buffer Fiber Optic Cable shall be manufactured by Berk-Tek: Model # PDR012-EB3010/25-I/O, or approved equal.

2.11 FIBER OPTIC CABLE TERMINATION HARDWARE

A. Fiber Optic Connectors: Provide keyed, ceramic-tipped connector plugs for termination at each fiber optic LIU's. Multi-mode Fiber Optic Cable (single mode as required).

B. Light Interface Unit (LIU):

1. IT Room Locations:

- a. Provide rack-mount multi-capacity terminal that is capable of a minimum of 24 fiber strands.
- b. Provide label holders and color-coded labels.
- c. Manufactured by Leviton: Model # 5R1UM-S03, or approved equal. Provide quantities as required. Provide all necessary appurtenances to terminate all fiber optic cables. This includes, but is not limited to:
 - 1) Provide fiber termination adapter panels for SC connectors.
 - a) Manufactured by Leviton: Model # 5F100-2QC, or approved equal. Provide quantities as required to terminate each multimode fiber routed to the MDF Room.

- b) Provide blank cover(s) for each unused adapter panel's space manufactured by Leviton: Model # 5F100-PLT, or approved equal. Provide quantities as required.

2.12 PATCH CABLES – FIBER OPTIC

- A. Upon completion of the project, the Data and Voice Infrastructure Installing Contractor shall deliver the following Fiber Optic patch cables for the MDF and EACH designated IDF location to the owner, as identified below:
 - 1. EACH Data Rack shall have a Qty. of 4 – 3' (1 meter) Fiber Optic multimode patch cords with Duplex LC connectors.
 - a. Manufactured by Leviton: Model # 5LDSC-M01, or approved equal. Provide quantities as required.
 - b. Provide Single Mode patch cords when Single Mode Fiber is shown on the Drawings.
 - 2. EACH Data Rack shall have a Qty. of 4 – 6' (2 meters) Fiber Optic multimode patch cords with Duplex LC connectors.
 - a. Manufactured by Leviton: Model # 5LDSC-M02, or approved equal. Provide quantities as required.
 - b. Provide Single Mode patch cords when Single Mode Fiber is shown on the Drawings.

2.13 HORIZONTAL CABLE – INSIDE PLANT (ISP)

- A. See “Testing of Cables” listed elsewhere within this specification for Testing Requirements to be documented and submitted at the completion of this project.
- B. EACH Cable installed shall be rated for the appropriate application, such as Riser Rated, Plenum Rated, Wet Rated, etc.
- C. Provide Horizontal Cabling from each Telecommunication Outlet to the nearest MDF or the nearest designated IDF location.
- D. Analog Plain Old Telephone Service (POTS) lines shall be provided for, but not limited to, the following items. These items shall be installed, complete without splices between the jack and cable termination point.
 - 1. Fire Alarm System.
 - 2. Intrusion Alarm System.
 - 3. Elevator (where applicable).
 - 4. Terminate all telephone jacks as described elsewhere in these specifications.
- E. Cable color codes shall be as follows:
 - 1. All horizontal data cables shall be blue in color.

2. All CCTV and IP Access Control cable shall be yellow in color.
 3. All Wireless Access Point cables shall be green in color.
- F. The workstation Telecommunication Horizontal Cable shall be Category 6 rated, 4-pair, 23 AWG UTP, unless noted otherwise.
1. Manufactured by Berk-Tek: Model # LANmark 1000 Series plenum rated cable for Category 6 applications, or approved equal.
- G. The Wireless Access Point Cable shall be Category 6A rated, 4pair, 23 AWG UTP, unless noted otherwise
1. Manufactured by Berk-Tek: Model # LANmark-10G Series plenum rated cable for Category 6A applications, or approved equal.

2.14 HORIZONTAL CABLE – OUTSIDE PLANT (OSP) & WET RATED LOCATIONS

- A. See “Testing of Cables” listed elsewhere within this specification for Testing Requirements to be documented and submitted at the completion of this project.
- B. Outside Plant (OSP) cables shall be used where conduits are routed below grade. Such as slab on grade floor boxes, underground conduits to another building, where required by code, etc. All Outside Plant (OSP) cables extending within the building at a distance greater than 49 feet shall be run in conduit.
- C. Provide Horizontal Cabling from each Telecommunication port to the nearest MDF or the nearest designated IDF location.
- D. The Telecommunication Horizontal Cable shall be Category 6 rated, 4-pair, 23 AWG UTP, unless noted otherwise.
1. Manufactured by Berk-Tek: Model # LANmark-6 OSP Series, or approved equal.

2.15 PATCH PANELS – COPPER

- A. All patch panels shall be located at the MDF and each designated IDF location. They shall be rack mounted unless specifically otherwise noted.
- B. Provide a minimum of 25 % spare patch panel jack capacity.
- C. Patch panels should be fully populated, avoiding blanks and empty ports (with the exception being the last patch panel in the series which may not be fully populated).
- D. All Category patch panels shall be tested and approved for Category wiring as specified to cable type, per TIA/EIA-568C; shall have, rear cable management bar and front labeling.

- E. Provide separate Patch Panels for the following equipment connection types:
1. Data Cables.
 2. Wireless Access Points.
 3. Analog Voice Cables.
 4. CCTV System:
 - a. Prior to running any cables, coordinate with the CCTV System Installing Contractor for actual Patch Panel locations within each Rack.
 5. Access Control System:
 - a. Prior to running any cables, coordinate with the CCTV System Installing Contractor for actual Patch Panel locations within each Rack.
- F. Patch Panels:
1. The panel shall be field-configurable and shall accept a full range of modular connectors.
 2. Manufactured by Leviton: Model # 4S255-S48, or approved equal for 48 port applications.
 3. Manufactured by Leviton: Model # 4S255-S24, or approved equal for 24 port applications.

2.16 PATCH CABLES - COPPER

- A. The Patch Cables shall be Category 6 rated, 4-pair, 23 AWG UTP for all Category 6 systems and Category 6A rated, 4-pair, 23 AWG UTP for all Category 6A systems, unless noted otherwise. Provide (1) Patch Cable per telecommunications outlet jack and (1) Patch Cable per telecommunications patch panel port as described below.
- B. The outer cable jacket shall match the color selection of the Horizontal Cable Color identified in "Horizontal Cable".
- C. Provide a minimum quantity of (1) 15' equipment cord for EACH telecommunication workstation outlet box shown in work areas. (Leviton # 62460-15L), or approved equal. See table below for MDF/IDF patch cord quantities.
- D. Provide a minimum quantity of (1) 3' equipment cord for EACH telecommunication jack at Each Wireless Access Point. (Leviton # 6210G-3(X), or approve equal. (X) Indicates color of equipment cord according to Horizontal Cable Color identified in "Horizontal Cable".
- E. Provide a minimum quantity of (1) 3' equipment cord for EACH telecommunications jack at systems related equipment such as CCTV, IP intercom clock, IP access control system. (Leviton # 62462-03(X), or approved equal. (X) Indicates color of equipment cord according to Horizontal Cable Color identified in "Horizontal Cable".

- F. Upon completion of the project, the Data and Voice Infrastructure Installing Contractor shall deliver the following patch cables:

The following items shall apply ONLY to the MDF Room and designated IDF locations.					
Item #	Cable Length	Color to be determined by horizontal System cabling.	Quantity of Patch Cables (provide the following percentage of patch cables based on the Total patch panel Ports provided for this project) Unless noted otherwise.		
				Manufactured by	Model # X indicates color of patch cable
1	3'		20%	Leviton	(CAT6) 62460-03(X)
2	7'		60%	Leviton	(CAT6) 62460-07(X)
3	9'		20%	Leviton	(CAT6) 62460-09(X)
4	3'		100%	Leviton	(CAT6A) 6210G-3(X)

2.17 RACKS AND ENCLOSURES

- A. Rack Mount all equipment that is capable of being Rack Mounted.
- B. Middle Atlantic is the basis of design for all enclosures.
- C. Equivalent manufacture's solutions may be submitted for prior approval no less than 2 weeks before bid date closing. Products not submitted for prior approval shall be rejected.
- D. Provide seismic bracing for ALL RACKS AND ENCLOSURES per manufacturer's recommended instructions/accessories.
- E. Section 272000 shall provide ALL Racks and related equipment, including but not limited to; Patch Panels, Patch Cords, Wire Management, Power Strip assemblies, etc. for ALL Local Area Network (LAN) bases Systems as shown on the site plans, floor plans, detail sheets, and riser diagrams.
- F. Racks:
 1. Free-Standing 2-Post:
 - a. The Rack shall have the following features:
 - 1) Complies with 19" wide rack EIA-310-D standards.
 - 2) Rack Height: 45RU.
 - 3) Color: Black.
 - 4) Vertical power distribution ("PD" series, quantities and sizes as required to accommodate full rack height)

- b. Installation:
 - 1) Secure EACH Rack to the floor using the manufacturer recommended installation method and the manufacturers recommended hardware/bolt down kit.
 - 2) Secure EACH Rack to the Cable Tray using the manufacturer recommended installation method.
 - 3) Provide vertical cable management between each rack
- c. Manufactured by Chatsworth Products: Model # 55053-703 or approved equal
 - 1) Provide the quantities, where shown in the drawings.

G. Enclosures:

1. Wall-Mounted Hinged Enclosure:

- a. The Rack shall have the following features:
 - 1) Complies with 19" wide rack EIA-310-D standards.
 - 2) Rack Height: 10RU.
 - 3) Color: Black.
 - 4) Front Door: Locking, Vented
 - 5) Provide Top Mount Fan Kit Model # DWR-FK22
 - 6) Provide Solid Copper Bussbar Model # BB-12
 - 7) Provide Rear Rail Kit Model # DWR-RR12
 - 8) Vertical wire management ("LACE" series, quantities and sizes as required to accommodate full rack-height)
 - 9) Vertical power distribution ("PD" series, quantities and sizes as required to accommodate full rack-height)
- b. Installation:
 - 1) Secure EACH Rack to the floor/wall using the manufacturer recommended installation method and the manufacturers recommended hardware/bolt down kit.
- c. Manufactured by Middle Atlantic: Model # DWR-12-26 or approved equal.
 - 1) Provide the quantities, where shown on the drawings

H. Grounding Terminal Block for Rack: For EACH Rack provided for this project, provide one Grounding Terminal Block.

I. Cable Management:

- 1. Vertical Cable Management for open-frame racks: Provide vertical cable management on both sides of each rack. Where two racks are installed side-to-side, provide one section between the Racks for each Rack provided for this project.
 - a. Manufactured by Chatsworth Products: "30161" series, or approved equal. Provide quantities as required.

2. Horizontal Cable Management

- a. Manufactured by Chatsworth Products: Model # 30139-X19 for 1RU applications and Model # 30130-x19 for 2RU applications, or approved equal. Provide quantities as required.

2.18 WIRE RINGS

- A. Cables on backboards shall be supported using open distribution rings. Rings shall be located within 12" of entering or exiting conduit, 6" prior to any radius bends and at least 12" on center. The rings shall have rounded edges and be designed in a "C" configuration. Securely mount distribution rings to the plywood backboard.
- B. Chatsworth Products Inc. (CPI): Model # 12035-001, or approved equal. Provide quantities as required.

2.19 CABLE MANAGEMENT TIES

- A. Wire ties of any type shall NOT be used anywhere in this installation.
- B. Bundle all Horizontal Cables together with Velcro-type tie wraps.
 1. Adjustable Velcro Straps shall be used for all cable bundles.
 - a. Provide Velcro Straps every two feet (approximately) above accessible ceilings, in Cable Trays (where applicable) and throughout the cable run.
 - b. Provide Velcro Straps every twelve inches (approximately) within the MDF and each designated IDF location.
 2. Chatsworth Products Inc. (CPI): Model # 020XX-201, or approved equal. XX indicates actual length. "06" (6-inches long for two-inch diameter cable bundles), "09" (9-inches long for three-inch diameter cable bundles), and "12" (12-inches long for four-inch diameter cable bundles). Provide quantities as required.

2.20 TMGB AND TGB (TELECOMMUNICATION GROUNDING BUSBARS)

- A. See Section 270000 for additional Grounding requirements.
- B. Ground all equipment per the Manufacturers recommendations, per Division 26, and as required by Code.
- C. Provide grounding and bonding per ANSI-STD-J-607-A, which includes, but is not limited to: Cable Tray, Rack(s), conduit sleeves, and other equipment connected to the TMGB/TGB.
 1. The minimum conductor size shall be #6 green insulated copper grounding conductor. However, the size of each conductor shall be based on the actual cable length as defined in ANSI-STD-J-607-A.

- D. TMGB: Provide and install (1) 4" high x 20" wide Copper Telecommunication Main Grounding Busbar (TMGB). Use standoff brackets to wall mount the copper busbar and insulators.
 - 1. Manufactured by Chatsworth Products Inc (CPI): Model # 40153-020, or approved equal.
- E. TGB: Provide and install at EACH designated IDF location (1) 2" high x 12" wide Copper Telecommunication Grounding Busbar (TGB). Use standoff brackets to wall mount the copper busbar and insulators.
 - 1. Manufactured by Chatsworth Products Inc (CPI): Model # 13622-012, or approved equal.
- F. Lug Style: EACH connection to the TMGB/TGB shall be a Copper 2-Hole Lug Straight Long Barrel Connection.
 - 1. Manufactured by Thomas & Betts: Model # 256 Series, or approved equal.

2.21 ADDITIONAL SYSTEM EQUIPMENT

- A. See Part 3 of this specification for additional provision of system Equipment and/or Labor.
- B. See 270528 for pathway requirements (cable tray, inner duct, etc.).

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 270000 - Low Voltage Systems General Requirements, for additional information.
- B. Prior to rough-in, coordinate with the Owner for the exact location(s).
- C. Install all cabling, devices, and/or equipment per the manufacturer's recommendation.

3.2 PRODUCT INSPECTIONS

- A. The Installing Contractor shall inspect all cables prior to installation to verify that it is identified properly on the reel identification label, that it is of proper gauge, containing correct number of pairs, and is the material ordered. Any physical damage to the cable and wire must be noted; un-uniform jacket thickness and jacket tightness should also be identified. Note any buckling of the jacket, which would indicate possible problems.

3.3 CABLE INSTALLATION - GENERAL

- A. EACH CABLE RUN SHALL BE CONTINUOUS, WITHOUT ANY SPLICES, from the Telecommunications Outlet to the patch panel(s). Any cable run that does not meet this requirement shall be replaced at no additional cost to the Owner.

- B. The Installing Contractor shall insure that EACH Telecommunications cable is installed with care, using techniques which prevent kinking, sharp bends, scraping cutting, deforming the jacket, or other damage. During inspection evidence of such damage will result in the material being declared unacceptable. The Installing Contractor shall replace unacceptable cabling at no additional cost to the Owner.
- C. Conduit and Raceway Usage: All Telecommunications cable shall be installed in grounded metal conduit or raceway dedicated for Telecommunications purposes, when called for on the Project Drawings, and not to be shared with electrical wiring.
- D. Cable shall not be draped on, tied or otherwise secured to electrical conduit, plumbing, ventilation ductwork or any other equipment. Cable shall be secured to building supports or hangers or to additional blocks or anchors specifically installed for this purpose.
- E. All wiring to be installed in a neat and inconspicuous manner and per local code requirements. Route wires parallel or perpendicular to the building structure using the specified cable supports. Wiring shall be installed near or on structural members to minimize the risk of physical damage by other trades or maintenance personnel servicing the equipment.
- F. Cable Lubricants specifically designed for installing Telecommunications cable may be used to reduce pulling tension as necessary when pulling cable into conduit. After installation, exposed cable and other surfaces must be cleaned of lubricant residue.
- G. Backboard and Rack Cable Supports: Clamps, "D-Rings", Velcro and tie-wraps are all acceptable ways to support cable. However, installation of these supports must be done with care so as not to cause crushing or distortion of the cable, nor cause tighter bends than the minimum radius permitted for each type of cable.

3.4 HORIZONTAL CABLING

- A. Horizontal Cables shall be dressed and terminated in accordance with TIA/EIA-568-B requirements and the cable manufacturer's recommendations.
 - 1. Untwisting of pairs at the termination point shall not exceed one-half an inch for Category 6 connecting hardware.
 - 2. Bend radius of the cable in the termination area shall not be less than the manufacturer's recommendation.
 - 3. The Horizontal Cable jacket shall be maintained as close as possible to the termination point.
- B. Every attempt shall be made to avoid running Horizontal Cables close to (less than 24") and parallel to power raceway and wiring, or close to light fixtures.
- C. When an approved cable support is used to support cable bundles, all horizontal cables shall be supported at a maximum of four-foot intervals with UL approved cable support. At no point shall cables rest on acoustic ceiling grids or panels. Cables shall not be attached to ceiling grid or lighting support wires. Where light support for drop cable legs is required, the Installing Contractor shall install clips to support the cabling.

- D. The installation of Horizontal Cables around moveable devices, instruments, subpanels, etc. shall be provided with adequate support, length, protection, and flexibility so that the cable is not damaged in the event the equipment is moved.
- E. Pathways:
 - 1. It is the responsibility of the contractor to ensure that ALL PATHWAYS for the permanent link of each balanced twisted pair cable shall not exceed 295' in length from work area outlet to telecommunications room patch panel.
 - 2. To ensure this length, all pathways shall be coordinated and installed prior to pouring of any slabs or the installation of any permanent structure which would inhibit a conduit or cable tray run from being installed after the structure is complete.
 - 3. See section 270528 for pathway types and additional requirements.

3.5 PLYWOOD BACKBOARD CABLING

- A. Horizontal Cable installation must conform to the Project Drawings. All cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance purposes such as access boxes, ventilation mixing boxes, access hatches to air filters, switch or electrical outlets, electrical panels, fire alarm equipment, clock systems, and lighting fixtures. Avoid crossing areas horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser without difficulty at a later time by maintaining maximum distance from these openings.
- B. Horizontal Cables shall be routed as close as possible to the ceiling, floor, or corners to insure that adequate backboard space is available for current and future equipment and for cable terminations. Horizontal Cables shall not be connected or attached to electrical conduit or other equipment. Minimum bend radius shall be observed.
- C. Lay cables via the shortest route directly to the nearest edge of the backboard from the mounted equipment or block. Velcro wrap all similar cables together and attached by means of clamps screwed to the outside edge(s) of the backboard vertically and/or horizontally, then route via "square" corners over a path that will offer minimum obstruction to future installations of equipment or other cables.
- D. Horizontal Cables that are not dressed in a neat fashion, or with excessive slack, will not be accepted.

3.6 TELEPHONE RISER BACKBONE CABLE

- A. Backbone Cable splices are only allowed in accessible, dry locations and housed in a splice case enclosure intended and suitable for the purpose. Each cable end that is spliced must be labeled. Verify intended splice locations with Engineer prior to installation.
- B. Backbone cables shall be installed separately from horizontal cables.
- C. Where backbone cables and horizontal cables are installed in a cable tray, backbone cables shall be installed first and bundled separately from the horizontal cables.

3.7 FIBER OPTIC BACKBONE CABLING

- A. All fiber optic cabling shall be installed in “orange” colored innerduct. There shall be no splices allowed.
- B. Fiber optic termination hardware shall be installed in the following manner:
 - 1. Fiber slack shall be neatly coiled within the Light Interface Unit (LIU). No slack loops shall be allowed external to the LIU’s, unless otherwise noted.
 - 2. Each cable shall be individually attached to the respective termination LIU by mechanical means. The cables strength member(s) shall be securely attached to the cable strain relief bracket in the LIU.
 - 3. Each fiber cable shall be stripped upon entering the termination panel and the individual fibers routed in the LIU.
 - 4. Each cable shall be clearly labeled at the entrance to the LIU. Cables labeled within the bundle shall not be acceptable.
 - 5. Dust caps shall be installed on the connectors and couplings at all times unless physically connected.

3.8 CABLE LABELING

- A. Alpha-numeric numbering shall be developed by the Installing Contractor, under the direction of the Owners IT Department. Label all equipment and cables in an identical fashion.
- B. Patch Panel Labeling: Each terminal shall be identified and marked on the patch panel with the outlet port identification.
- C. Outlet Port Labeling: Outlet labels for each port shall be identified and marked on the Outlet with the outlet port identification.
- D. Backbone Labels: Labels shall be identified and marked on all backbone cables (at both ends of the cable) with an identifier as to the location of the beginning and termination of each cable. Labels shall be attached to each cable at the point of entrance and exit to the MDF and IDF Rooms.
- E. Horizontal Cables: Each cable shall be identified and marked with the outlet port identification near the cable termination point at the rear of the patch panel.

3.9 TELECOMMUNICATION ROOMS

- A. The Telecommunication Rooms (MDF and designated IDF’s) shall house Racks, Patch Panels, Wire Management, UPS’s, Punch Blocks, and required cable routing hardware. Racks shall be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side. If one mounting rail of the rack is placed against a wall, the mounting rail shall be no closer than 6” to the wall to allow room for vertical management. Where there is more than one rack, the racks shall be ganged with vertical management hardware to provide interlay management. Ganged rack frames will be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces.

- B. Racks shall be installed in the following manner:
1. EACH Rack shall be securely attached to the floor and/or wall using the manufacturer's recommended mounting hardware.
 2. EACH Rack shall be Grounded/Bonded to the TMGB/TGB with a minimum size of one (1) #6 copper green insulated conductor or larger due to distance requirements based on ANSI-J-STD-607-A.
 3. Rack mount screws (#12-24) that are spare shall be bagged and left with the rack upon completion of the installation.
 4. All rack mounted equipment shall be installed in a designated Rack Unit. Equipment shall NOT be installed in between Rack Units; this will NOT be considered acceptable.
- C. Cable Tray: Configure as shown on the drawings. Provide Cable Tray as specified in Section 270528. Install the Cable Tray using the manufacturer's recommended mounting hardware, connectors, brackets, and fasteners.

3.10 TESTING OF CABLES

- A. Notification shall be given a minimum of 14 days prior to any testing so that the testing may be witnessed by the Owner.
- B. An ETL certified, TIA-1152 Level IIIe (ISO/IEC 11801 Level IV) Test Meter shall be used to test all balanced twisted-pair copper cabling.
- C. All labeling shall match the final room number identification at completion of the project (not the room number that is indicated on the Bid Set of drawings). This includes, but is not limited to; the Outlets, Port Addresses, Patch Panels, As-Built Drawings, and Test Results.
- D. Provide documentation of the following items of EACH Test Meter used:
1. Calibration certification from a third party shall be within two years of testing (at the time that the test is performed).
 2. Manufacturer of Test Meter.
 3. Model Number of Test Meter.
 4. Serial Number of Test Meter.
- E. Copper Cables – Category 6 and 6A Cables: Each of the pairs shall be tested from the Patch Panel or Punch Block to the Outlet. The Installing Contractor shall test:
1. Wire Map.
 2. Length.
 3. Insertion Loss / Attenuation.
 4. NEXT (Near End Cross Talk).
 5. PS-NEXT (Power Sum Near End Cross Talk).
 6. ACR-F Loss (Attenuation Crosstalk Ratio Far-end).
 7. PS ACR-F Loss (Power Sum Attenuation Crosstalk Ratio Far-end).
 8. Return Loss.
 9. Propagation Delay.
 10. Delay Skew.

11. The following tests are only required for CAT6A cabling:
 - a. PSANEXT (Power Sum Alien NEXT)
 - b. PSAACRF (Power Sum Alien ACRF)
- F. Copper Cables – Category 3 or 5e Cables: Each of the pairs shall be tested from the Patch Panel or Punch Block to the Outlet. The Installing Contractor shall test:
 1. Wire Map.
 2. Length.
 3. Insertion Loss / Attenuation.
 4. NEXT (Near End Cross Talk).
 5. PS-NEXT (Power Sum Near End Cross Talk).
 6. ACR-F Loss (Attenuation Crosstalk Ratio Far-end).
 7. PS ACR-F Loss (Power Sum Attenuation Crosstalk Ratio Far-end).
 8. Return Loss.
 9. Propagation Delay.
 10. Delay Skew.
- G. Fiber Optic Cables – Multi-Mode Inside Plant (ISP) and Outside Plant (OSP): Each of the fibers shall be tested from End-to-End. The Tests performed shall comply with ANSI/TIA-568-C.3 standards. The Installing Contractor shall test:
 1. Polarity Testing
 2. Length Measurement.
 3. OLTS / Link Attenuation.
 4. OTDR.
 5. Two 2-meter patch cords shall be used for the actual test. The two-jumper test shall be used to estimate the actual link loss of the installed cables plus the loss of the connectors. This measurement is consistent with the loss which network equipment will see under normal installation and use.
- H. Fiber Optic Cables – Multi-Mode Inside Plant (ISP): Each of the fibers shall be tested from End-to-End. The Tests performed shall comply with ANSI/TIA-568-C.3 standards.
- I. Fiber Optic Cables – Single-Mode Inside Plant (ISP) and Outside Plant (OSP): Each of the fibers shall be tested from End-to-End. The Tests performed shall comply with ANSI/TIA-568-C.3 standards.
- J. The source of each error shall be determined, corrected, and the cable re-tested. All defective cables, connectors, connections, and related appurtenances shall be replaced and re-tested at no additional cost to the Owner.
- K. Submit the Test Reports in PDF format.
- L. See the O & M Manual / As built Drawings requirements in this specification and also in Section 270000 for additional requirements.

- M. Acceptance of these test procedures is predicated on the Installing Contractor's use of the recommended products including, but not limited to; the specified cable type, patch panels, outlets, punch blocks, specified equipment identified in Part 2 and the installation standards of this specification. Adherence to these requirements shall be determined upon the completed installation and will be evaluated in the context of each of these factors.

3.11 FIRE RATED PENETRATIONS

- A. Install as per manufacturer's recommendations.
- B. Maintain all Code and AHJ requirements.
- C. See 270528 for additional requirements.

3.12 WARRANTY

- A. Upon final installation, a certificate providing an "Application Assurance Warranty" shall be provided to the owner. This warranty shall be valid for a period of no less than 25 Years. The warranty shall be direct to the end user, from the manufacturer, supported through the installing and certified Installing Contractor, and shall cover both materials and labor costs for any claims related to the warranty program. If the Installing Contractor were to default, the manufacturer will assume responsibility of employing another certified installer to maintain the existing warranty. Bids from installers or Installing Contractors who are not certified by the connecting hardware manufacturer and wire manufacturer at the time of project bid, will be rejected.

3.13 OPERATION & MAINTENANCE MANUALS (O&M'S)

- A. Provide all Operation & Maintenance Manuals (O&M's) documentation as defined in Section 270000 - Low Voltage Systems General Requirements and listed elsewhere in this specification.
- B. Provide hard copies of the Test Results of EACH Cable tested.
- C. Provide the Test Results on CD in PDF format.

3.14 AS-BUILT DRAWINGS

- A. Provide all As-Built documentation as defined in Section 270000 Low Voltage Systems General Requirements and listed elsewhere in this specification.
- B. All labeling shall match the final room number identification at completion of the project (not the room number that is indicated on the Bid Set of drawings). This includes, but is not limited to; the Outlets, Port Addresses, Patch Panels, As-Built Drawings, and Test Results.
- C. Update all documents provided in the Submittal and Shop Drawings to accurately reflect the actual equipment that was provided for this project, and the actual locations of the installed equipment.

- D. The Installing Contractor shall provide As-Built drawings to the Owner, which clearly indicates:
1. The floor plan of the building, showing the As-Built location of Telecommunication Outlets and their associated Port Address(es), conduit runs, and terminal cabinets.
 2. A list of EACH Telecommunication Outlet and the associated Port Address(es) shall clearly be identified according to system labeling scheme. Show all ports and punchdowns.
 3. Provide (3) sets of complete As-Built.

END OF SECTION 272000

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City of Everett
Everett Mall Bus Platform
WO NO. MALLSTN/24462

Appendix E Geotechnical Report

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FINAL GEOTECHNICAL ENGINEERING REPORT

Everett Mall Bus Station Platform Project Everett, Washington

HWA Project No. 2024-094

Prepared for PACE

November 27, 2024



GEOSCIENCES INC.

DBE/MWBE

Geotechnical Engineering
Pavement Engineering
Geoenvironmental Hydrogeology
Inspection & Testing



GEOSCIENCES INC.

DBE/MWBE

November 27, 2024
HWA Project No. 2024-094-21

PACE

11255 Kirkland Way, Suite 300
Kirkland, Washington 98033

Attention: Darrell Smith, PE

Subject: **FINAL GEOTECHNICAL ENGINEERING REPORT**
Everett Mall Bus Station Platform Project
Everett, Washington

Mr. Smith:

Attached is our final geotechnical engineering report for the Everett Mall Bus Station Platform project in Everett, Washington. This final geotechnical report includes the results of our field explorations, and our engineering analyses for design and construction of the proposed improvements.

We appreciate the opportunity to provide geotechnical engineering services on this project. Please call if you have any questions or comments concerning this report, or if we may be of further service.

Sincerely,

HWA GEOSCIENCES INC.

William R. Rosso, P.E.
Geotechnical Engineer

Bryan K. Hawkins, P.E.
Senior Geotechnical Engineer

Enclosure: Final Geotechnical Engineering Report

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**FINAL GEOTECHNICAL ENGINEERING REPORT
EVERETT MALL BUS STATION PLATFORM PROJECT
EVERETT, WASHINGTON**

1.0 INTRODUCTION

1.1 GENERAL

This report summarizes the results of a geotechnical study by HWA GeoSciences Inc. (HWA) in support of the Everett Mall Bus Station Platform project in Everett, Washington. The purpose of this study was to evaluate shallow soil and groundwater conditions in the vicinity of the proposed improvements to develop geotechnical recommendations for the project. The approximate site location is shown on the Site Vicinity Map, [Figure 1](#).

Our scope of work included performing four pavement cores within the vicinity of the proposed platform and hand excavation through each core hole, performing geotechnical laboratory testing on representative soil samples collected from the excavations, performing engineering analyses related to the improvements, and preparation of a draft and final geotechnical report.

1.2 PROJECT DESCRIPTION

The project is anticipated to consist of replacing the existing dual-sided transit stop at the mall with a single-sided bus platform that will serve four bus stops. The new platform will include new pavement, luminaires, cantilever bus shelters, and a small lightly loaded structure which will serve as a breakroom and restroom. The small structure is anticipated to be located on the platform between the shelters and will be supported by shallow spread footing foundations.

2.0 FIELD INVESTIGATION

2.1 PAVEMENT CORES

HWA completed a subsurface investigation program that consisted of performing four, 6-inch diameter pavement cores, along with excavations below using hand digging equipment, to evaluate existing pavement layer thicknesses and soil conditions below. The explorations, designated Core-1 through Core-4, were performed on May 16, 2024. Pavement core locations were selected based on the locations of the proposed improvements and approved by PACE prior to our field work. Subsurface explorations through each core hole were performed by two geologists from HWA using a digging bar and hand augers. Representative soil samples were collected from the hand auger excavations at varying depths for laboratory testing.

All core holes were backfilled with excavated soils compacted with the blunt end of a digging bar and patched with Aquaphalt cold patch matching the existing asphalt thickness. The

exploration locations are shown on the Site and Exploration Plan, [Figure 2](#). [Appendix A](#) provides photographic logs of the pavement cores. [Table 1](#) provides the Hot Mix Asphalt (HMA) and base course/granular fill thicknesses encountered in the cores, along with relevant notes pertaining to conditions encountered below.

Table 1. Pavement Core Data

Designation	HMA Thickness, in.	Base Course/Granular Fill Thickness, in.	Notes
Core-1	4 ¾	13	No crushed base course below the HMA. Very dense glacial till below the fill.
Core-2	4	15	No crushed base course below the HMA. Very dense glacial till below the fill.
Core-3	4 ¾	10 ¾	No crushed base course below the HMA. Very dense glacial till below the fill.
Core-4	1 ½	11 ½	11 ½ inches of CSBC below HMA. About 5 feet of medium dense, sandy fill below the CSBC.

2.2 LABORATORY TESTING

Laboratory tests were conducted at HWA's Bothell, Washington, laboratory on selected samples obtained from the explorations to characterize general engineering and index properties. The tests included visual classification, natural moisture content determination, and grain size distribution analyses using the washed sieve method and hydrometer methods. All tests were conducted in general accordance with appropriate ASTM International (ASTM) standards. Testing is discussed in further detail in [Appendix B](#). The test results are presented in [Appendix B](#), and displayed on the exploration logs in [Appendix A](#), as appropriate.

3.0 SITE CONDITIONS

3.1 SITE SURFACE CONDITIONS

The project site is located at the south parking lot of the Everett Mall. The mall is bounded by State Route 99 / Everett Mall Way (SR-99) to the north, Interstate 5 (I-5) to the east, 100th Place

SE and residential developments to the south, and West Mall Drive and commercial developments to the west. The location of the proposed new bus platform is currently developed as an asphalt parking lot with landscape islands and the site is relatively flat. The location for the proposed new platform is approximately 500 feet west of the existing two-way bus platform, just west of the LA Fitness in the southern mall parking lot.

3.2 GENERAL GEOLOGIC CONDITIONS

Geologic information for the project area was obtained from the *Geologic Map of the Everett 7.5-Minute Quadrangle, Snohomish County, Washington* (Minard, 1985) which suggests that the site is underlain by Vashon glacial till. Glacial till deposits consist of unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders deposited by glacial ice. Glacial till may contain interbedded stratified sand, silt, and gravel layers. Due to the weight of the ice, these deposits have been over-consolidated to a very dense or hard condition. The soils encountered in our explorations were generally consistent with the surface geology characterized by the referenced map.

3.3 SITE SOIL CONDITIONS

In general, the subsurface conditions encountered below the pavement in our explorations consisted of fill soils overlying glacial till. Further descriptions of soils encountered in our explorations are presented below in order of deposition, beginning with the most recently deposited.

- **Fill:** Fill was encountered in each of the excavations below the asphalt pavement surface. In Core-1 through Core-3, the fill generally consisted of dense, sandy gravel with varying amounts of silt was about 11 to 15 inches in thickness, extending to depths of about 15 to 19 inches below pavement surface.

In Core-4, approximately 11 inches of material consistent with Crushed Surfacing Base Course (CSBC) was encountered below the asphalt pavement surface. Below the crushed aggregate base, the excavation encountered fill soils consisting of medium dense, slightly gravelly sand to a depth of about 6 feet. A 6-inch-thick layer of stiff silt was encountered below the sand above an approximately 9-inch-thick layer of forest duff.

- **Forest Duff:** Forest duff was encountered in Core-4 at approximately 6 feet below the pavement surface. The forest duff was about 9 inches thick and comprised of dense, silty sand with abundant organics.
- **Glacial Till:** Glacial till was encountered below the fill and forest duff in each of the explorations and all of the excavations were terminated in this deposit. In Core-1 through Core-3, the glacial till was relatively unweathered and consisted of very dense, silty

gravel with sand and silty sand with gravel. In pavement core Core-4, the glacial till was weathered and consisted of medium dense, silty sand with gravel. Although the excavation in Core-4 was terminated in the weathered till, weathered glacial till typically transitions to unweathered till within a few feet below the top of the weathered zone.

The exploration logs presented in [Appendix A](#) provide more detail of subsurface conditions observed at specific locations and depths.

3.4 GROUNDWATER

Groundwater seepage was not observed in any of the pavement core explorations, but perched zones may be encountered above the glacial till, which is relatively impermeable, or within sandy seams in the till, especially during wetter times of the year. The depth of the local static water table is unknown but is likely below this glacial till unit.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

The subsurface soils encountered in our explorations should be sufficient to support the proposed bus platform, as well as the other associated improvements including the pavement sections, small structure, and luminaires.

Our subsurface investigation suggests that WSDOT's Street Light Standard Foundations plan should be appropriate to support the new luminaires. Based on the thick fill unit encountered at the location of Core-4, Type B foundations will likely be more appropriate for the site. Contractors should be prepared to use temporary casing or metal forms to prevent side wall caving where thicker fill units are encountered.

The glacial till soils encountered in the pavement core explorations should provide adequate bearing pressure to support the small structure. We recommend that a 12-inch-thick leveling pad of Crushed Surfacing Base Course (CSBC) be placed below shallow spread footings.

The native soils at the project site consist of glacially consolidated, dense to very dense glacial till, which is relatively impermeable. Therefore, onsite stormwater infiltration is not feasible.

4.2 SEISMIC DESIGN PARAMETERS

The contribution of potential earthquake-induced ground motion from known sources is included in the probabilistic ground motion maps developed by the USGS. Design data seismic site characterization and design recommendations based on USGS mapping and analysis are implemented in the 2021 International Building Code (IBC). As part of this code, the design of structures must consider dynamic forces resulting from seismic events. These forces are

dependent upon the magnitude of the earthquake event as well as the properties of the soils that underlie the site.

As part of the procedure to evaluate seismic forces, the 2021 IBC requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile 100 feet below the proposed foundation. The Site Class can then be determined in accordance with Section 20.3 of ASCE 7-16, and the corresponding values of F_a and F_v determined from Tables 11.4-1 and 11.4-2 of ASCE 7-16. Based on our understanding of the geology at the, the site classifies as Site Class “C”.

Should the information used as a basis for this design be incorrect, HWA should be notified to provide appropriate recommendations. The associated probabilistic ground acceleration values and site coefficients for the general site area were obtained from the Applied Technology Council Seismic Hazard Maps. The risk targeted seismic values and coefficient are presented in [Table 2](#).

Table 2. Ground Motion Values, Site Class C*

Period (sec)	Mapped MCE Spectral Response Acceleration (g)		Site Coefficients		Adjusted MCE Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)		Transition Point	Period (sec)
0.0	PGA	0.588	F_{PGA}	1.200	$PGAM$	0.704	-	-	T_0	0.089
0.2	S_s	1.361	F_a	1.200	S_{MS}	1.633	S_{DS}	1.089	T_s	0.443
1.0	S_1	0.482	F_v	1.500	S_{M1}	0.723	S_{D1}	0.482	T_L	6

Notes: *2% Probability of Exceedance in 50 years for Latitude 47.90834° and Longitude -122.21552°

PGA = Peak ground acceleration F_{PGA} = PGA site coefficient
 A_s = Design Seismic Coefficient equal to the mapped PGA adjusted for Site Class effects
 S_s = Short period (0.2 second) Mapped Spectral Acceleration
 S_1 = 1.0 second period Mapped Spectral Acceleration
 S_{MS} = Spectral Response adjusted for site class effects for short period = $F_a \cdot S_s$
 S_{M1} = Spectral Response adjusted for site class effects for 1-second period = $F_v \cdot S_1$
 S_{DS} = Design Spectral Response Acceleration for short period = $2/3 \cdot S_{MS}$
 S_{D1} = Design Spectral Response Acceleration for 1-second period = $2/3 \cdot S_{M1}$
 F_a = Short Period Site Coefficients
 F_v = Long Period Site Coefficients
 $T_0 = 0.2 \cdot S_{D1} / S_{DS}$
 $T_s = S_{D1} / S_{DS}$
 T_L = Long Period Transition period

4.2.1 Seismic Hazards

Earthquake-induced geologic hazards typically include land sliding, fault rupture, settlement, and liquefaction phenomena and their associated effects (loss of shear strength, bearing capacity failures, loss of lateral support, ground oscillations, lateral spreading, etc.).

Liquefaction typically occurs when loose to medium dense, granular, saturated soils are subjected to ground shaking. Because groundwater was not encountered within the fill soils and glacially consolidated soils (glacial till) were encountered below the fill at shallow depths, we consider the potential for liquefaction at the site to be low. Given the relatively flat topography of the site, we also anticipate the potential for slope instability within existing slopes at the site to be low during a seismic event.

Based on a review of the USGS fault database, the closest mapped fault trace is in the Southern Whidbey Island Fault Zone, approximately 1.7 miles to the southwest; however, it is not mapped as crossing the site. Therefore, the potential for fault rupture at the site is considered low.

4.3 PAVEMENT DESIGN

4.3.1 Pavement Subgrade Preparation

Subgrade preparation for pavement, sidewalks, ramps, curbs and other improvements founded at grade should begin with the removal of all existing pavement, topsoil, deleterious material, and vegetation to expose dense, competent native soils or adequately compacted structural fill. A smooth bucket should be used to limit disturbance. We recommend that in areas accessible to construction equipment, the exposed subgrade be proof-rolled under the observation of the geotechnical engineer using a fully-loaded dump truck to identify any areas of loose, pumping, or otherwise unsuitable soils. If such soils are encountered, they should be over-excavated as directed by the geotechnical engineer and replaced with properly compacted structural fill. In areas inaccessible to large equipment, the subgrade soils should be evaluated by the geotechnical engineer using a T-handled probe.

4.3.2 Design Traffic

Design traffic parameters for the new bus platform pavement were provided by PACE and the City of Everett, consisting of 300 fully-loaded 40-foot buses per day and 40 WB-60 vehicles per day along with an annual traffic volume growth rate of 3 percent. We were requested to perform new HMA and PCC designs for a 20-year design life and a 40-year design life.

Based on the traffic loading described above, we calculated the following Equivalent Single Axle Load (ESAL) values for use in design:

	Flexible ESALs	Rigid ESALS
Total ESAL - 20 Year Design Life	8380984	11926448
Total ESAL - 40 Year Design Life	16761968	23852896

The pavement recommendations presented in this report are based on these traffic calculations. If additional traffic count information is obtained that varies appreciably from these values, the recommendations given in this report should be reviewed and revised as necessary.

4.3.3 New HMA Pavement Design

Tables 3 and 4 provide our HMA design recommendations, for a 20-year design life and 40-year design life, respectively, assuming the traffic loading inputs described above. These pavement designs are based on the design method given in the AASHTO Guide for Design of New Pavement Structures (AASHTO, 1993) using the following parameters:

- Reliability = 90%
- Initial Serviceability = 4.5
- Terminal Serviceability = 3.0
- Overall Standard Deviation = 0.5
- Subgrade Resilient Modulus = 15 ksi

These values result in a required AASHTO Structural Number (SN) of 4.0 for a 20-year design life and 4.4 for a 40-year design life.

Table 3. Structure Requirements for New HMA Pavement – 20-Year Design Life

Material Description	Minimum Layer Thickness (inches)	WSDOT Standard Specification
HMA	8	5-04
CSBC	6	9-03.9(3)

Table 4. Structure Requirements for New HMA Pavement – 40-Year Design Life

Material Description	Minimum Layer Thickness (inches)	WSDOT Standard Specification
HMA	9	5-04
CSBC	6	9-03.9(3)

HMA: Hot Mix Asphalt

CSBC: Crushed Surfacing Base Course

Table 5 provides our HMA design recommendations for miscellaneous, lightly loaded pavement sections such as parking stalls or parking area drive aisles where buses and/or heavy vehicles are not anticipated. The recommendations in Table 5 are for lightly loaded pavements and are not based on the traffic loading provided to us. They are intended only for use in areas where work

to construct the proposed improvements may impact the existing parking lot and require a replacement section.

Table 5. Structure Requirements for New HMA Pavement - Parking and Drive Aisles

Material Description	Minimum Layer Thickness (inches)	WSDOT Standard Specification
HMA	6	5-04
CSBC	6	9-03.9(3)

We recommend that the asphaltic layers consist of HMA Class ½-inch. The upper 2 inches of the CSBC layer could be replaced with CSTC if desired. Recommendations are presented below for subgrade preparation and structural fill placement and compaction for pavement reconstruction. The use of engineered fibers (such as FORTA-FI) could be considered in the HMA wearing course to prolong the pavement life and delay the onset of distress.

4.3.4 HMA Design Considerations

The following design considerations should be noted and implemented:

- The longitudinal joints in the HMA wearing course should coincide with a line lane or an edge line.
- When pavement reconstruction is called for in conjunction with the HMA overlay, construction of the wearing course for both the HMA overlay and reconstruction areas should be placed as the final stage of the paving operation.
- The HMA will likely require a functional overlay after about 17 years because of non-structural associated distress caused by environmental factors such as degradation of the asphalt surface.

4.3.5 HMA Binder Selection

The selection of the optimum asphalt binder type for the prevailing climate is critical to ensure long-term pavement performance. Use of the wrong binder can result in low temperature cracking or permanent deformation at high temperatures.

Based on the climate in Everett, we recommend Superpave Performance Grade binder PG 58H-22 be used for pavement overlays.

4.3.6 Placement of HMA

Placement of HMA should be in accordance with Section 5-04 of the *WSDOT Standard Specifications* (WSDOT, 2024). Particular attention should be paid to the following:

- HMA should not be placed until the engineer has evaluated and approved the surface following grinding. In some areas, deeper grinding may be required due to distresses observed in the layer after initial grinding.
- HMA should not be placed on any frozen or wet surface.
- HMA should not be placed when precipitation is anticipated before the pavement can be compacted, or before any other weather conditions which could prevent proper handling and compaction of HMA.
- HMA should not be placed when the average surface temperatures are less than 45° F.
- HMA temperature behind the paver should be in excess of 240° F. Compaction should be completed before the mix temperature drops below 180° F. Comprehensive temperature records should be kept during the HMA placement.
- Sufficient tack coat must be applied uniformly and allowed to break and set before placing HMA above an existing HMA layer in order to create a strong bond between layers. The surface of the pavement should be thoroughly cleaned prior to tack coat application. Improper tack coat application can cause unbonded layers and will lead to premature pavement distress/failure.
- For cold joints, tack coat should be applied to the edge to be joined and the paver screed should be set to overlap the first mat by 1 to 2 inches.

4.3.7 New PCC Pavement Design

Tables 6 and 7 provide our PCC design recommendations, for a 20-year design life and 40-year design life, respectively, assuming the traffic loading inputs described above. These pavement designs are based on the design method given in the AASHTO Guide for Design of New Pavement Structures (AASHTO, 1993) using the following parameters:

- Reliability = 90%
- Initial Serviceability = 4.5
- Terminal Serviceability = 3.0
- Overall Standard Deviation = 0.35
- Modulus of Rupture = 700 psi
- Elastic Modulus = 4,000,000 psi
- Load Transfer Coefficient = 3.2 (doweled joints)

- Drainage Coefficient = 1.0
- Edge Support = 1.0
- Slab/Base Friction Coefficient = 1.4
- Modulus of Subgrade Reaction = 200 psi/in

Table 6. Structure Requirements for New PCC Pavement – 20-Year Design Life

Material Description	Minimum Layer Thickness (inches)
PCCP	11
CSBC	6

Table 7. Structure Requirements for New PCC Pavement – 40-Year Design Life

Material Description	Minimum Layer Thickness (inches)
PCCP	12
CSBC	6

The pavement should consist of Jointed Plain Concrete Pavement (JPCP) and design and construction should be in conformance with the 2023 WSDOT *Standard Plans* (WSDOT, 2023). Transverse and longitudinal joints should conform to Standard Plan A-40.10-04. Isolation joints should conform to Standard Plan A-40.15-00. Sawed joints and sealants should conform to Standard Plan A-40.10-4. Dowel bar baskets should conform to Standard Plan A-40.00-01.

4.3.8 Drainage

For both HMA and PCC pavements, it is essential to the satisfactory performance of the roadway that good drainage is provided to prevent water ponding on or alongside, or accumulating beneath, the pavement. Water ponding can cause saturation of the pavement and subgrade layers and lead to premature failure. The surface of the pavement should be sloped to convey water from the pavement to appropriate drainage facilities.

4.4 STRUCTURE FOUNDATIONS

Based on the results of our explorations, glacially consolidated soils are generally anticipated to be encountered at relatively shallow depths below existing grades. We understand that the small structure will generally be lightly loaded. We recommend the foundations for the structure be placed on a 12-inch-thick leveling pad comprised of Crushed Surfacing Base Course (CSBC) conforming to Section 9-03.9(3) of the WSDOT *Standard Specifications* (WSDOT, 2024).

These foundations can be designed using an allowable bearing pressure of 2,500 psf, provided the CSBC leveling pad is founded on native glacial till soils, or structural fill placed above the native till soils. This bearing capacity value applies to total of dead load and/or frequently applied live load and can be increased by one-third for combined/transient loads, including: dead, live, wind, and seismic loads.

Exterior footings should be founded at a depth of at least 18 inches below the surface for frost protection. Continuous spread footings should have a minimum width of 18 inches and isolated spread footings should have a minimum width of 30 inches. Provided subgrade is prepared in accordance with our recommendations, total footing settlements are estimated to be less than 1 inch for 50-kip column loads and 2.5-kip/ft wall loads. Differential settlement over 50 feet is estimated to be less than ½-inch between similarly loaded footings.

4.5 LUMINAIRE FOUNDATIONS

We understand that new luminaires will be constructed as part of the proposed improvements for this project. We anticipate that WSDOT Standard Plans for construction of luminaire foundations will be applicable. Based on the results of our explorations and the presence of glacial till at shallow depths, we recommend using an allowable lateral bearing pressure of 1,500 psf for design of luminaire foundations that are constructed in native soils, or densely compacted structural fill. If soils other than glacial till or structural fill are encountered at the location of a luminaire foundation, HWA should be contacted to evaluate the soils and provide design recommendations based on the soils encountered.

Drilled shaft luminaire foundations can be constructed using conventional methods such as flighted augers. It is likely that cobbles and boulders could be present. Per the Unified Soil Classification System (USCS), cobbles are defined as a rock with a dimension between 3 and 12 inches; boulders are defined as rock with a minimum dimension of 12 inches. The contractor should be prepared to encounter cobbles and boulders during drilling of shafts.

Although no groundwater was encountered during drilling the contractor should be prepared to control groundwater, perched water, and/or surface water entering and collecting inside the drilled shaft excavation. The contractor should be prepared to prevent caving of the drilled shaft sidewalls using temporary casing. The concrete should be placed using a tremie pipe from the bottom of the shaft if water inside the drilled shaft excavation is over a depth of 6 inches.

A qualified geotechnical engineer should observe shaft excavation and concrete placement. This will also provide the opportunity to confirm conditions assumed in the design and provide corrective recommendations as necessary to adapt to conditions observed during construction.

4.6 STORMWATER MANAGEMENT

It is our understanding that construction of the proposed improvements will not change the amount of impermeable surface within the parking lot. The feasibility of using infiltration as part of the stormwater management for this site was evaluated in accordance with the 2019 Stormwater Management Manual for Western Washington (Ecology, 2019). Consideration was given to the underlying stratigraphy of the project site. The explorations indicate that the site is underlain by glacial till soils which are relatively impermeable and are likely to result in perched groundwater conditions. We do not recommend the use of infiltration at this site.

4.7 GENERAL EARTHWORK

4.7.1 General

We anticipate that trenching and excavations will be necessary to support the installation of utilities. Additionally, existing utilities may require relocation due to proposed improvements. We anticipate that most earthwork will be shallow and will not extend beyond a depth of about 4 feet. If excavations are anticipated to extend to depths greater than 4 feet, HWA should be notified to ensure the recommendations provided within this report remain applicable.

4.7.2 Temporary Shoring and Sloped Excavations

We expect that temporary shoring for work at the site will not be required. Design of temporary shoring and maintenance of safe working conditions, including temporary excavation stability is the responsibility of the contractor. In accordance with Part N of Washington Administrative Code (WAC) 296-155, all temporary cuts in excess of 4 feet in height must be either sloped or shored prior to entry by personnel.

The fill soils can generally be classified as Type C soils per WAC 296-155. Where shoring is not used, temporary cuts in Type C soils should be sloped no steeper than 1½H:1V (horizontal:vertical). The native glacial till soils can generally be classified as Type B soils per WAC 296-155. Where shoring is not used, temporary cuts in Type B soils should be sloped no steeper than 1H:1V (horizontal:vertical).

We anticipate that the contractor should be able to manage perched groundwater seepage using sumps and pumps. If significant perched groundwater seepage is encountered within the trench excavations, unshored excavations will require flatter side slopes of at least 4H:1V.

4.7.3 Structural Fill

All excavations should be backfilled with structural fill. The existing soils encountered in our explorations are not suitable for reuse as structural fill due to their high fines content and imported structural fill will be required.

Imported structural fill should consist of imported, clean, free-draining, granular soils clear of organic matter or other deleterious materials. Structural fill for pavement base and areas of over-excavation below structures should conform to the specifications for Crushed Surfacing Base Course specified in Section 9-03.9(3) of the WSDOT *Standard Specifications* (WSDOT, 2024). The fine-grained portion of structural fill soils should be non-plastic. Gravel Borrow conforming to Section 9-03.14(1) of the WSDOT *Standard Specifications* (WSDOT, 2024) may be used as structural fill placed in other areas or a depth below the full pavement section.

4.7.4 Backfill Placement and Compaction

Proper preparation, placement, and compaction of structural fill is extremely important to limit future settlement of the ground surface below structures, pavement, and along trenches.

Structural fill soils should be moisture conditioned and compacted to the requirements specified in Section 2-03.3(14)C, Method C, of the WSDOT *Standard Specifications* (WSDOT, 2024); except the standard of compaction achieved should not be less than 95% of the theoretical maximum dry density (MDD), as determined by test method ASTM D1557 (modified Proctor). Subgrade compaction in roadbed areas should conform to the requirements of Section 2 06.3(1) of the WSDOT *Standard Specifications* (WSDOT, 2024).

Observation and testing of backfill by a representative of the Geotechnical Engineer is recommended to help the contractor achieve proper backfill preparation and uniform moisture conditioning, loose lift thickness control, and application of appropriate compaction effort.

4.7.5 Wet Weather Earthwork

The native glacial till soils encountered contain a high fines content (about 30%) and will be difficult to place/compact or traverse with construction equipment during periods of wet weather. We recommend all earthwork activities occur during the dry summer months to avoid extra costs and problems associated with earthwork in wet conditions. General recommendations relative to earthwork performed in wet weather or in wet conditions are presented below. These recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soil should be followed promptly by the placement of concrete or placement and compaction of structural fill material. The size and type of construction equipment used may need to be limited to prevent soil disturbance.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.

- The ground surface within the construction area should be sealed by a smooth drum roller, or equivalent, and under no circumstances should soil be left uncompacted and exposed to moisture infiltration.
- Excavation and placement of fill material should be monitored to determine that the work is being accomplished in accordance with the project specifications and that the weather conditions do not adversely impact the quality of work.

5.0 CONDITIONS AND LIMITATIONS

We have prepared this final geotechnical data report for PACE and the City of Everett for use in design for this project. The interpretations presented in this report should not be construed as our warranty of subsurface conditions at the site. Experience has shown that soil and groundwater conditions can vary significantly over small distances and with time. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study of this scope and nature.

Within the limitations of scope, schedule and budget, HWA attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology in the area at the time the report was prepared. No warranty, express or implied, is made.

HWA does not practice or consult in the field of safety engineering. We do not direct the contractor's operations and cannot be responsible for the safety of personnel other than our own on the site. As such, the safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered unsafe.

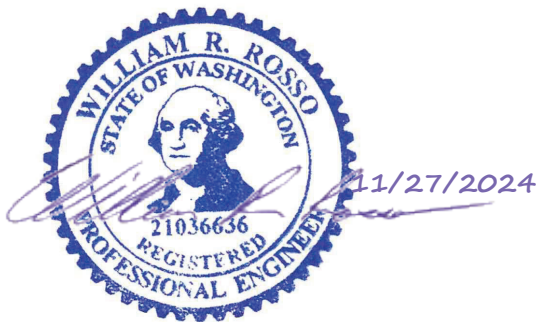


November 27, 2024
HWA Project No. 2024-094-21

We appreciate the opportunity to provide geotechnical services on this project. Should you have any questions or comments, or if we may be of further service, please do not hesitate to call.

Sincerely,

HWA GEOSCIENCES INC.



William R. Rosso, P.E.
Geotechnical Engineer

A handwritten signature in blue ink, likely belonging to Bryan K. Hawkins, located to the right of the seal.

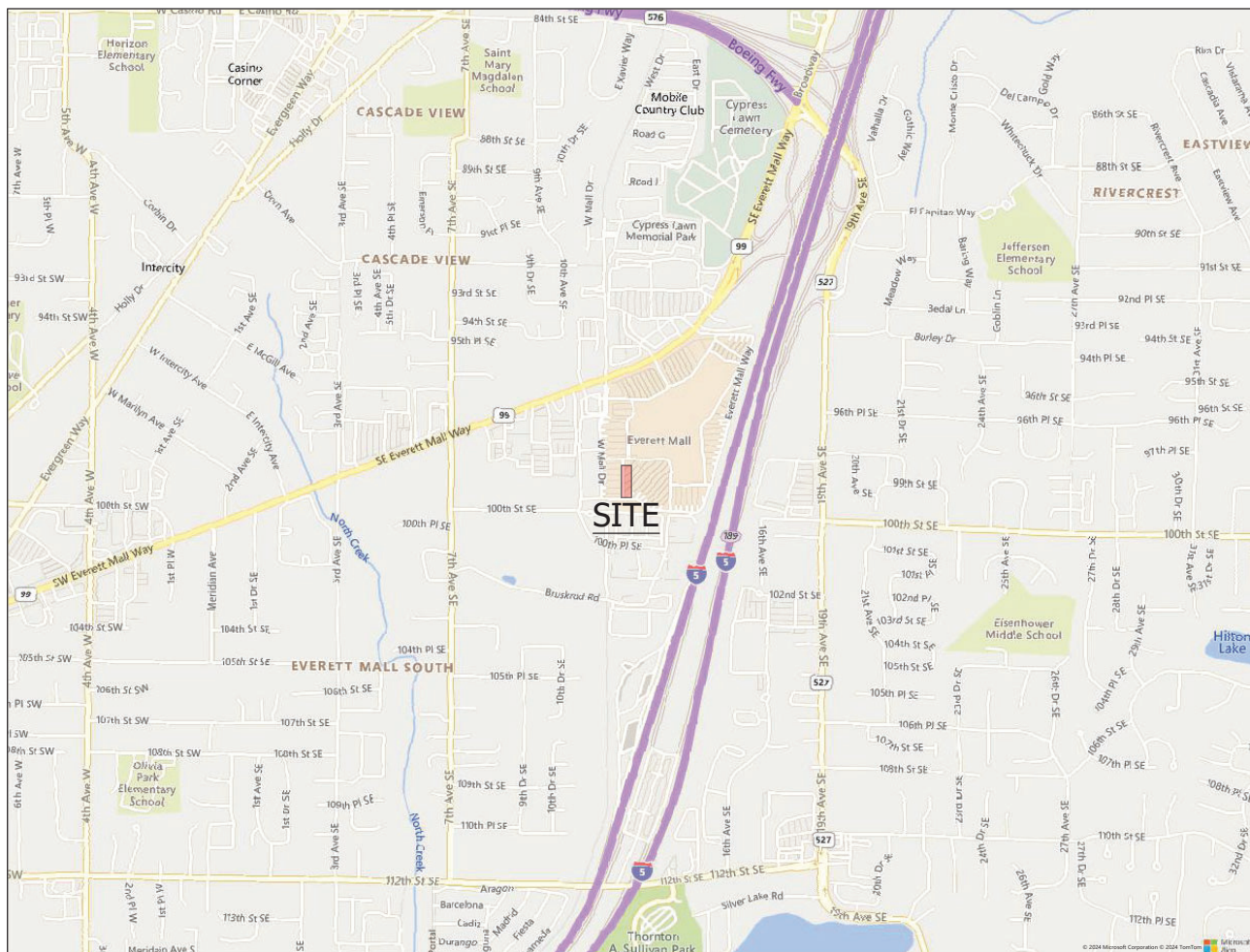
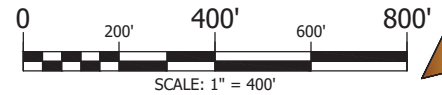
Bryan K. Hawkins, P.E.
Senior Geotechnical Engineer

6.0 REFERENCES

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SITE MAP



VICINITY MAP



SITE AND VICINITY MAP

EVERETT MALL BUS STATION PLATFORM
EVERETT, WASHINGTON

FIGURE NO.:

1

DRAWN BY: CHECK BY:
CF WRR

PROJECT #
2024-094-21

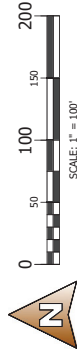


GEOSCIENCES INC.
DBE/MWBE



100TH ST SE
Scale: 1" = 100'-0"

EXPLORATION LEGEND
CORE-1 PAVEMENT CORE AND HAND AUGER BORING DESIGNATION AND APPROXIMATE LOCATION (HWA, 2024)



AERIAL IMAGERY REFERENCE IS APPROXIMATE AND MAY APPEAR OFFSET FROM SURVEYED DATA AND BASEMAPS.
BASE MAP PROVIDED BY: SING AND SENEVIRATNE



EVERETT MALL BUS STATION PLATFORM
EVERETT, WASHINGTON

SITE AND
EXPLORATION PLAN

DRAWN BY:	CF	FIGURE NO.:	2
CHECK BY:	WRR	PROJECT NO.:	2024-094-21

APPENDIX A

FIELD EXPLORATION

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)		GW Well-graded GRAVEL
		More than 50% of Coarse Fraction Retained on No. 4 Sieve	GP	Poorly-graded GRAVEL
	Gravel with Fines (appreciable amount of fines)		GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils		Clean Sand (little or no fines)	SW
		SP		Poorly-graded SAND
50% or More of Coarse Fraction Passing No. 4 Sieve		SM	Silty SAND	
		SC	Clayey SAND	
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%		ML SILT
				CL Lean CLAY
				OL Organic SILT/Organic CLAY
	Silt and Clay	Liquid Limit 50% or More		MH Elastic SILT
				CH Fat CLAY
				OH Organic SILT/Organic CLAY
Highly Organic Soils				PT PEAT

TEST SYMBOLS	
%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit, LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
OC	Organic Content
pH	pH of Soils
PID	Photoionization Device Reading
PP	Pocket Penetrometer (Approx. Comp. Strength, tsf)
Res.	Resistivity
SG	Specific Gravity
CD	Consolidated Drained Triaxial
CU	Consolidated Undrained Triaxial
UU	Unconsolidated Undrained Triaxial
TV	Torvane (Approx. Shear Strength, tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

	2.0" OD Split Spoon (SPT)
	(140 lb. hammer with 30 in. drop)
	Shelby Tube
	Non-standard Penetration Test
	(3.0" OD Split Spoon with Brass Rings)
	Small Bag Sample
	Large Bag (Bulk) Sample
	Core Run
	3-1/4" OD Split Spoon

GROUNDWATER SYMBOLS

	Groundwater Level (measured at time of drilling)
	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments.
(GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS



Everett Mall Bus Station Platform
Everett, Washington

GEOSCIENCES INC.

LEGEND 2024-094.GPJ 6/10/24

PROJECT NO.: 2024-094

FIGURE:

A-1

EXCAVATION COMPANY: HWA GeoSciences Inc.
EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel
STREET: Everett Mall Parking Lot

LOCATION: See Figure 2
DATE COMPLETED: 5/16/24
LOGGED BY: RM

DEPTH (feet)	USCS SOIL CLASS.	SYMBOL	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			4.75 inches Hot Mix Asphalt. 2 lifts: 1.75" x 3". No cracking at this location. Lifts are unbonded. (HMA)				
1		GP	13 inches Gravel Borrow. Dense, olive-gray, sandy GRAVEL, moist. Fine with some coarse gravel, mostly rounded. (FILL)		S-1	6	
2		GM	Very dense, olive-brown, very sandy, silty GRAVEL, moist. Fine to coarse, subrounded. (GLACIAL TILL)		S-2	5	GS

The corehole was terminated at 2-feet below ground surface.
No groundwater seepage was observed during the exploration.

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



GEOSCIENCES INC.

Everett Mall Bus Station Platform
Everett, Washington

PAVEMENT CORE
Core-1

PAGE: 1 of 1

EXCAVATION COMPANY: HWA GeoSciences Inc.
EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel
STREET: Everett Mall Parking Lot

LOCATION: See Figure 2
DATE COMPLETED: 5/16/24
LOGGED BY: RM

DEPTH (feet)	USCS SOIL CLASS.	SYMBOL	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
--------------	------------------	--------	-------------	-------------	---------------	---------------------	-------------

0			4 inches Hot Mix Asphalt. 2 lifts: 2.25" x 1.75". Top lift is underlain by pre-level lift; 0.75" on right side of core (as pictured) and tapers out on left side of core. Paving fabric between top lift and pre-level lift. Base lift is cracked and unbonded from pre-level lift. No cracking in top lift. (HMA)				
1	GP GM		15 inches Gravel Borrow. Dense, olive-brown, silty, sandy GRAVEL, moist. Fine with some coarse, rounded gravel, silt content increases with depth. (FILL)				
2	GM		Very dense, olive-gray, sandy, silty GRAVEL, moist. Fine to coarse, subrounded gravel. (GLACIAL TILL)				

S-1 4 GS

The corehole was terminated at 2-feet below ground surface.
No groundwater seepage was observed during the exploration.

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



GEOSCIENCES INC.

Everett Mall Bus Station Platform
Everett, Washington

PAVEMENT CORE
Core-2

PAGE: 1 of 1

EXCAVATION COMPANY: HWA GeoSciences Inc.
EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel
STREET: Everett Mall Parking Lot

LOCATION: See Figure 2
DATE COMPLETED: 5/16/24
LOGGED BY: RM

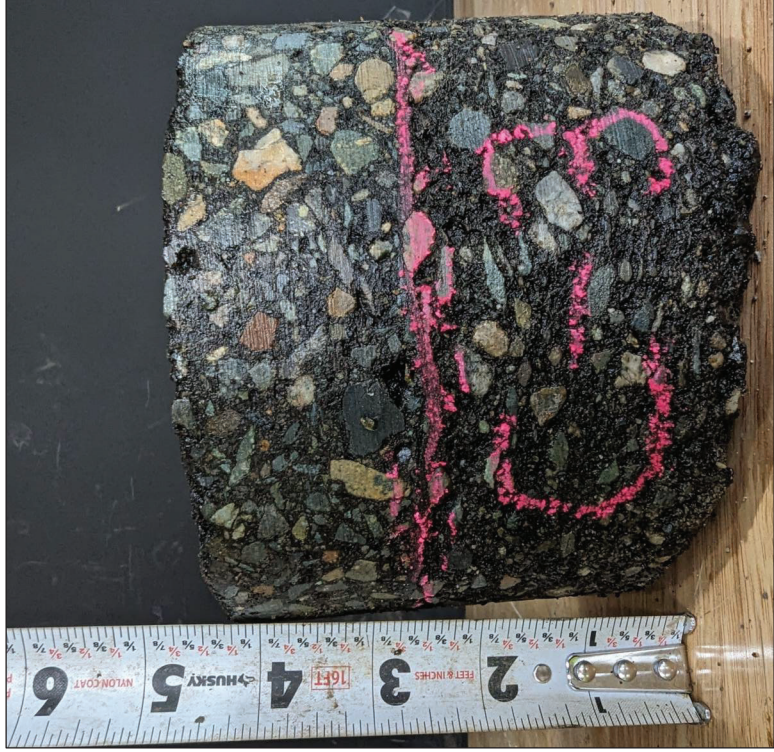
DEPTH (feet)	USCS SOIL CLASS.	SYMBOL	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
--------------	------------------	--------	-------------	-------------	---------------	---------------------	-------------

0			4.25 inches Hot Mix Asphalt. 2 lifts: 1.75" x 2.5". Lifts are bonded, with paving fabric between lifts. No cracking at this location.				
1	SP SM		10.75 inches Gravel Borrow. Dense, olive-brown, slightly silty, gravelly, SAND, moist. (FILL)				
2	SM		Very dense, olive-gray, silty SAND with fine, rounded gravel, (GLACIAL TILL)				

S-1 5

The corehole was terminated at 24 inches below ground surface. No groundwater seepage was observed during the exploration.

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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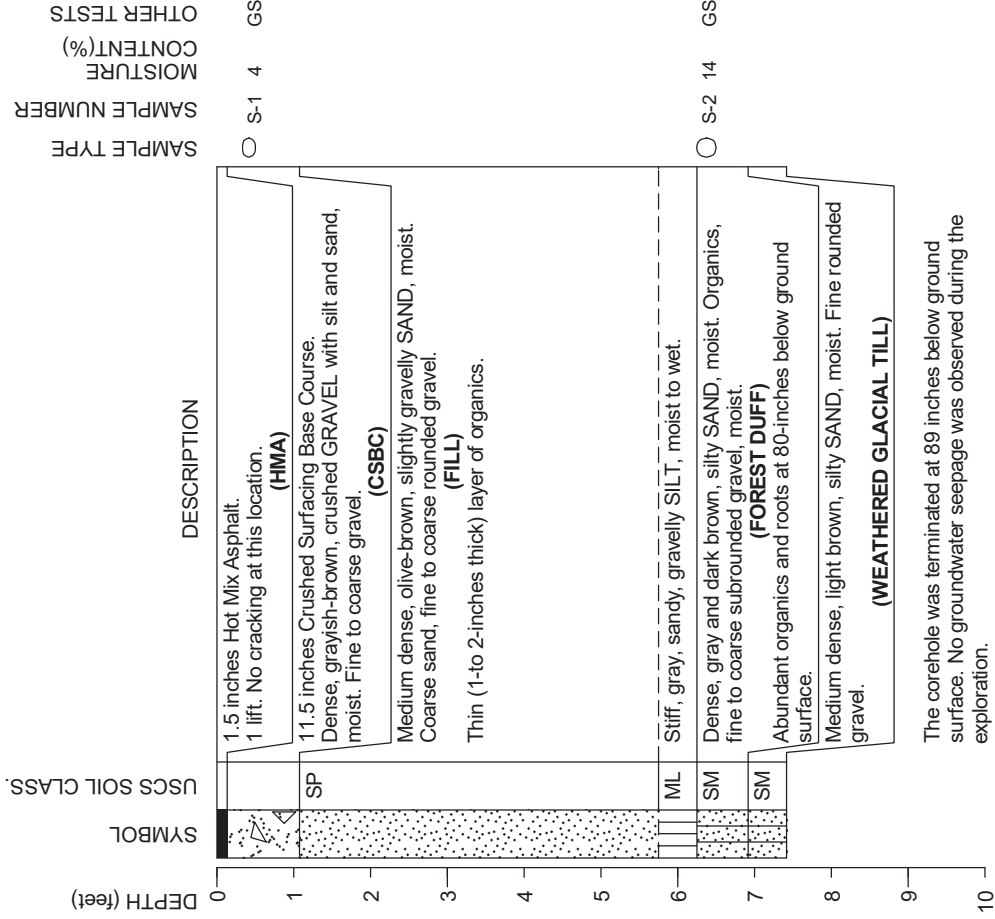
Everett Mall Bus Station Platform
Everett, Washington

PAVEMENT CORE
Core-3

PAGE: 1 of 1

EXCAVATION COMPANY: HWA GeoSciences Inc.
EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel
STREET: Everett Mall Parking Lot

LOCATION: See Figure 2
DATE COMPLETED: 5/16/24
LOGGED BY: RM



PAVEMENT CORE PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



GEOSCIENCES INC.

Everett Mall Bus Station Platform
Everett, Washington

PAVEMENT CORE
Core-4

PAGE: 1 of 2

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative soil samples obtained from our explorations were placed in plastic bags to prevent loss of moisture and transported to our Bothell, Washington, laboratory for further examination and testing. Laboratory tests were conducted on selected soil samples to characterize relevant engineering and index properties of the site soils. Laboratory testing was conducted as described below. A Summary of Material Properties is provided on [Figure B-1](#).

MOISTURE CONTENT: The moisture content of selected soil samples was determined in general accordance with ASTM D 2216. The results are summarized on the attached Summary of Material Properties, [Figure B-1](#), which also provides information regarding the classification of the sample, as determined using ASTM D 2487, and are shown at the sampled intervals on the appropriate summary logs in [Appendix A](#).

PARTICLE SIZE ANALYSIS OF SOILS: Selected samples were tested to determine the particle (grain) size distribution of material in general accordance with ASTM D6913 and D7928. The results are presented on the Summary of Material Properties, [Figure B-1](#), and on the Particle-Size Analysis of Soils reports, [Figures B-2 and B-3](#), which also provide information regarding the classification of the sample.

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT(%) (440° C)	ORGANIC CONTENT (%) (750° C)	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% SILT	% CLAY	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
Core-1	0.5	0.8	5.7			LL	PL	PI					GP	Olive-brown, poorly graded GRAVEL with sand
Core-1	1.7	1.9	5.0						48.6	36.2			GM	Olive-brown, silty GRAVEL with sand
Core-2	1.7	2.0	3.6						52.1	35.7	11.0	1.1	GM	Olive-brown, silty GRAVEL with sand
Core-3	0.8	1.1	5.2										SP-SM	Olive-brown, poorly graded SAND with silt and gravel
Core-4	0.3	0.5	4.0						60.9	32.5			GW-GM	Light olive-brown, well-graded GRAVEL with silt and sand
Core-4	6.3	6.5	13.8						36.0	36.9	26.3	0.9	SM	Dark olive-brown, silty SAND with gravel

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report text, other graphs and tables, and the exploration logs.
2. The classification of soils in this table is based on ASTM D2487 and D2488 as applicable.



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INDEX MATSUM 2024-094.GPJ 6/11/24

Everett Mall Bus Station Platform
Everett, Washington

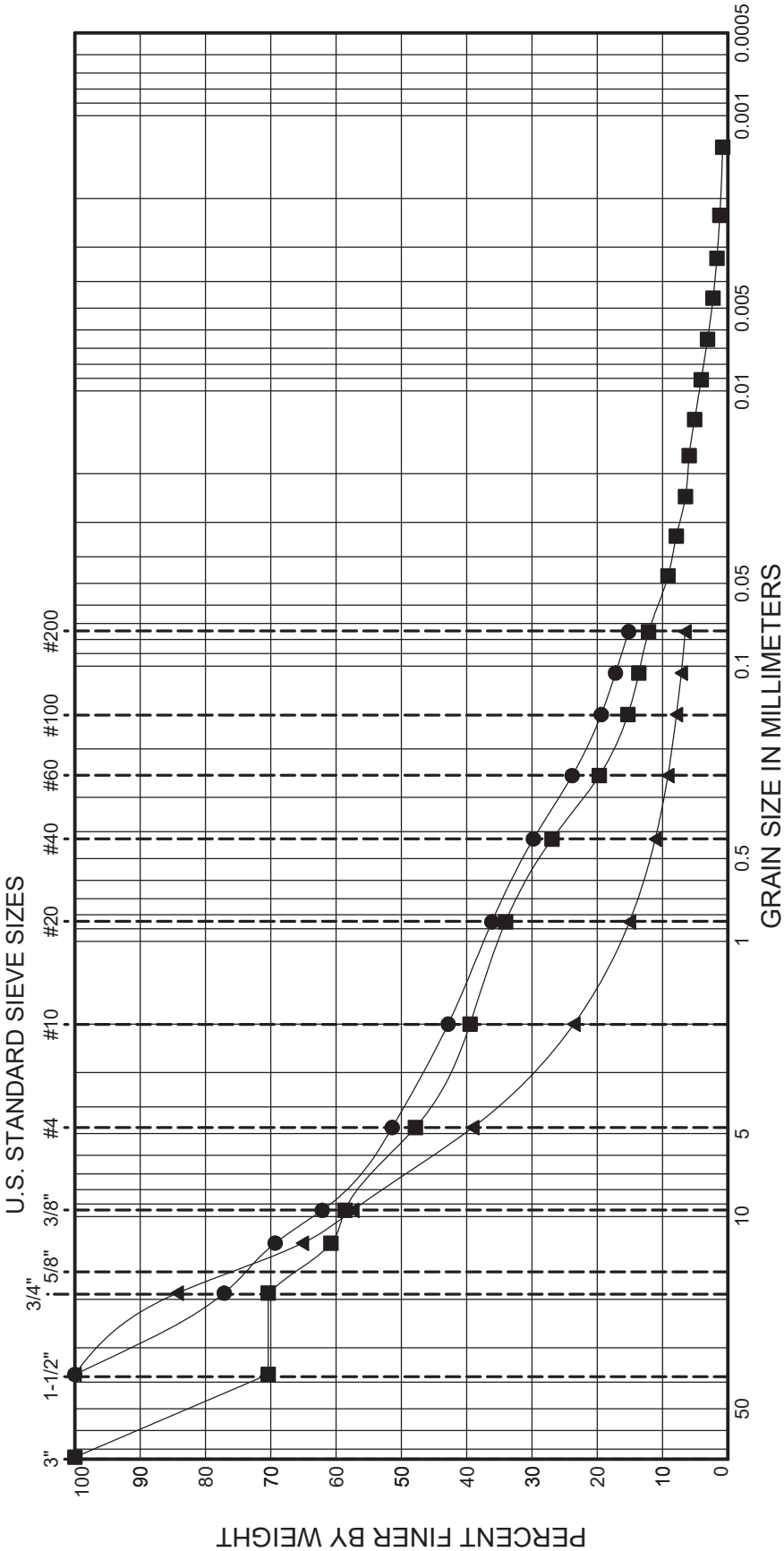
SUMMARY OF
MATERIAL PROPERTIES

PAGE: 1 of 1

PROJECT NO.: 2024-094

FIGURE: B-1

GRAVEL		SAND			SILT		CLAY	
Coarse	Fine	Coarse	Medium	Fine				



SYMBOL	SAMPLE	DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	Core-1	S-2	1.7 - 1.9 (GM) Olive-brown, silty GRAVEL with sand	5				48.6	36.2			15.2
■	Core-2	S-1	1.7 - 2.0 (GM) Olive-brown, silty GRAVEL with sand	4				52.1	35.7	11.0	1.1	
▲	Core-4	S-1	0.3 - 0.5 (GW-GM) Light olive-brown, well-graded GRAVEL with silt and sand	4				60.9	32.5			6.5



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HWAGRSZ SILT-CLAY PERCENTAGE WITH 7928 2024-094.GPJ 6/10/24

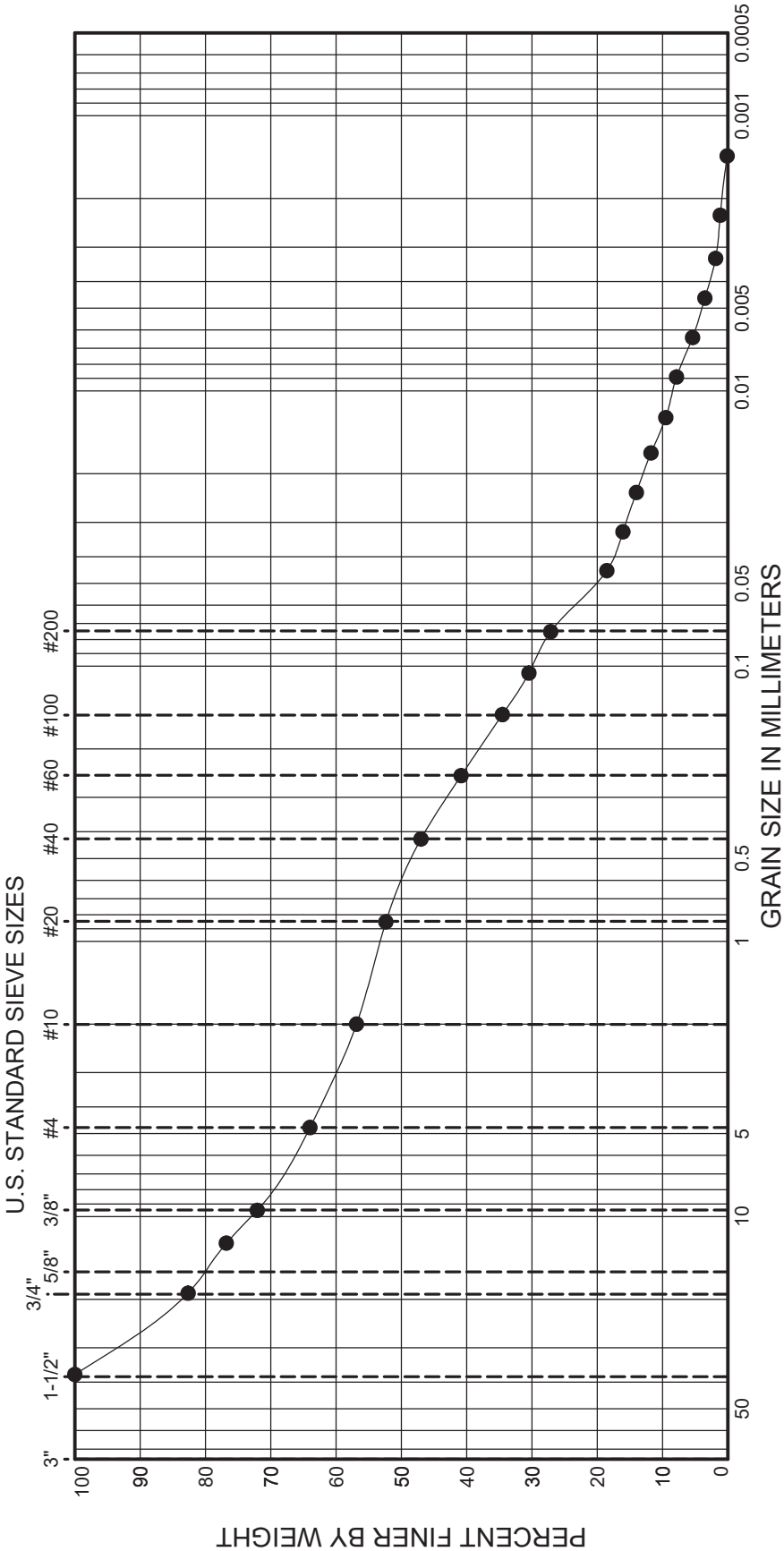
Everett Mall Bus Station Platform
Pavement Investigation
Everett, WA

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2024-094

FIGURE: B-2

GRAVEL		SAND			SILT		CLAY	
Coarse	Fine	Coarse	Medium	Fine				



SYMBOL	SAMPLE	DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	Core-4	6.3 - 6.5	(SM) Dark olive-brown, silty SAND with gravel	14				36.0	36.9	26.3	0.9	



GEOSCIENCES INC.

HWAGRSZ SILT-CLAY PERCENTAGE WITH 7928 2024-094.GPJ 6/10/24

Everett Mall Bus Station Platform
Pavement Investigation
Everett, WA

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2024-094

FIGURE: B-3

City of Everett
Everett Mall Bus Platform
WO NO. MALLSTN/24462

Appendix F
City of Everett Noise Ordinance

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Chapter 20.08

NOISE CONTROL

Sections:

20.08.005	Purpose—Liability.
20.08.010	Declaration of policy—Findings of special conditions.
20.08.020	Definitions.
20.08.030	Environmental sound—Unlawful sounds designated.
20.08.040	Environmental sound—Maximum permissible levels.
20.08.050	Environmental sound—Modifications to maximum permissible noise levels.
20.08.060	Motor vehicle noise—Maximum permissible levels.
20.08.070	Motor vehicle noise—Maximum levels for new vehicles.
20.08.080	Motor vehicle noise—Specific prohibitions.
20.08.090	Public nuisance and disturbance noises.
20.08.100	Noises exempt—At all times.
20.08.110	Noises exempt during daytime hours.
20.08.120	<i>Repealed.</i>
20.08.130	Administrator established—Qualifications, powers and duties.
20.08.140	Measurement of sound.
20.08.150	Variances.
20.08.160	<i>Repealed.</i>
20.08.170	<i>Repealed.</i>
20.08.180	<i>Repealed.</i>
20.08.190	<i>Repealed.</i>
20.08.200	<i>Repealed.</i>
20.08.210	Provisions not exclusive.
20.08.220	Enforcement—Violation—Penalty.

20.08.005 Purpose—Liability.

A. It is expressly the purpose of this chapter to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any

particular class or group of persons who will or should be especially protected or benefited by the terms of this chapter.

B. Nothing contained in this chapter is intended to be nor shall be construed to create or form the basis for any liability on the part of the city, its officers, employees or agents, for any injury or damage resulting from the failure of anyone to comply with the provisions of this chapter, or by reason or in consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement pursuant to this chapter, or by reason of any action or inaction on the part of the city related in any manner to the enforcement of this chapter by its officers, employees or agents. (Ord. 1556-89 § 3, 1989.)

20.08.010 Declaration of policy—Findings of special conditions.

A. *Declaration of Policy.* It is hereby declared to be the policy of the city to minimize the exposure of citizens to the harmful physiological and psychological effects of excessive noise. It is the express intent of the city council to control the level of noise and to promote and preserve the public health, safety, and welfare while affording protection to free speech activity as required by applicable constitutional law. It is the express intent of the city council to control the level of noise in a manner which promotes commerce; the use, value, and enjoyment of property; sleep and repose; the quality of the environment; and which enables all residents of the city to peacefully coexist in a manner which is mutually respectful of the interests and rights of others.

B. *Findings of Special Conditions.* The problem of noise in the city has been studied since 1972 by the city. On the basis of this experience and knowledge of conditions within the city, the city council finds that special conditions exist within the city which makes necessary any and all differences between this chapter and the regulations adopted by the Department of Ecology. (Ord. 3509-16 § 1, 2016; Ord. 534-78 § 1, 1978.)

20.08.020 Definitions.

All technical terminology used in this chapter not defined herein shall be interpreted in conformance with American National Standards Institute Specifications Section 1.4-2014 as it currently exists or is later amended. For purposes of this chapter, the words and phrases used herein shall have the meaning indicated below:

- A. "Administrator" means the noise control administrator as established in Section [20.08.130](#), or designee.
- B. "dB(A)" means a sound level, measured in decibels, using the A frequency-weighting network of a sound level meter.
- C. "District" means the land use zones to which the provisions of this chapter are applied. For the purposes of this chapter the following noise control districts shall be established which include land use zones designated in the Everett zoning code as follows:

Noise Control District	Land Use Zones
1. District I	All residentially zoned districts including but not limited to R.S., R-1, R-1A, R-2, R-2A, R-3, R-3L, R-4, R-5, and UR.
2. District II	All business and commercially zoned districts including but not limited to B-1, B-2, UM, BMU, E1, E-1 MUO, C-1, C-1R, C-2 and ULI.
3. District III	All agricultural and manufacturing zoned districts including but not limited to A,

Noise Control District	Land Use Zones
------------------------------	----------------

	M-M, M-1, M-S, W-C and all other nonresidential, nonbusiness and noncommercially zoned districts.
--	---

For any land use zone not listed in this subsection C, the administrator may determine that the zone is substantially similar to a zone listed in this subsection C and may classify it similarly for purposes of this chapter.

D. "Emergency work" means work made necessary to restore property to a safe condition following a public calamity, work required to protect persons or property from imminent exposure to danger, or work by private or public utilities for providing or restoring immediately necessary utility service.

E. "Gross vehicle weight rating" means the value specified by the manufacturer as the recommended maximum loaded weight of a single vehicle.

F. "Motorcycle" means any motor vehicle having a saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, except farm tractors and such vehicles powered by engines of less than five horsepower.

G. "Motor vehicle" means any vehicle which is self-propelled, used primarily for transporting persons or property upon public highways, and required to be licensed under RCW [46.16A.030](#). (Aircraft, watercraft, and vehicles used on rails or tracks are not motor vehicles as that term is used herein.)

H. "New motor vehicle" means a motor vehicle manufactured after December 31, 1976, the equitable or legal title of which has never been transferred to a person who, in good faith, purchases the new motor vehicle for purposes other than resale.

I. "Noise" means the intensity, duration and character of sounds from any and all sources.

J. "Off-highway vehicle" means any self-propelled motor driven vehicle not used primarily for transporting persons or property upon public highways nor required to be licensed under RCW [46.16A.030](#).

K. "Person" means any individual, firm, association, partnership, corporation or any other entity, public or private.

L. "Property boundary" means the survey line at ground surface which separates the real property owned, rented or leased by one or more other persons and its vertical extension.

M. "Public highway" means the entire width between the boundary lines of every way publicly maintained by the department of highways or any county or city when any part thereof is generally open to the use of the public for purposes of vehicular travel as a matter of right.

N. "Public nuisance noise" means any sound which annoys, injures, interferes with or endangers the comfort, repose, health or safety of others and affects the rights of a community or neighborhood although the extent of the damage may be unequal.

O. "Receiving property" means real property within which sound originating from sources outside the property boundary is received.

P. "Sound level" means a weighted sound pressure level obtained by the use of a sound level meter and weighted as specified in American National Standards Institute Specifications, Section 1.4-2014.

Q. "Sound level measurement procedures" means standardized procedures for the measurement of sound levels of sources regulated by this chapter and performed in accordance with the Washington State Department of Ecology rules, Chapter [173-58](#) WAC.

R. "Sound level meter" means a sound level measuring device, either Type I or Type II, as defined by American National Standards Institute Specifications, Section 1.4-2014.

S. "Temporary construction site" means any location where site clearing, construction of plat improvements, or construction or remodeling of a structure, facility, improvement or other feature attached to the land occurs. This includes roadway, bikeway, trail, sidewalk or other similar construction, repair or improvement.

T. "WAC" means the Washington Administrative Code as currently enacted or hereafter amended.

U. "Watercraft" means any contrivance, excluding aircraft, used or capable of being used as a means of transportation or recreation on water.

V. "Weekend" means Saturday and Sunday or any legal holiday observed by the state of Washington. (Ord. 3617-18 § 73, 2018; Ord. 3509-16 § 2, 2016; Ord. 3440-15 § 3, 2015; Ord. 1556-89 § 1, 1989; Ord. 690-80 § 2, 1980; Ord. 534-78 § 2, 1978.)

20.08.030 Environmental sound—Unlawful sounds designated.

It is unlawful for any person to cause or permit noise to intrude into the real property of another person which noise exceeds the maximum permissible sound pressure levels set forth in this chapter. (Ord. 3509-16 § 3, 2016; Ord. 534-78 § 3(a), 1978.)

20.08.040 Environmental sound—Maximum permissible levels.

For sound sources located within the city of Everett, the maximum permissible noise levels are as follows:

District Sound Source	District of Receiving Property within the City of Everett		
	I	II	III
I	55 dB(A)	57 dB(A)	60 dB(A)
II	57 dB(A)	60 dB(A)	65 dB(A)
III	60 dB(A)	65 dB(A)	70 dB(A)

Where a receiving property lies within more than one district, the most restrictive maximum permissible noise level shall apply to the receiving property. (Ord. 3509-16 § 4, 2016; Ord. 534-78 § 3(b), 1978.)

20.08.050 Environmental sound—Modifications to maximum permissible noise levels.

The maximum permissible sound levels established by this chapter shall be modified, reduced or increased as follows:

A. Between the hours of ten p.m. and seven a.m. during weekdays, and between the hours of ten p.m. and nine a.m. on weekends, the levels established in Section [20.08.040](#) are reduced by ten dB(A) where the receiving property lies within District I of the city of Everett.

B. At any hour of the day or night, for any source of sound which is of short duration, the levels established by this chapter are increased by:

1. Five dB(A) for a total of fifteen minutes in any one-hour period; or
2. Ten dB(A) for a total of five minutes in any one-hour period; or
3. Fifteen dB(A) for a total of one and one-half minutes in any one-hour period. (Ord. 3509-16 § 5, 2016; Ord. 534-78 § 3(c), 1978.)

20.08.060 Motor vehicle noise—Maximum permissible levels.

It is unlawful for any person to operate any motor vehicle upon any public highway or any combination of such vehicles under any conditions of grade, load, acceleration, or deceleration in such a manner as to exceed the maximum permissible sound levels for the category of vehicle, as measured at a distance of fifty feet from the center of the lane of travel within the speed limits specified, under procedures set forth in Chapter [173-62](#) WAC, Motor Vehicle Noise Performance Standards, including:

Vehicle Category Type	45 MPH or Less	Over 45 MPH
Motor vehicles over 10,000 pounds GVWR	86 dB(A)	90 dB(A)

Vehicle Category Type	45 MPH or Less	Over 45 MPH
Motorcycles	78 dB(A)	82 dB(A)
All other motor vehicles	72 dB(A)	78 dB(A)

(Ord. 3509-16 § 6, 2016; Ord. 534-78 § 4(a), 1978.)

20.08.070 Motor vehicle noise—Maximum levels for new vehicles.

It is unlawful for any person to sell or offer for sale a new motor vehicle, except an off-highway vehicle, which produces a maximum noise exceeding the following noise levels at a distance of fifty feet under acceleration test procedures set forth in Chapter [173-62](#) WAC.

Vehicle Category	Date of Manufacture	Maximum Sound
Any motor vehicle over 10,000 pounds GVWR excluding buses	Before January 1, 1978	86 dBA
Any motor vehicle over 10,000 pounds GVWR excluding buses	After January 1, 1978	83 dBA
Any motor vehicle over 10,000 pounds GVWR excluding buses	After January 1, 1982	80 dBA
All buses over 10,000 pounds GVWR	After January 1, 1980	85 dBA
All buses over 10,000 pounds GVWR	After January 1, 1983	83 dBA

Vehicle Category	Date of Manufacture	Maximum Sound
All buses over 10,000 pounds GVWR	After January 1, 1986	80 dBA
Any motor vehicle 10,000 pounds GVWR or less	After January 1, 1976	80 dBA
Motorcycles	After January 1, 1976	83 dBA
Motorcycles	After January 1, 1986	80 dBA

(Ord. 3509-16 § 7, 2016; Ord. 534-78 § 4(b), 1978.)

20.08.080 Motor vehicle noise—Specific prohibitions.

A. *Mufflers and Exhaust Systems.* Every motor vehicle operated upon the public highways shall at all times be equipped with an exhaust system and a muffler in good working order and constant operation to prevent excessive or unusual noise.

B. *Tire Noise.* It is unlawful for any person to operate a motor vehicle in such a manner as to cause or allow to be emitted squealing, screeching or other such noise from the tires in contact with the ground because of rapid acceleration or excessive speed around corners or other such reason, except that noise resulting from emergency braking to avoid imminent danger shall be exempt from this section.

C. *Alteration of Motor Vehicles.* It is unlawful for any person to change or modify any part of a motor vehicle or install any device thereon in any manner that permits sound to be emitted by the motor vehicle in excess of the limits prescribed in Sections [20.08.060](#) and [20.08.070](#).

D. Violation of this section is a misdemeanor. (Ord. 3509-16 § 8, 2016; Ord. 534-78 § 4(c), 1978.)

20.08.090 Public nuisance and disturbance noises.

A. *Public Nuisance Noises.* The administrator may determine that a sound constitutes a public nuisance noise as defined herein. It is unlawful for any person to cause or allow to be emitted a noise which has been determined a public nuisance noise.

B. *Public Disturbance Noises Originating from Real or Personal Property.* Unless specifically exempted, public disturbance noises emanating from real or personal property possessed or controlled by the person causing or permitting the public disturbance noise are prohibited at all times. These include but are not limited to the following sounds if the sound is plainly audible across a real property line or fifty feet from the source, whichever is less.

1. The frequent, repetitive and/or continuous sounding of any horn, siren or alarm attached to a motor vehicle, except when used as a warning of danger or as specifically permitted or required by law.
2. The frequent, repetitive and/or continuous sounds in connection with the starting, operation, repair and/or testing of any motor vehicle, motorcycle, off-highway vehicle or internal combustion engine.
3. The creation of frequent, repetitive and/or continuous sounds which emanate from real property possessed or controlled by the person causing or permitting the sound, such as sounds from audio equipment, television, video equipment, musical instruments, band sessions and/or social gatherings.
4. Violation of this section is a misdemeanor.

C. *Public Disturbance Noises Originating from Public Property.* Unless specifically exempted, public disturbance noises originating from a person or personal property while on public property or a public right-of-way are prohibited at all times. In addition to public disturbance noises defined in subsection B of this section, the following are public disturbance noises:

1. A person or performer creating a sound, whether amplified or unamplified, between the hours of ten p.m. and seven a.m. so as to be plainly audible across a real property boundary which is not the source of sound;

2. A person or performer creating a sound, whether amplified or unamplified, between the hours of seven a.m. and ten p.m. so as to be plainly audible one hundred feet or more from the source of the sound;
 3. The use of a sound amplifier or other device capable of producing or reproducing amplified sound upon public streets for the purpose of commercial advertising or sales or for attracting the attention of the public to any vehicle, structure or property or the contents therein, except that vendors whose sole method of selling is from a moving vehicle shall be exempt from this subsection;
 4. Sound from the frequent, repetitive and/or continuous operating or playing of motor vehicle audio equipment, whether portable or stationary or mounted on or within a motor vehicle.
 5. Violation of this section is a misdemeanor.
- D. It is unlawful to intentionally fail to cease a public disturbance noise when directed to do so by a law enforcement officer. The content of the sound will not be considered in determining any violation of this section. Violation of this section is a misdemeanor. (Ord. 3509-16 § 9, 2016; Ord. 2394-99 § 11, 1999; Ord. 1971-93 § 1, 1993; Ord. 690-80 § 2, 1980; Ord. 534-78 § 5, 1978.)

20.08.100 Noises exempt—At all times.

- A. The following noises are exempt at all times from this chapter:
1. Noise originating from aircraft in flight, and sounds which originate at airports and are directly related to flight operations;
 2. Noise created by the operation of equipment or facilities of surface carriers engaged in commerce by railroad;
 3. Noises created on property of federal military facilities;
 4. Noise created by watercraft and float planes in operation;
 5. Noise created by safety and protective devices, such as relief valves where noise suppression would defeat the safety release intent of the device;

6. Noise created by fire alarms being used for their intended purpose;
7. Noise created by emergency equipment, including, but not limited to, emergency standby or backup equipment, and emergency work necessary in the interests of law enforcement or of the health, safety or welfare of the community; and including, but not limited to, any emergency work necessary to replace or repair essential utility services;
8. Noise created by auxiliary equipment on motor vehicles used for highway maintenance;
9. Noise originating from officially sanctioned parades, sporting events and other public events;
10. Noise created by motor vehicles when regulated by Sections [20.08.060](#) through [20.08.080](#);
11. Noise caused by natural phenomena;
12. Noise originating from motor vehicle racing events at existing authorized facilities;
13. Noise created by existing stationary equipment used in the conveyance of water by a utility and noise created by existing electrical substations;
14. Noises in compliance with a lawfully issued conditional use permit or SEPA determination. (Ord. 3509-16 § 10, 2016; Ord. 1971-93 § 2, 1993; Ord. 1556-89 § 2, 1989; Ord. 564-78 §§ 1—3, 1978; Ord. 534-78 § 6(a), (b), 1978.)

20.08.110 Noises exempt during daytime hours.

The following noises shall be exempt from the provisions of this chapter between the hours of seven a.m. and ten p.m. on weekdays and nine a.m. and ten p.m. on weekends and holidays:

- A. Noise created by powered equipment used in temporary or periodic maintenance or repair of residential property.
- B. Noise created by aircraft engine testing and maintenance not related to flight operations.
- C. Noise created by the discharge of firearms on authorized shooting ranges.
- D. Noise created by the installation or repair of essential utility services.

- E. Noise created by blasting.
- F. Noise created by bells, chimes or carillons not operating for more than five minutes in any one hour.
- G. Noise originating from forest harvesting and silvicultural activity.
- H. Noise originating from temporary construction sites, excepting that noise from a temporary construction site that is received in a District I property is exempt between seven a.m. and ten p.m. on weekdays and between eight a.m. and six p.m. on weekends and holidays.
- I. Noise emanating from marine-oriented construction sites except between the hours of ten p.m. and seven a.m. on weekdays and weekends if the receiving property is located in District I of the city. (Ord. 3509-16 § 11, 2016; Ord. 534-78 § 6(c), 1978.)

20.08.120 Noises exempt from nighttime reduction.

Repealed by [Ord. 3509-16](#). **20.08.130 Administrator
established—Qualifications, powers and duties.**

- A. *Establishment.* The position of administrator is hereby established. The administrator or administrator's designee is authorized to administer and enforce the provisions of this chapter.
- B. *Qualifications of Administrator.* The administrator shall be qualified to perform and interpret sound level measurements consistent with guidance provided by the State Department of Ecology or other recognized institution to operate Type I and Type II sound level meters, and make all computations and calculations necessary to enforce this chapter.
- C. *Authority of Administrator.* The authority of the administrator shall include but is not limited to:
 - 1. Promulgate rules and regulations consistent with the terms of this chapter and reasonably necessary to implement the provisions of this chapter;
 - 2. Obtaining assistance from other appropriate city departments and officials to effectively administer this noise chapter;

3. Training police officers and staff in noise ordinance enforcement;
4. Purchasing and maintaining sound measuring equipment and training city staff in their calibration and use;
5. Investigating citizens' noise complaints;
6. Granting or denying variances according to procedures set forth in this chapter;
7. Assisting city departments in evaluating and reducing the noise impact of their activities;
8. Providing public education and information regarding noise, this noise chapter and city of Everett noise control districts. (Ord. 3509-16 § 12, 2016; Ord. 534-78 § 7, 1978.)

20.08.140 Measurement of sound.

- A. If the measurements of sound are made with a sound level meter, it shall be an instrument in good operating condition meeting the requirements for a Type I or Type II instrument, as delineated in American National Standards Institute Specifications (ANSI) Section 1.4-2014.
- B. Sound measurements shall be taken using the guidance of Chapter [173-58](#) WAC, Sound Level Measurement Procedures, and using any additional methods recognized as best practice by the noise industry.
- C. Any sound measurements performed by a third party may be considered by the noise administrator, provided they are in accordance with this section and performed by an individual trained to operate Type I and Type II sound level meters. (Ord. 3509-16 § 13, 2016; Ord. 534-78 § 8, 1978.)

20.08.150 Variances.

- A. A person may request a variance from compliance with this chapter by making an application with the administrator at least thirty days before the time period for the variance is to take effect. The application shall be in writing and shall be accompanied by a fee in the

amount of one hundred dollars. The variance may not be used for private activities (weddings, parties, etc.). The applicant shall explain the:

1. Nature of the noise.
2. Source of the noise.
3. Duration for which the noise will be created.
4. Time period for which the variance will be necessary.
5. Reason why the noise violation cannot be avoided, and
6. Mitigating conditions the applicant will implement to minimize the noise level violations.
7. The applicant shall list all property owners who adjoin the subject property per county assessor records, except that (a) the administrator may waive this property owner list requirement if the administrator determines that the granting of the variance would have no significant effect on adjoining property owners, and (b) the administrator may increase the required property owner list to include all property owners within five hundred feet of the subject property per county assessor records if the administrator determines that the granting of the variance would have a significant impact on such property owners.

B. The administrator, after informing the affected city departments, and after considering the relative interests of the applicant, of the other owners or possessors of property likely to be affected by the noise, and of the general public, may grant a variance if the administrator determines that the noise level violations:

1. Cannot be avoided,
2. Will exist for a specific period of time,
3. Will not endanger public health, safety or welfare, and
4. Have been mitigated to the greatest extent reasonably possible.

C. Variances granted pursuant to this chapter shall be in writing and must include the time period the variance will be in effect and the location of the variance.

D. The administrator may deny a variance application if:

1. The administrator determines that the applicant does not meet the criteria listed in subsection B of this section; or
2. The variance was obtained with false or misleading information.

E. The administrator may revoke a variance if:

1. At any time during the variance the administrator determines that the variance holder no longer meets the criteria listed in subsection B of this section;
2. The variance holder causes or permits noise that fails to comply with the variance or other provisions of this chapter not affected by the variance and the issuance of a violation citation or stop work order has been or would be ineffective to secure compliance; or
3. The variance was obtained with false or misleading information.

F. The variance holder must post the variance in a viewable area at the location of the variance or keep it on their person during the effective period of the variance.

G. If the administrator grants a variance, notice shall be mailed by first class mail to those property owners appearing on the list provided by the applicant per the application requirement herein. The applicant shall be responsible for paying all mailing costs, which shall be in addition to the variance application fee.

H. Any variance granted by the administrator shall be restricted in duration and an implementation schedule for achieving compliance with this chapter shall be incorporated therein. No variance shall exceed thirty days. Variances may be renewed, but no renewal shall be granted unless application is made at least sixty days prior to expiration of the issued variance and the applicant complies with all other requirements of this section.

I. Any person aggrieved by a variance decision may file an appeal in writing with the land use hearing examiner within ten days of issuance of the administrator's decision. The appeal shall be a proceeding pursuant to Title [15](#), Review Process IIIA. The appellant must prove by clear and convincing evidence that the administrator abused his or her discretion in a decision made pursuant to this section. Any appeal of a variance decision by the administrator may be affirmed, reversed, or modified by the hearing examiner. The decision of the hearing examiner shall be final. The applicable provisions of Title [15](#) shall govern procedure and process of any appeal of an administrator's decision, except that public notice requirements established in

Section [15.24.110](#) do not apply to this appeal process. Further, where a provision of Title [15](#) conflicts with a provision of this section, this section controls. (Ord. 3509-16 § 14, 2016; Ord. 534-78 § 9, 1978.)

20.08.160 Right to appeal.

Repealed by [Ord. 3509-16](#). **20.08.170 Appeal procedure.**

Repealed by [Ord. 3509-16](#). **20.08.180 Variance procedure.**

Repealed by [Ord. 3509-16](#). **20.08.190 Hearing officer.**

Repealed by [Ord. 3509-16](#). **20.08.200 Enforcement—Complaints.**

Repealed by [Ord. 3509-16](#). **20.08.210 Provisions not exclusive.**

The provisions of this chapter shall be cumulative and nonexclusive, and shall not affect any other claim, cause of action or remedy; nor, unless specifically provided, shall this chapter be deemed to repeal, amend or modify any law, ordinance or regulation relating to noise, but shall be deemed additional to existing legislation and common law on noise. (Ord. 534-78 § 13(a), 1978.)

20.08.220 Enforcement—Violation—Penalty.

A. It shall be unlawful to violate or be in conflict with this chapter. Each day, defined as the twenty-four-hour period beginning at 12:01 a.m., in which violation of this chapter occurs, shall constitute a separate violation.

B. Any person, firm, corporation, or association or any agent thereof who violates any of the provisions of this chapter shall be subject to the provisions of Chapter [1.20](#). In the event an appeal of an order issued pursuant to Chapter [1.20](#) is not subject to Chapter [36.70C](#) RCW (the Land Use Petition Act), appeal shall be by writ of certiorari.

C. A violation of Section [20.08.080](#) or of Section [20.08.090\(B\)](#), [\(C\)](#), or [\(D\)](#) is a criminal misdemeanor punishable in accordance with Section [10.04.080](#).

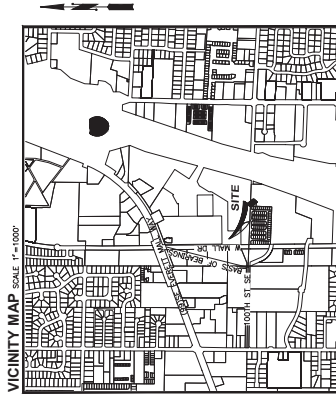
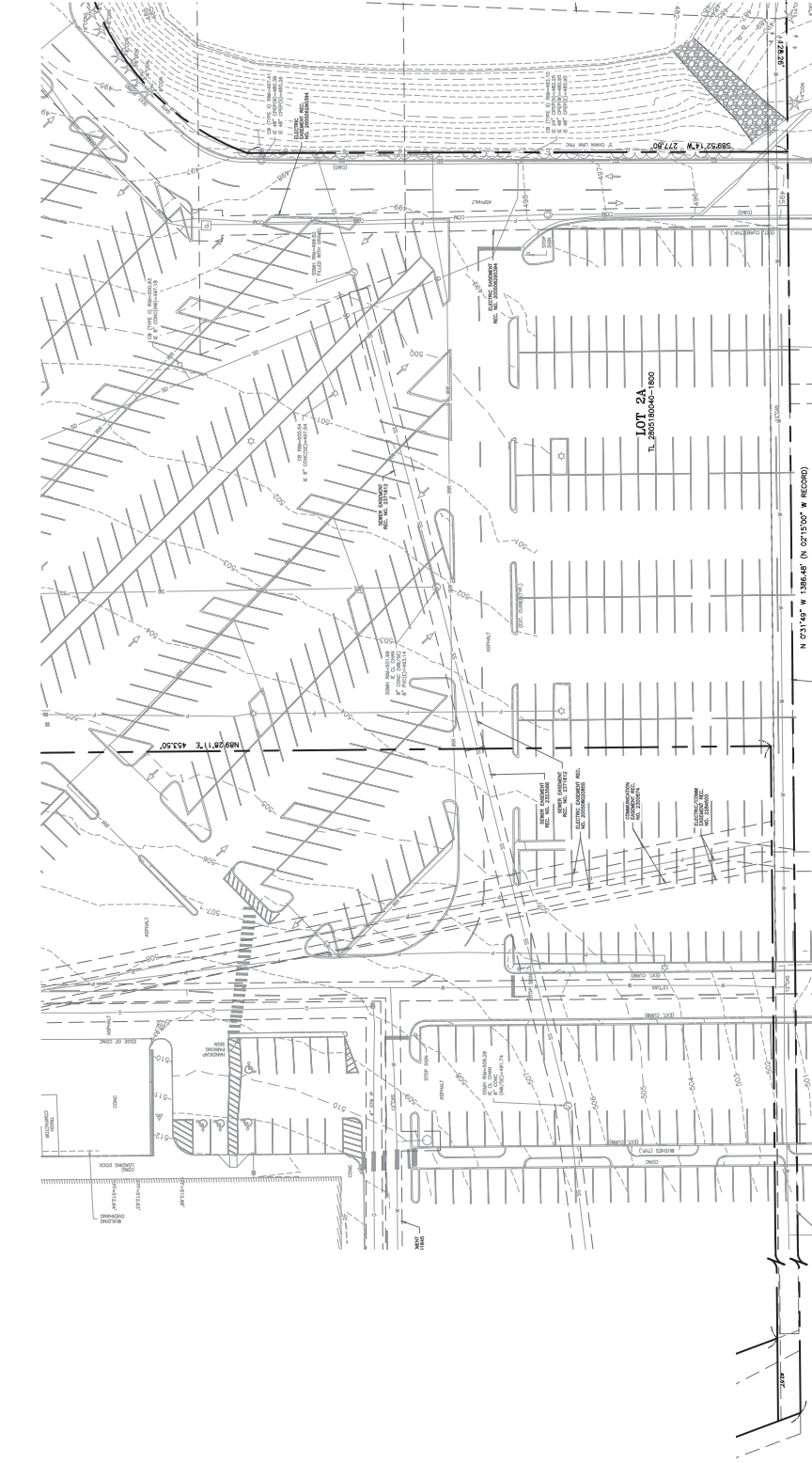
D. *Evidence in Criminal Proceedings.* In any criminal prosecution under Section [20.08.080](#) or of Section [20.08.090\(B\)](#), [\(C\)](#), or [\(D\)](#), evidence of sound level through the use of a sound level meter reading shall not be necessary to establish the commission of the offense. (Ord. 3509-16 § 15, 2016; Ord. 690-80 § 3, 1980; Ord. 534-78 § 12, 1978.)

The Everett Municipal Code is current through Ordinance 4052-24, passed November 6, 2024.

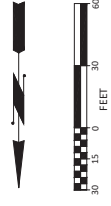
Disclaimer: The City Clerk's Office has the official version of the Everett Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

[City Website: www.everettwa.gov](http://www.everettwa.gov)






[Hosted by General Code.](#)



SURVEY NOTES:

[illegible]

LEGEND:

- | | | | |
|---|------------------------------------|-------|--------------------|
|  | CASED MONUMENT | _____ | CENTER LINES |
|  | SURFACE MONUMENT | _____ | PROPERTY LINES |
|  | TACK IN LEAD | _____ | RIGHT-OF-WAY LINES |
|  | MAGNETIC NAIL W/ WASHER | _____ | LOT LINES |
|  | REBAR AND CAP TO BE SET (LS 33130) | _____ | _____ |

FOUND SPINDLE IN CONCRETE
CENTERLINE 100TH PLACE SE,
WEST OF WEST MALL WAY.
ELEV. = 448.68'

[illegible]

EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

SURVEY & CONTROL

SURVEY CONTROL PLA

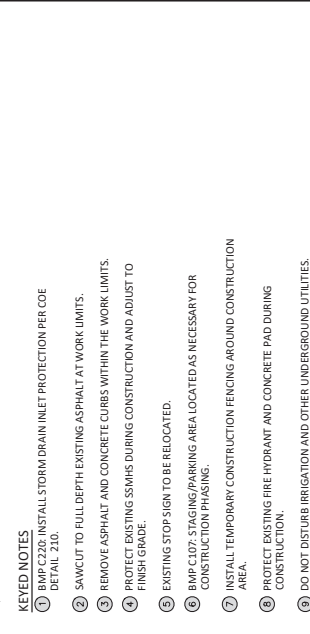
SE 1/4 SEC 18 T 28N R5E

SWPPP ELEMENT LIST

- 1 ELEMENT #1: MARK CLEARING LIMITS**
■ BMP C101: INSURE PRESENT URBAL VEGETATION
■ BMP C102: BUFFER ZONES
■ BMP C103: HIGH VISIBILITY PLASTIC OR METAL FENCE
- 2 ELEMENT #2: ESTABLISH CONSTRUCTION ACCESS**
■ BMP C105: STABILIZED CONSTRUCTION ENTRANCE
■ BMP C106: WHEEL WASH
■ BMP C107: CONSTRUCTION ROAD/PARKING AREA STABILIZATION
- 3 ELEMENT #3: CONTROL FLOW RATES**
■ BMP C203: WATER BARS
■ BMP C204: TEMPORARY SEDIMENT POND
■ NOT APPLICABLE TO MY PROJECT
- 4 ELEMENT #4: INSTALL SEDIMENT CONTROLS**
■ BMP C231: BRUSH BARRIER
■ BMP C232: GRAVEL FILTER BERM
■ BMP C233: VEGETATED STRIP
■ BMP C234: STRAW MATS
■ BMP C240: SEDIMENT TRAP
■ BMP C241: TEMPORARY SEDIMENT POND
- 5 ELEMENT #5: STABILIZE SOILS**
■ BMP C101: MULCHING
■ BMP C122: NETS AND BLANKETS
■ BMP C123: PLASTIC COVERING
■ BMP C126: TOPSOILING/COMPOSTING
■ BMP C128: POLYACRYLAMIDE FOR SOIL EROSION PROTECTION
■ BMP C129: SURFACE POLYMERIZATION
■ BMP C131: GRADIENT TERRACES
■ BMP C140: DUST CONTROL
- 6 ELEMENT #6: PROTECT SLOPES**
■ BMP C201: INTERCEPTOR DIKE AND SWALE
■ BMP C202: GRASS-LINED CHANNELS
■ BMP C203: WATER BARS
■ BMP C204: PIPE SLOPE DRAINS
■ BMP C205: SUBSIDENCE MONITORING
■ BMP C206: LIQUID SPREADER
■ BMP C207: CHECK DAMS
■ BMP C208: TRIANGULAR SILT DIKE (GEOTEXTILE-ENCLOSED)
■ CHECK DAM
■ NOT APPLICABLE TO MY PROJECT
- 7 ELEMENT #7: PROTECT DRAIN INLETS**
■ BMP C220: STORM DRAIN INLET PROTECTION
- 8 ELEMENT #8: STABILIZE CHANNELS AND OUTLETS**
■ BMP C202: CHANNEL LINING
■ BMP C203: CHANNEL ARMOURING
■ NOT APPLICABLE TO MY PROJECT

- 9 ELEMENT #9: CONTROL POLLUTANTS**
■ BMP C151: CONCRETE HANDLING PREVENTION
■ BMP C152: SAW-CUTTING AND SURFACING POLLUTION
■ BMP C153: MATERIAL DELIVERY, STORAGE AND CONTAINMENT
■ BMP C154: CONSTRUCTION STORMWATER CHEMICAL TREATMENT
■ BMP C155: CONSTRUCTION STORMWATER FILTRATION
■ BMP C252: HIGH PH NEUTRALIZATION USING CO₂
■ BMP C253: PH CONTROL FOR HIGH PH WATER
■ NOT APPLICABLE TO MY PROJECT
- 10 ELEMENT #10: CONTROL DETERIORATION**
■ BMP C236: VEGETATED FILTERING
■ NOT APPLICABLE TO MY PROJECT
- 11 ELEMENT #11: MAINTAIN BMPs**
■ BMP C150: MATERIALS ON HAND
■ LEAD C160: CERTIFIED EROSION AND SEDIMENT CONTROL
■ NOT APPLICABLE TO MY PROJECT
- 12 ELEMENT #12: MANAGE THE PROJECT**
■ BMP C150: MATERIALS ON HAND
■ BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL
■ LEAD C162: SCHEDULING
- 13 ELEMENT #13: PROTECT LOW IMPACT DEVELOPMENT**
■ BMP C102: BUFFER ZONES
■ BMP C200: INTERCEPTOR DIKE AND SWALE
■ BMP C207: CHECK DAMS
■ BMP C208: TRIANGULAR SILT DIKE (GEOTEXTILE-ENCLOSED)
■ BMP C231: BRUSH BARRIER
■ BMP C233: SILT FENCE
■ BMP C234: STRAW MATS
■ NOT APPLICABLE TO MY PROJECT

- KEYED NOTES**
1 BMP C220 INSTALL STORM DRAIN INLET PROTECTION PER CDE DETAIL 210.
2 SAWCUT TO FULL DEPTH EXISTING ASPHALT AT WORK LIMITS.
3 REMOVE ASPHALT AND CONCRETE CURBS WITHIN THE WORK LIMITS.
4 PROTECT EXISTING SMHS DURING CONSTRUCTION AND ADJUST TO FINISH GRADE.
5 EXISTING STOP SIGN TO BE RELOCATED.
6 BMP C107 STAGING/PARKING AREA LOCATED AS NECESSARY FOR CONSTRUCTION PHASING.
7 INSTALL TEMPORARY CONSTRUCTION FENCING AROUND CONSTRUCTION AREA.
8 PROTECT EXISTING FIRE HYDRANT AND CONCRETE PAD DURING CONSTRUCTION.
9 DO NOT DISTURB IRRIGATION AND OTHER UNDERGROUND UTILITIES.



Drawing		Sheet No.	84	of Total
CX1		4		

DEMOLITION & SITE PREP
SITE PREPARATION AND EROSION CONTROL

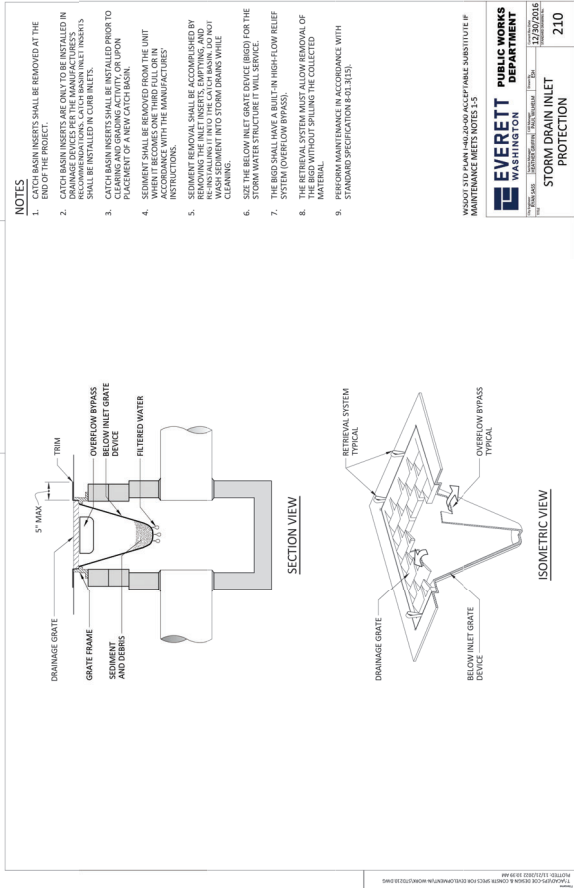


WORK ORDER MALLSTN/24462

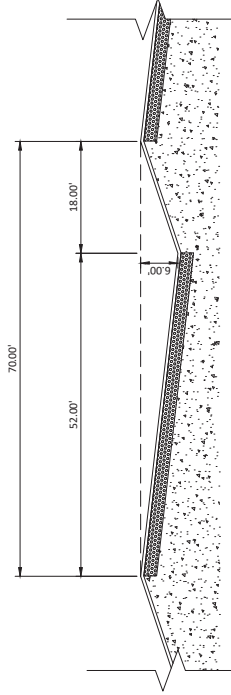
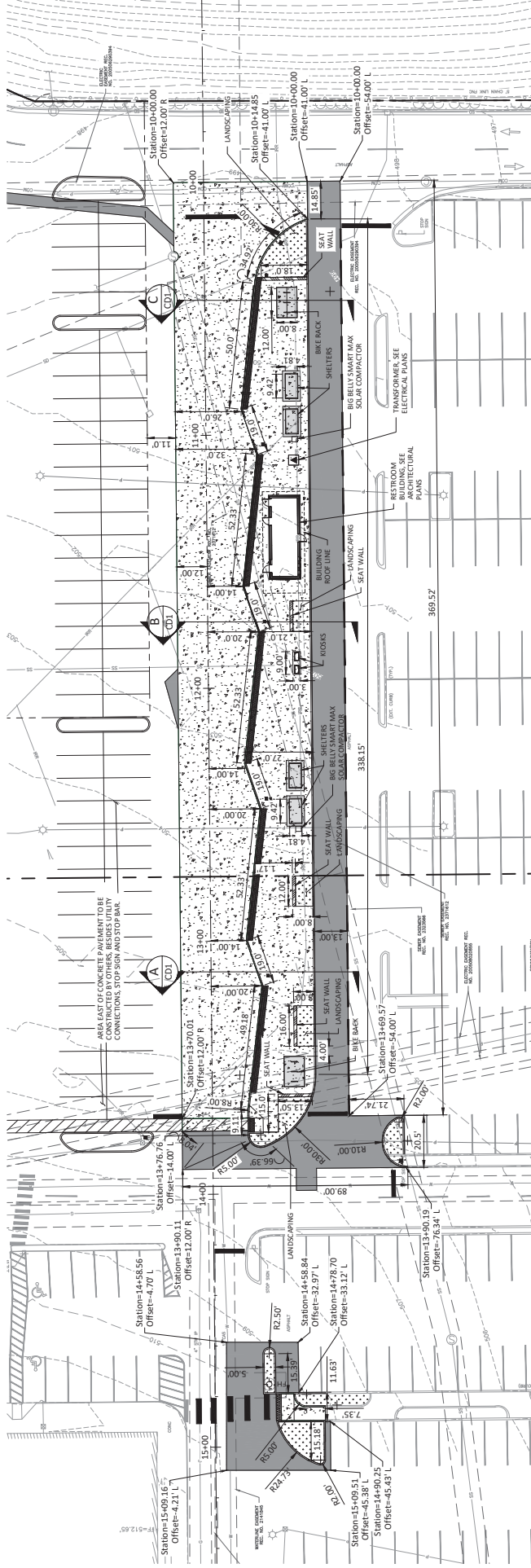


Pace Engineers		12/22/2023	
Kirkland, WA 98033		12/22/2023	
www.paceeng.com			
DESIGNED BY		CHECKED BY	
DATE		DATE	
APPROVED BY		APPROVED BY	
REVISION		REVISION	
DATE		DATE	
ACTION		ACTION	
BID		BID	
10/02/2023		10/02/2023	
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RECORD		RECORD	
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SE 1/4 SEC 18 T 28N R5E



SE 1/4 SEC 18 T 28N R5E



SAWTOOTH BUS BAY TYPICAL LAYOUT DETAIL
NTS

Drawing		C1		CIVIL		EVERETT MALL BUS PLATFORM		EVERETT TRANSIT		PACE Engineers		City of Everett	
Sheet No.		6		SITE PLAN		WORK ORDER MALLSTN/24462		EVERETT TRANSIT		PACE Engineers		City of Everett	
Scale		1" = 40'											
Revision													
NO.		DATE		APPROVED		REVISION		PLANS ISSUED FOR		DESIGN REVIEW		DESIGN REVIEW	
BID		10/20/2024		DS		CONST		RECORD		ACTION		ACTION	
ACTION		DATE		APPROVED		DATE		APPROVED		DATE		APPROVED	

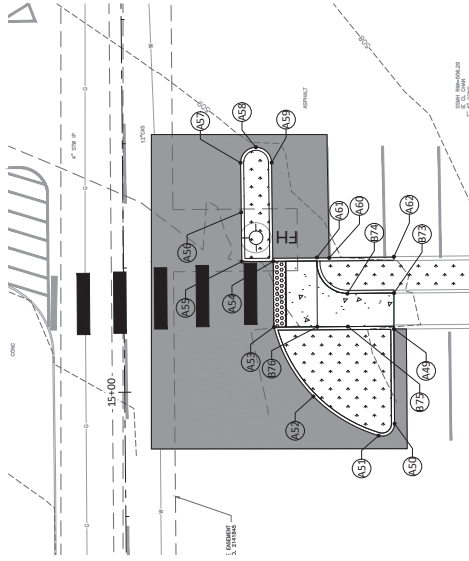
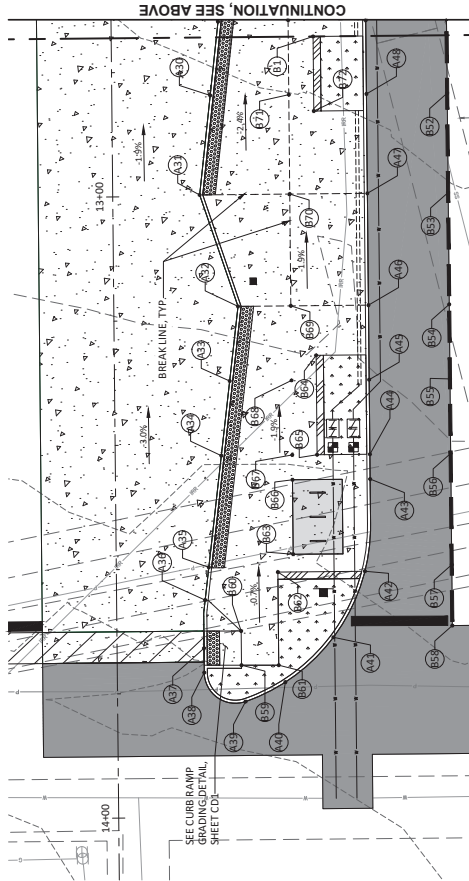
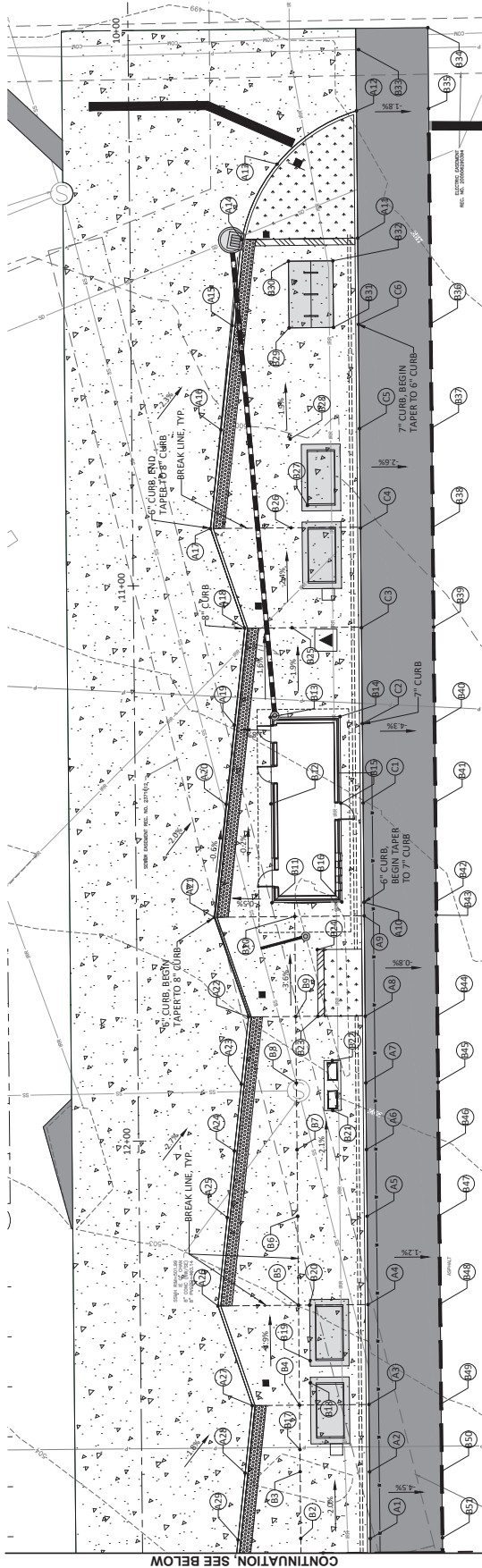
1. INSTALL TESC FEATURES.

1. INSTALL TSG FEATURES.
2. PERFORM UTILITY LOCATES.
3. VERIFY UTILITY CONNECTIONS WITH UTILITY PROVIDER AND PERFORM SUPPLEMENTARY POT-HOLING.
4. CONSTRUCT PHASE 1 IMPROVEMENTS (CEMENT CONCRETE DRIVE, CONCRETE TRANSIT PLATFORM, CURBING, HMA PAVEMENT SURFACE UTILITIES TO 6" OF RESTROOM BUILDING, PARKING LOT MODIFICATION, STRIPING, TRANSIT SHELTERS, BIKE RACKS, KIOSKS, SIGNAGE, LANDSCAPING & IRRIGATION, AND GRAVEL CONCRETION PAD FOR RESTROOM BUILDING).
5. CONSTRUCT PHASE 2 IMPROVEMENTS (CONSTRUCT RESTROOM BUILDING AND BRING BUILDING UTILITIES TO CONNECTION POINT 6 FROM EDGE OF BUILDING, UTILITY PURVEYOR OR CONTRACTOR WILL CONNECT UTILITIES AT EXTERIOR DESIGNATED CONNECTION POINT. CONSTRUCTION FOR CONNECTION TO THE BUILDING AND INSURE IT IS FULLY FUNCTIONAL AND COMPLETE). PHASE 2 CAN BE CONSTRUCTED CONCURRENTLY WITH PHASE 1.
6. CONSTRUCT PHASE 3 IMPROVEMENTS (CONSTRUCT REMAINING CEMENT TRANSIT PLATFORM, CURBING, HMA PAVEMENT SURFACE, CLEAN PROJECT SITE AND REMOVE EROSION CONTROL FEATURES).
7. ALL THREE PHASES SHALL BE FULLY CONSTRUCTED PRIOR TO CITY GRANTING SUBSTANTIAL PROJECT COMPLETION.



CIVIL

SE 1/4 SEC 18 T 28N R5E



NO.		DATE	APRVD	DS	CONST	RECORD	ACTION		DATE	APRVD	DATE	APRVD
BID		10/02/2024										
ACTION		DATE	APRVD	DATE	APRVD	DATE	ACTION		DATE	APRVD	DATE	APRVD



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PACE Engineers
Kirkland, WA 98033
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EVERETT TRANSIT

CIVIL
EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

SE 1/4 SEC 18 T 28N R5E

GRADING TABLE				
POINT #	FINISHED GRADE F/LTC	NORTHING	EASTING	
A1	504.08/504.58'	334477.02	1301404.56	
A2	503.85/504.35'	334465.02	1301404.68	
A3	503.62/504.12'	334453.02	1301404.79	
A4	502.82/503.32'	334434.88	1301404.97	
A5	502.50/503.00'	334418.97	1301405.12	
A6	502.26/502.76'	334406.97	1301405.24	
A7	502.02/502.52'	334394.97	1301405.35	
A8	501.78/502.28'	334382.97	1301405.47	
A9	501.50/501.60'	334364.88	1301405.64	
A10	501.09/501.59'	334362.43	1301405.67	
A11	499.29/499.79'	334242.83	1301406.82	
A12	498.96/499.46'	334219.93	1301407.04	
A13	499.24/499.74'	334229.52	1301421.34	
A14	499.49/499.99'	334243.12	1301427.71	
A15	499.79/500.29'	334258.60	1301429.41	
A16	500.17/500.67'	334277.38	1301431.42	
A17	500.32/500.82'	334295.15	1301433.32	
A18	500.76/501.26'	334313.10	1301427.16	
A19	500.88/501.38'	334330.53	1301429.01	
A20	500.97/501.47'	334344.81	1301430.50	
A21	501.10/501.60'	334365.14	1301432.66	
A22	502.01/502.51'	334383.08	1301436.47	
A23	502.00/502.50'	334395.19	1301427.76	
A24	502.28/502.78'	334407.20	1301429.02	
A25	502.52/503.02'	334419.21	1301430.28	
A26	502.83/503.33'	334435.14	1301431.97	
A27	503.81/504.31'	334453.08	1301425.79	
A28	503.84/504.34'	334465.24	1301427.08	
A29	504.08/504.58'	334477.25	1301428.35	
A30	504.32/504.82'	334489.12	1301429.60	
A31	504.64/505.14'	334505.14	1301431.29	
A32	505.59/506.09'	334523.08	1301425.12	
A33	505.61/506.11'	334535.09	1301426.46	
A34	505.84/506.34'	334547.11	1301427.81	
A35	506.19/506.69'	334565.08	1301429.82	
A36	506.29/506.79'	334570.36	1301430.43	
A37	506.38/506.88'	334578.10	1301430.59	
A38	506.42/506.92'	334582.03	1301430.55	
A39	506.41/506.91'	334586.70	1301423.90	
A40	506.32/506.82'	334583.57	1301417.49	


GRADING TABLE			
POINT #	FINISHED GRADE F/LTC	NORTHING	EASTING
A41	506.06/506.56'	334576.35	1301409.76
A42	505.81/506.31'	334565.72	1301404.69
A43	505.52/506.02'	334550.87	1301403.85
A44	505.44/505.94'	334546.88	1301403.89
A45	505.21/505.71'	334534.87	1301404.00
A46	504.98/505.48'	334522.88	1301404.12
A47	504.63/505.13'	334504.88	1301404.29
A48	504.31/504.81'	334488.88	1301404.45
A49	508.81/509.31'	334695.28	1301400.02
A50	509.10/509.60'	334710.52	1301399.92
A51	509.25/509.75'	334712.43	1301402.50
A52	509.72/510.22'	334706.13	1301412.98
A53	510.21/510.71'	334694.94	1301419.33
A54	510.05/510.55'	334684.37	1301419.44
A55	510.08/510.58'	334684.42	1301424.51
A56	509.68/510.18'	334676.48	1301424.61
A57	509.21/509.71'	334668.51	1301424.71
A58	509.05/509.55'	334666.01	1301422.24
A59	509.17/509.67'	334668.48	1301419.71
A60	509.11/509.61'	334683.79	1301410.45
A61	509.20/509.70'	334683.75	1301412.41
A62	508.66/509.16'	334683.62	1301400.02

GRADING TABLE			
POINT #	FINISHED GRADE	NORTHING	EASTING
B1	504.71'	334479.63	1301413.04
B2	504.69'	334477.02	1301417.06
B3	504.44'	334465.00	1301417.18
B4	504.19'	334453.00	1301417.29
B5	503.45'	334435.00	1301417.47
B6	503.13'	334419.00	1301417.62
B7	502.89'	334407.00	1301417.74
B8	502.64'	334395.00	1301417.85
B9	502.38'	334383.00	1301417.97
B10	501.74'	334365.00	1301418.14
B11	501.65'	334362.53	1301422.26
B12	501.65'	334344.73	1301422.43
B13	501.65'	334329.12	1301422.55
B14	501.65'	334329.00	1301409.99
B15	501.65'	334344.61	1301409.84
B16	501.65'	334362.38	1301409.67
B17	504.36'	334461.00	1301417.22
B18	504.00'	334448.98	1301415.33
B19	503.83'	334444.98	1301415.37
B20	503.43'	334434.98	1301415.47
B21	502.68'	334399.94	1301411.31
B22	502.50'	334390.94	1301411.39
B23	502.34'	334382.96	1301413.97
B24	501.90'	334370.96	1301414.09
B25	501.34'	334313.01	1301418.65
B26	500.92'	334295.01	1301418.82
B27	500.82'	334290.98	1301415.86
B28	500.61'	334279.01	1301418.97
B29	500.22'	334259.01	1301419.17
B30	499.99'	334247.00	1301419.28
B31	500.15'	334258.93	1301411.17
B32	499.91'	334246.93	1301411.28
B33	498.86'	334208.90	1301406.66
B34	498.58'	334204.95	1301394.19
B35	498.73'	334219.50	1301394.05
B36	499.11'	334258.25	1301393.67
B37	499.57'	334277.01	1301393.49
B38	499.89'	334294.92	1301393.32
B39	500.13'	334312.88	1301393.15
B40	500.45'	334330.13	1301392.98


GRADING TABLE			
POINT #	FINISHED GRADE F/LTC	NORTHING	EASTING
C1	501.05/501.59'	334344.57	1301405.84
C2	501.01/501.59'	334330.26	1301405.98
C3	500.62/501.20'	334313.00	1301406.14
C4	500.26/500.84'	334295.04	1301406.32
C5	499.90/500.48'	334277.14	1301406.49
C6	499.52/500.10'	334258.38	1301406.67

GRADING TABLE			
POINT #	FINISHED GRADE	NORTHING	EASTING
B41	500.76'	334344.44	1301392.84
B42	501.13'	334362.31	1301392.67
B43	501.18'	334364.76	1301392.64
B44	501.54'	334382.85	1301392.47
B45	501.80'	334398.86	1301392.35
B46	502.06'	334406.86	1301392.24
B47	502.32'	334418.85	1301392.12
B48	502.66'	334434.75	1301391.97
B49	503.03'	334452.75	1301391.79
B50	503.26'	334464.89	1301391.68
B51	503.49'	334476.89	1301391.56
B52	503.72'	334488.75	1301391.45
B53	504.04'	334504.75	1301391.29
B54	504.42'	334522.75	1301391.12
B55	504.73'	334534.75	1301391.00
B56	505.04'	334546.75	1301390.89
B57	505.55'	334564.66	1301390.71
B58	505.83'	334574.46	1301390.62
B59	506.68'	334580.84	1301424.56
B60	506.64'	334575.34	1301424.61
B61	506.75'	334580.84	1301418.56
B62	506.53'	334565.85	1301418.70
B63	506.46'	334562.98	1301416.24
B64	505.78'	334530.96	1301412.54
B65	506.08'	334546.96	1301412.39
B66	506.23'	334550.98	1301416.35
B67	506.15'	334546.99	1301416.39
B68	505.93'	334535.00	1301416.50
B69	505.70'	334523.00	1301416.62
B70	505.36'	334505.00	1301416.79
B71	504.94'	334488.00	1301416.95
B72	504.96'	334491.63	1301412.92
B73	509.13'	334689.49	1301400.02
B74	509.44'	334689.57	1301407.52
B75	509.82'	334694.87	1301407.49
B76	510.21'	334694.91	1301412.35

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STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
1000 4TH AVENUE, SUITE 300
SEATTLE, WA 98101
www.wa.gov

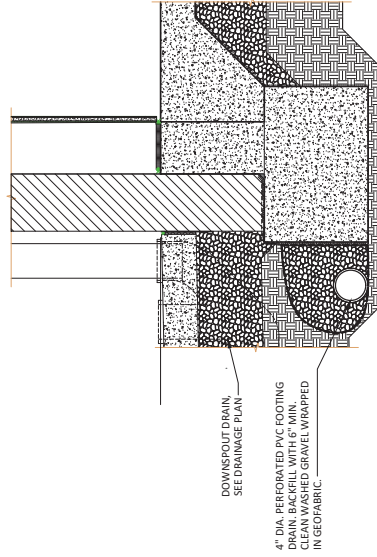


PACE Engineers
Kirkland, WA 98033
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EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

CIVIL
GRADING POINT TABLES



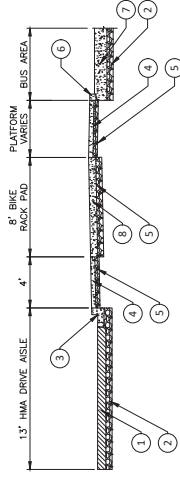
Drawing	C5
Sheet No.	10

KEYED NOTES

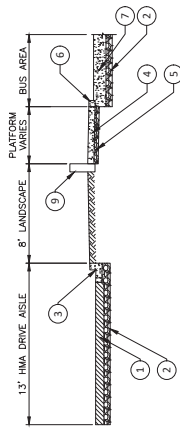
- 1 6" CL 1/2" HMA PG 58H-22
- 2 6" CRUSHED SURFACING BASE COURSE
- 3 TYPE A-1 CEMENT CONCRETE CURB AND GUTTER PER CODE DETAIL 307
- 4 4" CEMENT CONCRETE SIDEWALK PER CODE DETAIL 312. SEE SHEET D03 FOR JOINT DETAIL
- 5 4" CRUSHED SURFACING BASE COURSE
- 6 INTEGRAL CURB, SEE DETAIL, SHEET D03
- 7 12" CEMENT CONCRETE PAVEMENT
- 8 6" CEMENT CONCRETE SIDEWALK
- 9 SEAT WALL, SEE DETAIL, SHEET D04

NOTES:

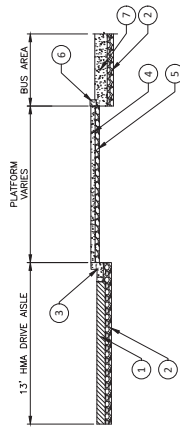
1. IMMEDIATELY FOLLOWING SPREADING AND FINAL SHAPING OF CSBC, CSTC AND GRAVEL BORROW, EACH LAYER OF SURFACING SHALL BE COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY AS DETERMINED BY SECTION 2-03.31(4) OF WSDOT SPECIFICATION BOOK.
2. CEMENT CONCRETE SIDEWALK TO BE 6" THICK AT BIKE RACK PAD AND BUS SHELTER LOCATIONS. EXPANSION JOINT WITH PREMOLDED JOINT FILLER WILL BE PLACED AROUND ALL 6" THICK CONCRETE STRUCTURES SUCH AS BIKE RACK PADS AND TRANSIT SHELTER PADS.



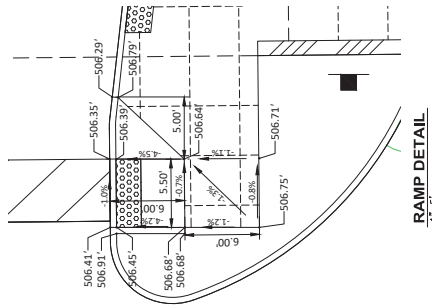
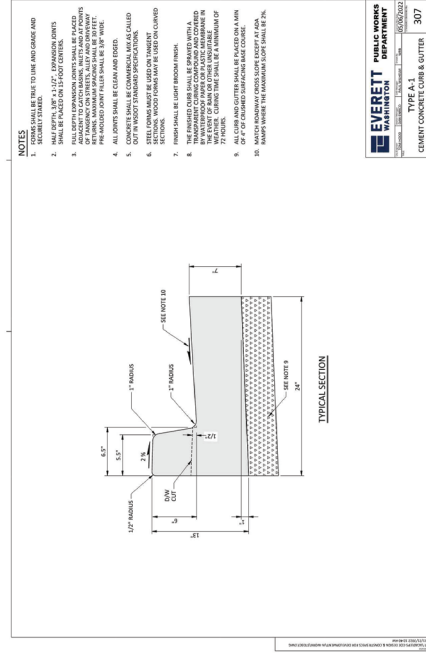
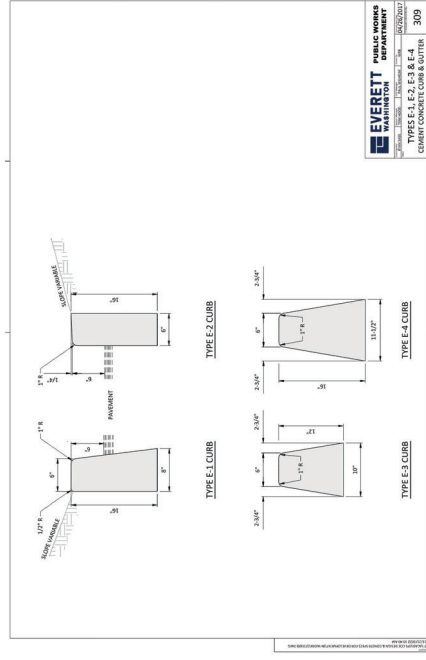
SECTION C-C



SECTION B-B



SECTION A-A
1"=5'



RAMP DETAIL
1"=5'

[illegible]

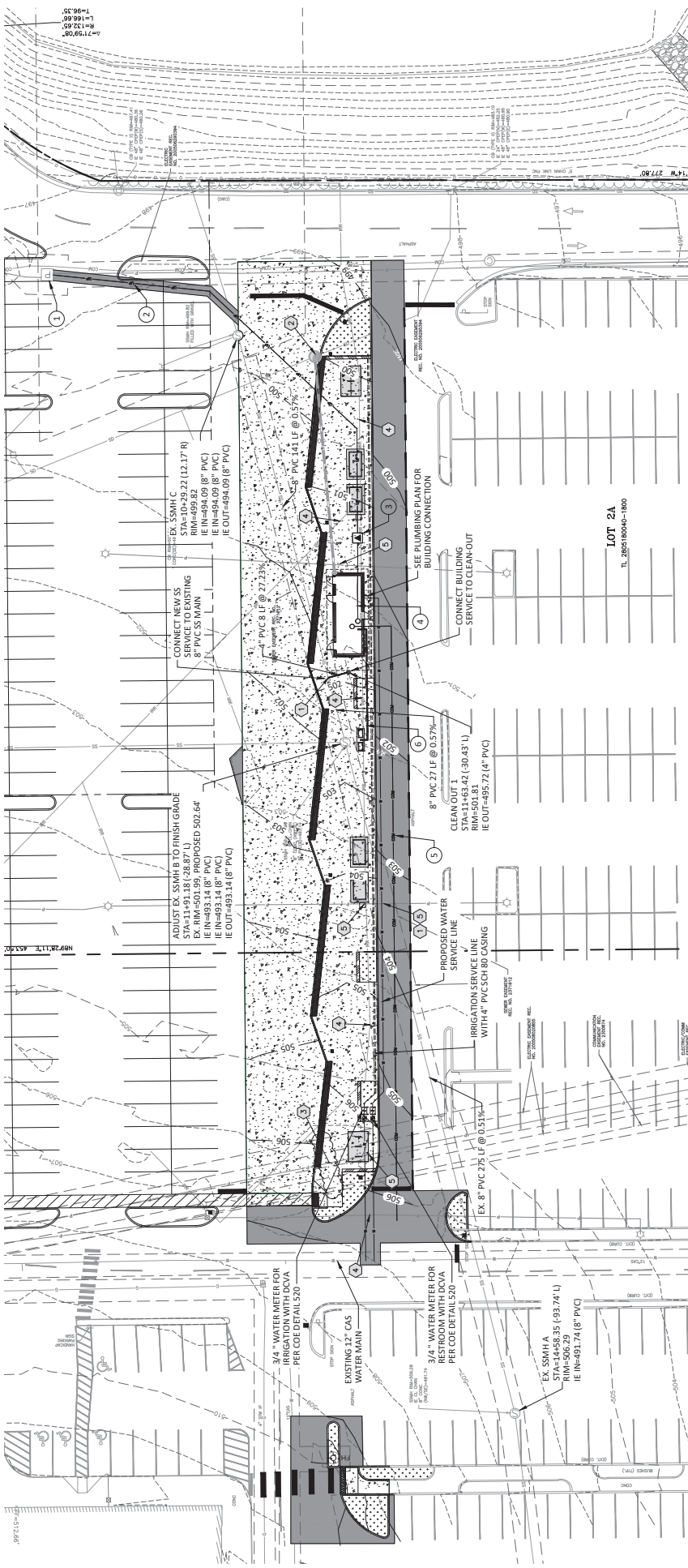
EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

CIVIL

GRADING DETAILS AND SECTIONS

Drawing	CD1
Sheet No.	11

SE 1/4 SEC 18 T 28N R5E



7 POTHOLING TABLE

SANITARY SEWER	
1	EXISTING SNOPOD VAULT RA-39346
2	PROVIDE 4" CONDUIT FOR PRIMARY SERVICE FEEDER PER SNOPOD REQUIREMENTS. COORDINATE EXACT ROUTING AND INSTALLATION REQUIREMENTS WITH SNOPOD ENGINEER.
3	PROPOSED SNOPOD PAD MOUNTED SERVICE TRANSFORMER.
4	BUILDING 208V/120V, 200A, 4-WIRE SERVICE FEEDER
5	(3) 2" FCB TELECOMMUNICATIONS SERVICE. SERVICE TIE IN POINT TO BE DETERMINED.
6	POWER AND TELECOMMUNICATION SERVICE FROM RESTROOM BUILDING TO KIOSK. CAP SERVICES AT KIOSK.

8 ELECTRICAL NOTES

- EXISTING SNOPOD VAULT RA-39346
- PROVIDE 4" CONDUIT FOR PRIMARY SERVICE FEEDER PER SNOPOD REQUIREMENTS. COORDINATE EXACT ROUTING AND INSTALLATION REQUIREMENTS WITH SNOPOD ENGINEER.
- PROPOSED SNOPOD PAD MOUNTED SERVICE TRANSFORMER.
- BUILDING 208V/120V, 200A, 4-WIRE SERVICE FEEDER
- (3) 2" FCB TELECOMMUNICATIONS SERVICE. SERVICE TIE IN POINT TO BE DETERMINED.
- POWER AND TELECOMMUNICATION SERVICE FROM RESTROOM BUILDING TO KIOSK. CAP SERVICES AT KIOSK.

REVISION	
NO.	DATE
1	10/20/2023
2	10/20/2023
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Kalamazoo, MI 49001
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EVERETT TRANSIT

EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

CIVIL
UTILITY PLAN

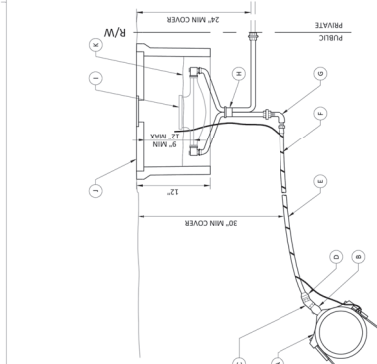
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EVERETT MALL BUS PLATFORM

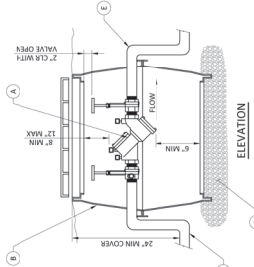
WORK ORDER MALLSTN/24462

CIVIL



3/4" OR 1" METERED WATER SERVICE

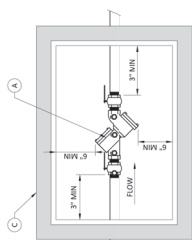
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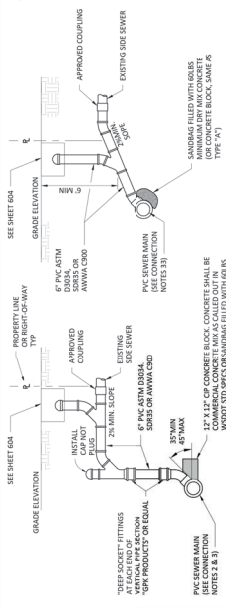
- | NOTES | |
|-------|------------------------|
| 1. | ALL TESTS |
| 2. | TEST COMPLETED EVER IS |
| 3. | PROVIDED IF VAULT |
-
- | PARTS | |
|-------|--|
| A. | WA STATE ASSEMBLY |
| B. | IN NON-PRECISE 233-LA BOX (1 EQUIVALENT) |
| C. | IN TRAFFIC LOCATED EVERYWHERE |
| D. | IF A DAY MUST BE GRAVEL |
| E. | ANGLES SUFFICIENT VALVE O |

- ## PARTS
- A. WASTE STATE APPROVED DOUBLE CHECK VALVE ASSEMBLY.
 - B. IN NON-TRAFFIC AREAS USE:
 - 1. UTILITY PLASTIC VALVE
 - 2. UTILITY PLASTIC VALVE
 - 3. 1/4" OR APPROVED EQUAL OR PLASTIC CO. UTILITY VALVE TO 1324-32, OR APPROVED
 - C. IN TRAFFIC AREAS:
 - 1. A TRAFFIC LOADED BOX MUST BE USED AND LOCATION APPROVED BY THE CITY OF MARIETTA FOR EACH LOCATION.
 - 2. IF A TRAFFIC LOADED BOX IS NOT PROVIDED THERE MUST BE A MINIMUM OF 18" OF GRANULAR GRAVEL AT THE BOTTOM OF BOX.
 - 3. ANGLES MAY BE IN OR OUT OF BOX SO LONG AS SUFFICIENT ROOM IS ALLOWED AT EACH END FOR VALVE OPERATOR AND DISCARD REPAIR OR

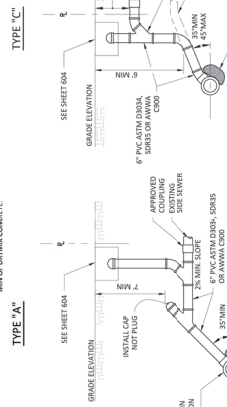


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|  EVERETT
WASHINGTON | PUBLIC WORKS | | 09/18/2017
<small>Printed: 09/18/2017 10:05 AM</small> |
| | DEPARTMENT | | |
| Project Name
Metered Water Services | Project No.
501 | Project Location
3/4" & 1" | Project Manager
[Blank] |

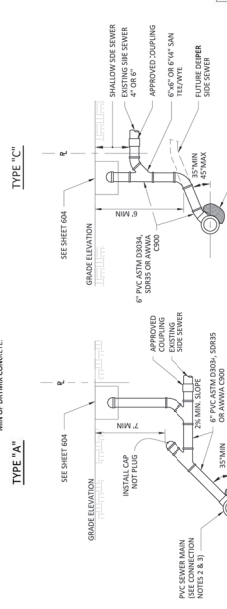
- ## NOTES
1. PVC SIDE SEWER CONNECTIONS TO PVC IN MAIN SHALL BE FACTORY TIES.
 2. TYPE A & B SHALL BE USED ONLY WHEN SEWER MAIN DEPTH EXCEEDS 15 FEET OR APPROVED BY THE ENGINEER. TYPE D SHALL BE USED FOR ALL OTHERS. ALL SHALL BE SHALLOW (LESS THAN 6' DEPTH AT PROPOSED LINE)
 3. CONNECTIONS TO EXISTING CONCRETE SEWER MAINS SHALL BE MADE PER STANDARD DRAWINGS 612 & 613 OR BY APPROVED MANUFACTURED CONCRETE CONNECTIONS.
 4. SEE STANDARD DRAWING 604, WHERE BIRCH AND COVER INSTALLATIONS ARE SHOWN FOR PAVED AND UNPAVED AREAS. FIELD CONDITIONS WILL DICTATE WHETHER INSTALLATION IS APPROPRIATE.
 5. CONNECTIONS TO EXISTING HOVE SEWER MAINS SHALL BE MADE PER STANDARD



TYPE "A"



45° MAX



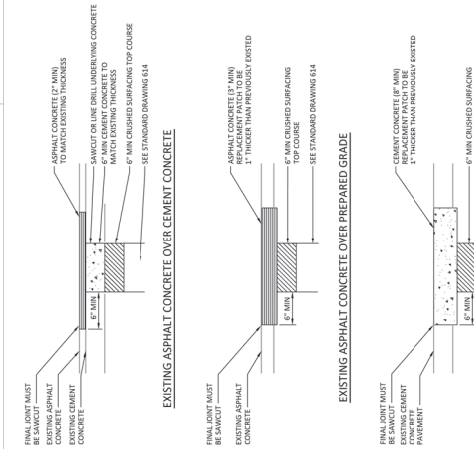
SANDERSON, J. M. 1990.

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|---|---|-------------------------|
|  EVERETT
WASHINGTON | PUBLIC WORKS
DEPARTMENT | |
| City of Everett
1000 1st Avenue
Everett, WA 98201
Phone: (425) 343-2200
Fax: (425) 343-2201
Website: www.everettwa.gov | Date: 12/30/2016
Time: 10:00 AM
Location: 602 | 602
TYPE A, B, C & D |

-

- [illegible]

- | | | | |
|--|---------------------------------|------------------------------------|--------------------|
|  EVERETT
WASHINGTON | | PUBLIC WORKS
DEPARTMENT | |
| PROJECT NO.
2015-001 | PROJECT NAME
SEWER CLEAN-OUT | DATE
03/30/2015 | DRAWING NO.
604 |
| TYPE
TYPE 1, 2, 3 & 12" CAST IRON
RING & COVER | | | |

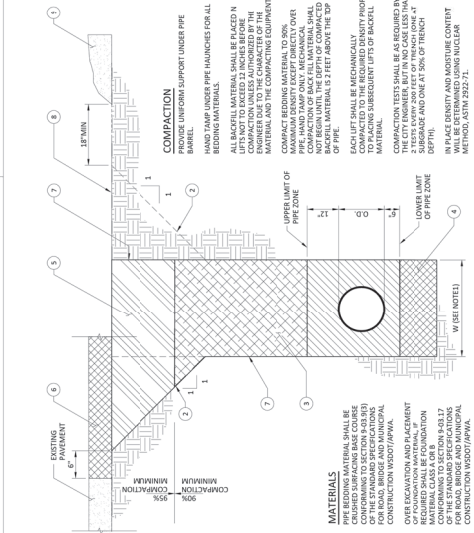


NOTES

1. ALL TRENCHES IN ROADWAY AREAS SHALL BE BACKFILLED AND PATCHED WITH TEMPORARY PATCHING MIXTURE. PERMANENT PATCHES SHALL BE GRANTED BY THE CITY ENGINEER.
2. PERMANENT PATCHES ON TRENCHES SHALL BE PERMANENTLY PATCHED WITHIN 7 DAYS OF COMPLETION OF WORK WITHIN ROADWAY AREA.
3. CEMENT CONCRETE FOR PATCHING SHALL BE PLACED IN PLACE AND FINISHED TO MEET STANDARD SPECIFICATIONS.



PAVEMENT PATCHING DETAILS 326



NOTES

1. MAXIMUM WIDTH OF TRENCH: FOR PIPES 15" OR LESS IN DIA. W=40" FOR PIPES 18" OR GREATER W=1.3 X (D+40) WHERE D IS THE DIAMETER OF THE PIPE.
2. ALL TRENCHES SHALL BE BACKFILLED TO ORIGINAL FINISH GRADE WITHIN 7 DAYS OF COMPLETION OF WORK WITHIN ROADWAY AREA.
3. CEMENT CONCRETE FOR PATCHING SHALL BE PLACED IN PLACE AND FINISHED TO MEET STANDARD SPECIFICATIONS.



TYPICAL TRENCH SECTION 614

NO.		DATE	APPROVED	REVISION	PLANS LISTED FOR		RECORD	ACTION		DATE	APPROVED
BID	1202024	DS	CONST								
ACTION	DATE	APPROVED									



EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

CIVIL
UTILITY DETAILS

Drawing
UD2
Sheet No.
15
84
OF 84



CONSTRUCTION NOTES

- 1 2" WIDE DETECTABLE/TRIANGULATED DOME WARNING STRIP YELLOW.
- 2 CONTRACTION JOINT TO BE 3/16" WIDE BY 1/2" DEEP FLOWELED JOINTS.
- 3 EXPANSION JOINT WITH PREMOLDED JOINT FILLER.
- 4 LONGITUDINAL CONTRACTION JOINT PER WSDOT STD PLAN A-40-10-04.
- 5 TRANSVERSE CONSTRUCTION JOINT PER WSDOT STD PLAN A-40-10-04.
- 6 SEAT WALL, SEE DETAIL SHEET D04
- 7 BIKE RACK, SEE DETAIL SHEET D05
- 8 SEE CEMENT CONC. CURB & GUTTER COE 307 DETAIL, SHEET CD1
- 9 SEE INTEGRAL CURB DETAIL E-1, COE 309 DETAIL, SHEET TD3
- 10 SEE BARRIER CURB TYPE E-1, COE 309 DETAIL, SHEET CD1

NOTE

- 11 CONSTRUCT TRANSIT PLATFORM PER COE SIDEWALK STD (4" CEMENT CONC. OVER 4" CSBC. SEE SHEET T03 FOR JOINT DETAILS.
- 12 KIOSK, TRANSITVUE AMDS-F5-55-01. SEE KIOSK FOUNDATION DETAIL. SHEET T05
- 13 INSTALL TRANSIT SHELTER, BRASCO INTERNATIONAL SMLINE - SLS150-C. METAL BUS BENCH TO BE INSTALLED UNDER EACH BUS SHELTER. SEE DETAIL SHEET T05

CHANNELIZATION NOTES

- 14 INSTALL BIG BELLY SMART MAX-SOLAR COMPACTOR
- 15 PERPENDICULAR CURB RAMP PER WSDOT STD PLAN F-40.15-04, SEE SHEET TD4.
- 16 SEE TRENCH SECTION DETAIL COE 6.14 AND PAVEMENT PATCH DETAIL COE 3.26, SHEET UD2.
- 17 PAVEMENT PATCH: 6" C1 ½" HMA PG 58H-22

CONSTRUCTION NOTES

-

PERMANENT SIGNING SCHEDULE		
SIGN NAME	SIZE	QUANTITY
R1-1 STOP SIGN	30" X 30"	4



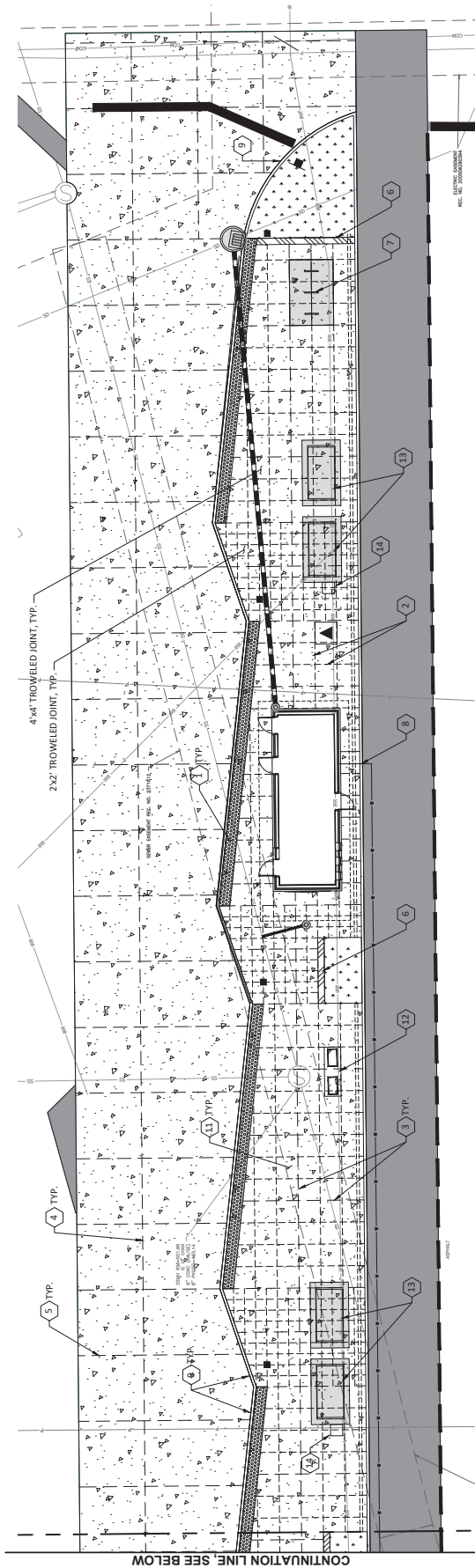
PACE Engineers
11255 Kirkland Way, Suite 300
Kirkland, WA 98033
p. 425.827.2014
www.paceengineers.com



EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

PAVING
GE AND C
PLAN

SE 1/4 SEC 18 T 28N R5E



GENERAL NOTES:

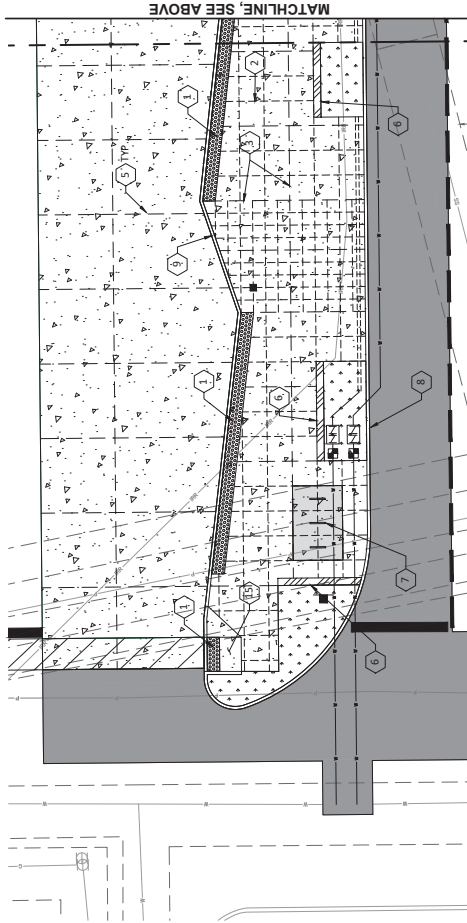
- TRANSIT PLATFORM AND SIDEWALKS CONCRETE SHALL BE STANDARD GREY COLOR WITH MEDIUM BROOM FINISH.
- TROWELED TOOL JOINT FINISH REQUIRED ALONG CURVE LINES. DETECTABLE TRUNCATED DOME WARNING STRIPS CONTRACTION JOINTS AND ALL SIDEWALK TRANSIT PLATFORM EXPANSION JOINTS.
- SEE SECTION DETAILS, SHEET CD1 FOR TRANSIT CENTER PLATFORM CONCRETE THICKNESS.
- SEE SECTION DETAILS, SHEET CD1 FOR PAVEMENT AND SIDEWALK THICKNESS.
- SEE GRADING PLAN SHEET C3 FOR SITE ELEVATION CONTROL.
- SEE DWG CD1 FOR CURB TYPE.

CONSTRUCTION NOTES

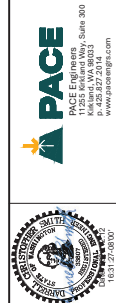
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- CONTRACTION JOINT TO BE 3/16\"/>
- EXPANSION JOINT WITH PREMOIDED JOINT FILLER.
- LONGITUDINAL CONTRACTION JOINT PER WSDOT STD PLAN A-40.10-04.
- TRANSVERSE CONTRACTION JOINT PER WSDOT STD PLAN A-40.10-04.
- SEAT WALL, SEE DETAIL, SHEET TD4
- INSTALL 3 BIKE RACKS, SEE DETAIL, SHEET TD5
- SEE CEMENT CONC. CURB & GUTTER CODE 307 DETAIL, SHEET CD1

LEGEND

- NEW HMA PAVEMENT
- NEW CONCRETE
- NEW CONCRETE, 6\"/>
- LANDSCAPING
- EXPANSION JOINTS
- CONTRACTION JOINTS
- NEW CONCRETE SEAT WALL



DESIGNED BY		CHECKED BY		APPROVED BY	
DESIGNED		CHECKED		APPROVED	
DATE		DATE		DATE	
ACTION		ACTION		ACTION	



EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

PAVING
BUS SHELTER PLATFORM PLAN

SE 1/4 SEC 18 T 28N R5E

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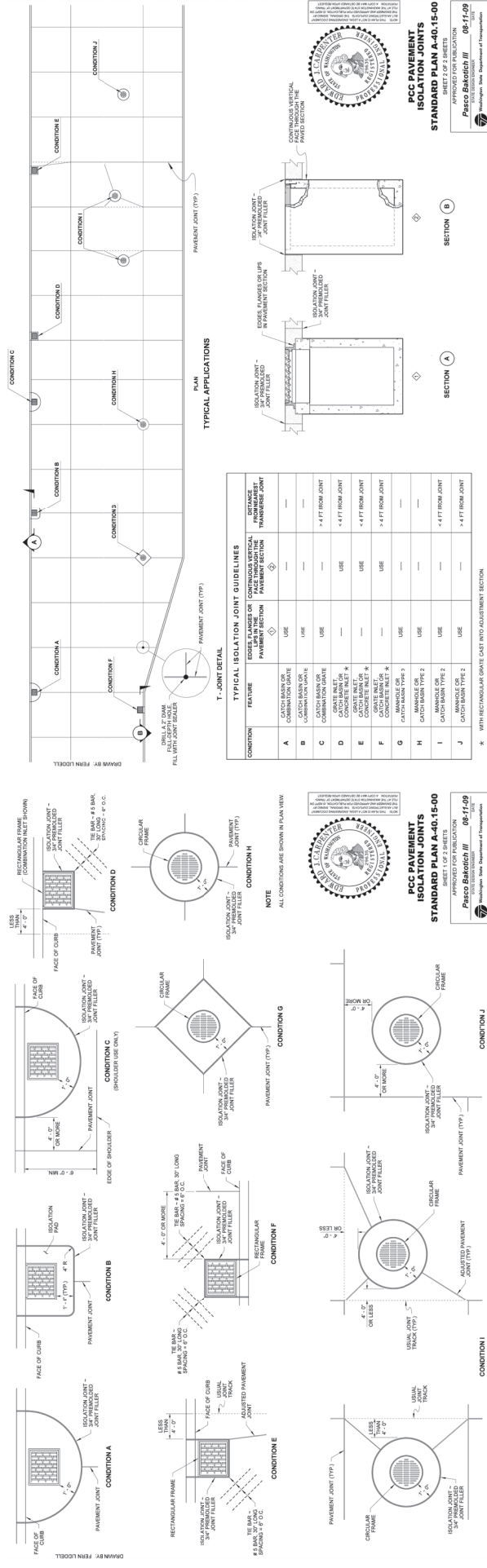
PACE
PACE Engineers
Kirkland, WA 98033
www.paceeng.com

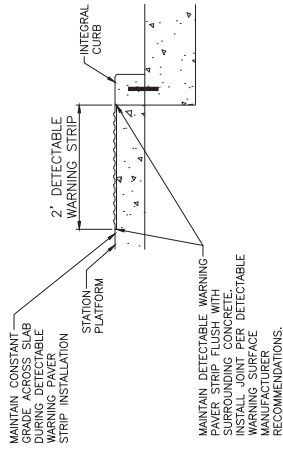


EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

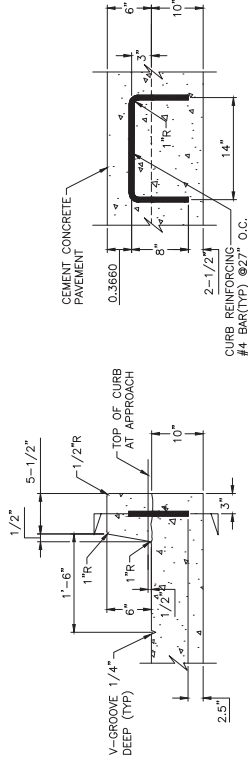
PAVING
PAVING, SIGNAGE AND CHANNELIZATION
DETAILS

Sheet No.	19	84
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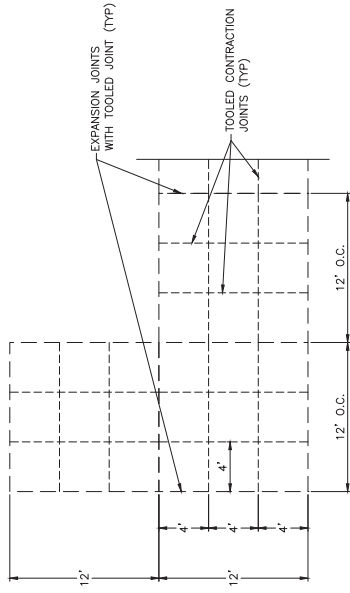




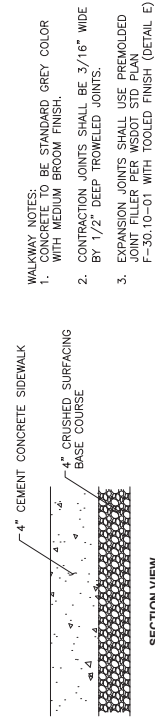
1 SHELTER PLATFORM DETAIL
NOT TO SCALE



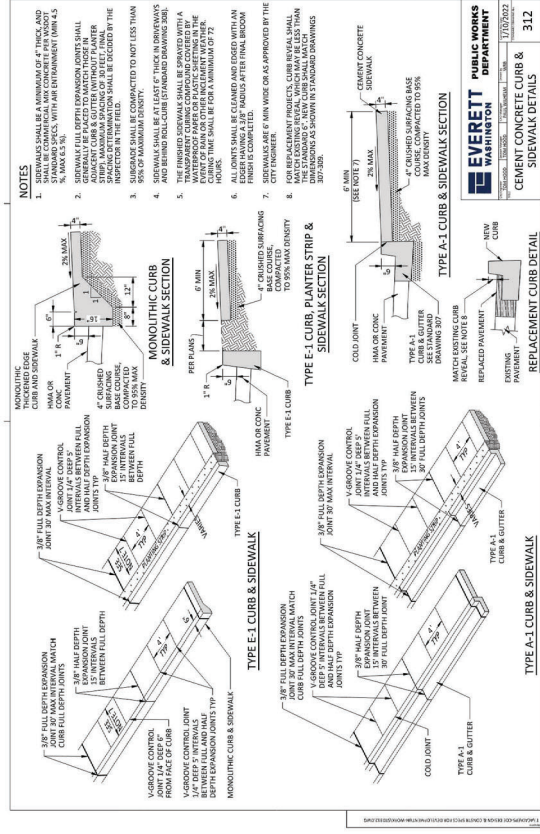
3 **INTEGRAL CURB DETAIL**
NOT TO SCALE



PLAN VIEW



SECTION VIEW



2 PEDESTRIAN CONCRETE PAVING DETAIL
NOT TO SCALE

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EVERETT MALL BUS PLATFORM

WORK ORDER MALLSTN/24462

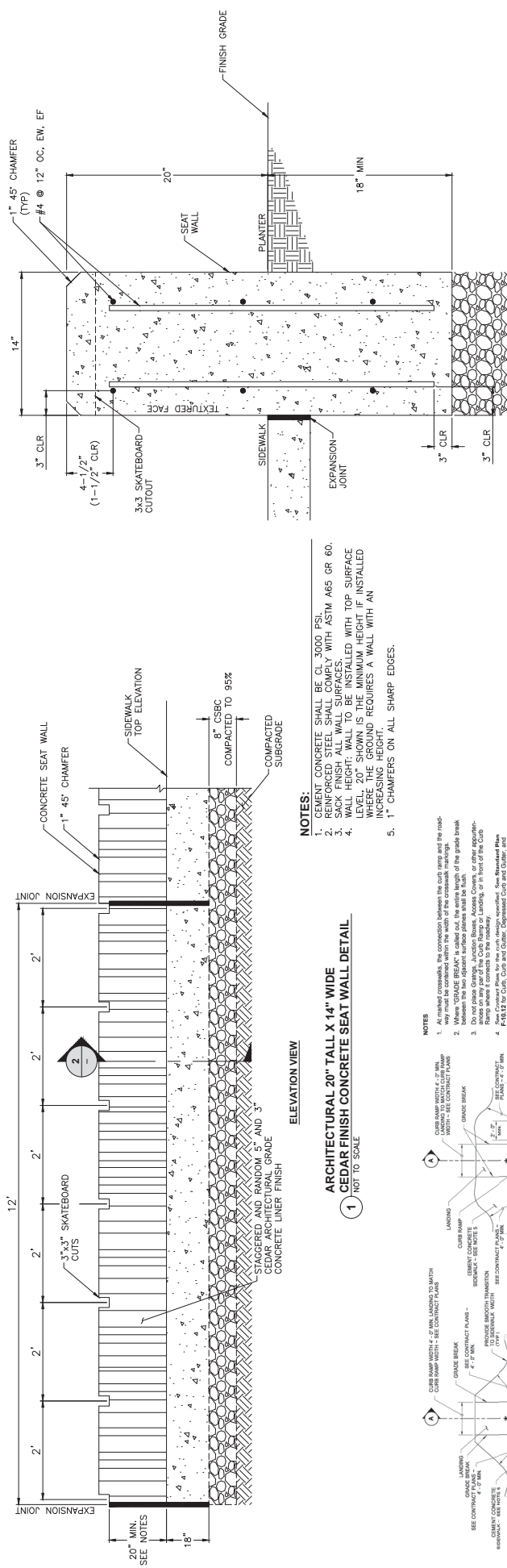
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PAVING, SIGNAGE AND CHANNELIZATION DETAILS

Drawing
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Sheet No. 20 of 84

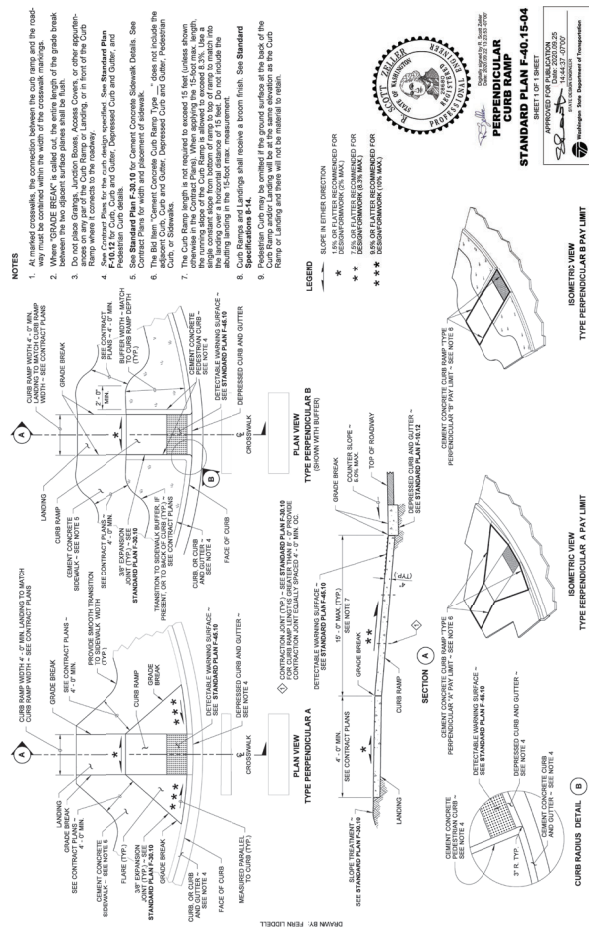
SE 1/4 SEC 18 T 28N R5E



2 SEAT WALL SECTION & REINFORCEMENT DETAIL
NOT TO SCALE

- NOTES:**
1. CEMENT CONCRETE SHALL BE CL 3000 PSI.
 2. REINFORCED STEEL SHALL COMPLY WITH ASTM A65 GR 60.
 3. ALL REINFORCEMENT SHALL BE INSTALLED WITH TOP SURFACE LEVEL, 20" SHOWN IS THE MINIMUM HEIGHT IF INSTALLED WHERE THE GROUND REQUIRES A WALL WITH AN INCREASING HEIGHT.
 4. 1" CHAMFERS ON ALL SHARP EDGES.

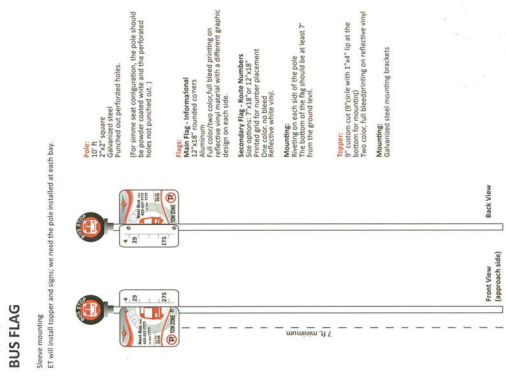
1 ARCHITECTURAL 20" TALL X 14" WIDE
CEDAR FINISH CONCRETE SEAT WALL DETAIL
NOT TO SCALE



LEGEND

- 1. 1/4" MIN. CURB HEIGHT
- 2. 1/4" MIN. CURB WIDTH
- 3. 1/4" MIN. CURB AREA
- 4. 1/4" MIN. CURB PERIMETER
- 5. 1/4" MIN. CURB VOLUME
- 6. 1/4" MIN. CURB MASS
- 7. 1/4" MIN. CURB DENSITY
- 8. 1/4" MIN. CURB STRENGTH
- 9. 1/4" MIN. CURB DURABILITY
- 10. 1/4" MIN. CURB RESISTANCE
- 11. 1/4" MIN. CURB TENSILE
- 12. 1/4" MIN. CURB COMPRESSIVE
- 13. 1/4" MIN. CURB ELONGATION
- 14. 1/4" MIN. CURB REDUCTION
- 15. 1/4" MIN. CURB MODULUS
- 16. 1/4" MIN. CURB POISSON'S
- 17. 1/4" MIN. CURB COEFFICIENT
- 18. 1/4" MIN. CURB THERMAL
- 19. 1/4" MIN. CURB EXPANSION
- 20. 1/4" MIN. CURB CONTRACTION
- 21. 1/4" MIN. CURB PERMEABILITY
- 22. 1/4" MIN. CURB ABSORPTION
- 23. 1/4" MIN. CURB RETENTION
- 24. 1/4" MIN. CURB RELEASE
- 25. 1/4" MIN. CURB STABILITY
- 26. 1/4" MIN. CURB FLUIDITY
- 27. 1/4" MIN. CURB CONSISTENCY
- 28. 1/4" MIN. CURB SETTING
- 29. 1/4" MIN. CURB CURING
- 30. 1/4" MIN. CURB FINISHING
- 31. 1/4" MIN. CURB PROTECTING
- 32. 1/4" MIN. CURB REMOVING
- 33. 1/4" MIN. CURB REPAIRING
- 34. 1/4" MIN. CURB MAINTAINING
- 35. 1/4" MIN. CURB MONITORING
- 36. 1/4" MIN. CURB EVALUATING
- 37. 1/4" MIN. CURB REPORTING
- 38. 1/4" MIN. CURB ARCHIVING
- 39. 1/4" MIN. CURB SHARING
- 40. 1/4" MIN. CURB COLLABORATING
- 41. 1/4" MIN. CURB COMMUNICATING
- 42. 1/4" MIN. CURB COOPERATING
- 43. 1/4" MIN. CURB COMPROMISING
- 44. 1/4" MIN. CURB COMPROMISING
- 45. 1/4" MIN. CURB COMPROMISING
- 46. 1/4" MIN. CURB COMPROMISING
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- 50. 1/4" MIN. CURB COMPROMISING

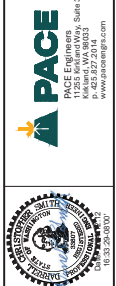
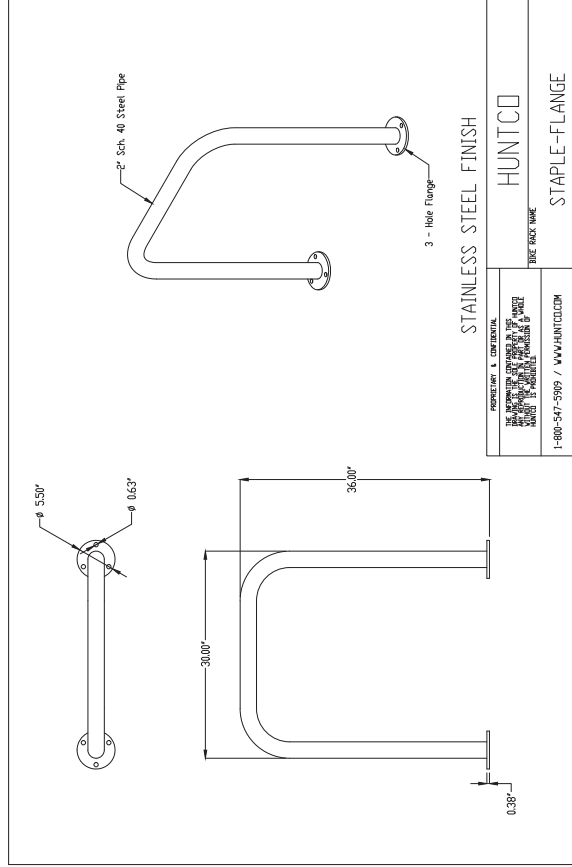
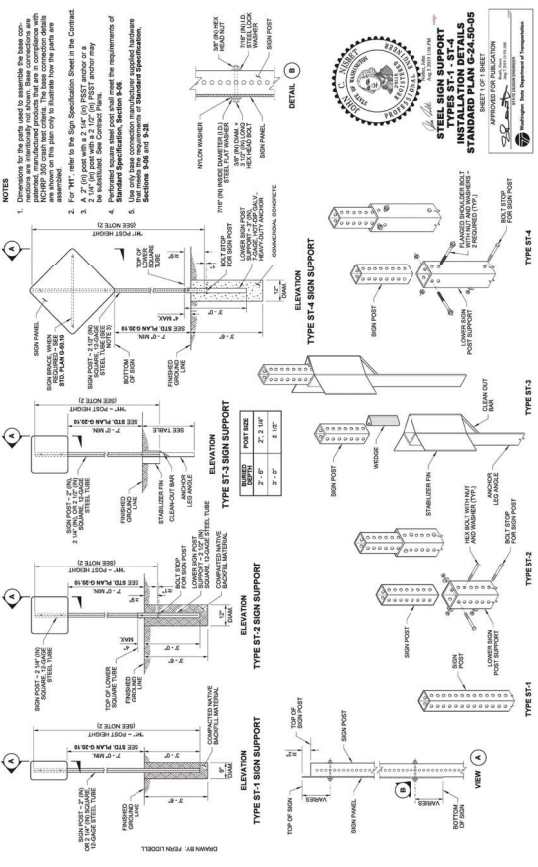
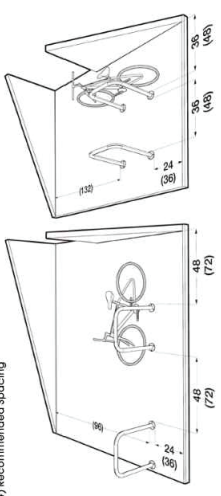
SIGN POST & FOUNDATION TO BE INSTALLED BY CONTRACTOR. CITY FORCES WILL SUPPLY & INSTALL BUS FLAG SIGNS. SIGN POSTS SHALL BE LOCATED A MINIMUM OF 3 FEET FROM FACE OF CURB



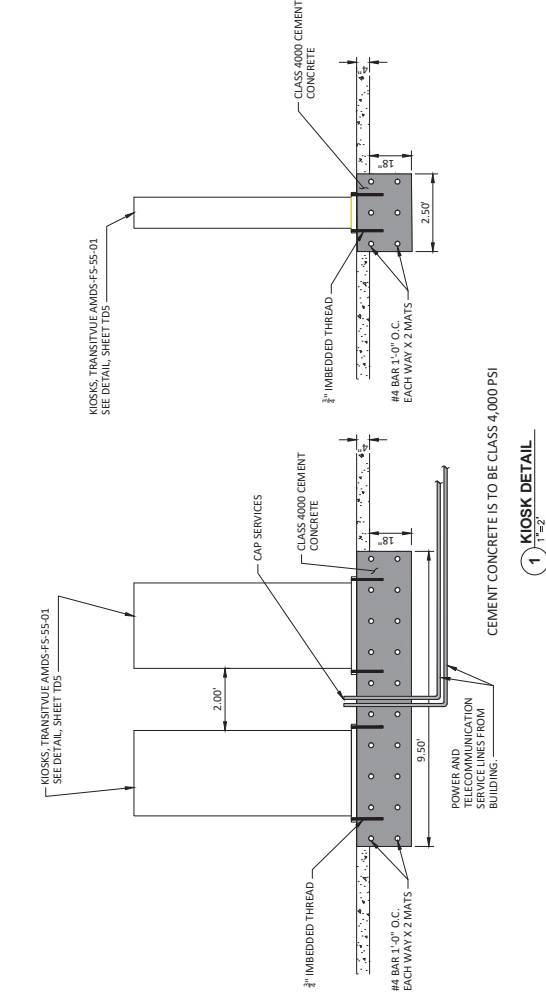
Notes:
1. Signpost shall be installed by contractor.
2. City forces will supply and install bus flag signs.
3. Signposts shall be located a minimum of 3 feet from face of curb.

RECOMMENDED LAYOUT

Notes:
"Bike" is 70"
Minimum Spacing
(4) Recommended Spacing

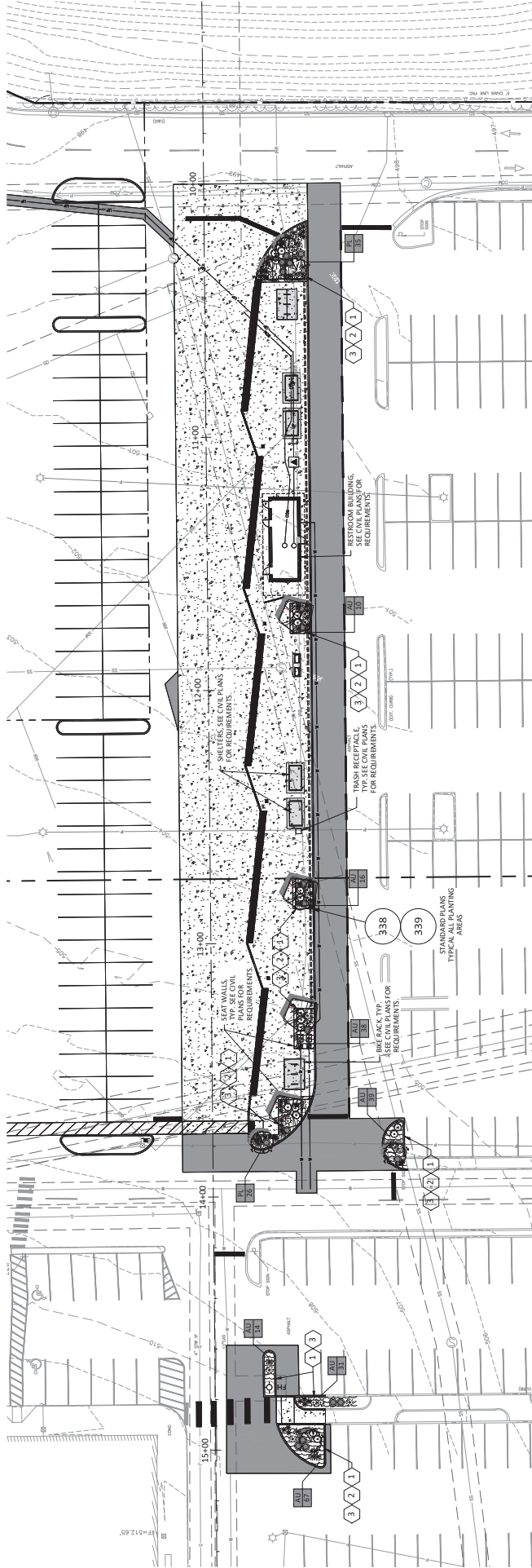


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SE 1/4 SEC 18 T 28N R5E



PLANT SCHEDULE

SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE
DECIDUOUS TREES				
	6	AMELANCHIER X GRANDIFLORA	APPLE SERVICEBERRY	2' CAL B&B
	4	PRUNUS SERRULATA 'ROYAL BURBUNDY'	ROYAL BURBUNDY CHERRY	2' CAL B&B
SHRUBS				
	17	Berberis thunbergii	BAGATELLE JAPANESE BARBERY	2 GAL 18" FT. MIN
	14	Pinus mugo var. pumillo	DWARF MUGO PINE	2 GAL 18" FT. MIN
	18	Rhododendron x hino-crimson	HINO-CRIMSON KURUME AZALEA	2 GAL 18" FT. MIN
GRASSES				
	23	Helictotrichon smyrnensis	BLUE OAT GRASS	2 GAL
PERENNIALS				
	39	Hemerocallis 'happy returns'	HAPPY RETURNS DAYLILY	2 GAL
GROUND COVERS				
	215	Arctostaphylos uva-ursi	KINKINCK	4" POT
	61	Prunus laurocerasus 'mount vernon'	MOUNT VERNON ENGLISH LAUREL	1 GAL

PLANTING CALLOUTS

AS SHOWN ON PLAN SHEET
GROUND COVERS AND OTHER PLANT MATERIAL NOT SHOWN MAY BE INSTALLED USING THIS ANNOTATION LABEL

AUT	CODE	QUANTITY
3	2	1

LANDSCAPE CONSTRUCTION NOTES

- PREPARE PLANTING AREA PER PLANTING PREPARATION DETAIL 1.
- INSTALL ROOT BARRIERS AS SPECIFIED IN CITY STANDARD DETAIL 389.
- PLANT TREES, SHRUBS AND GROUND COVERS PER CITY STANDARD DETAIL 338.

PLANT MATERIAL MUST CONFORM TO CITY OF EVERETT MUNICIPAL CODE SECTION 19.35.055
ALL PLANT MATERIAL SHALL BE MINIMUM 18" CAL. B&B
MINIMUM HT. REQUIREMENTS.

DESIGNED BY	REVISION
DRAWN BY	DATE
CHECKED BY	DATE
DESIGN REVIEW	DATE

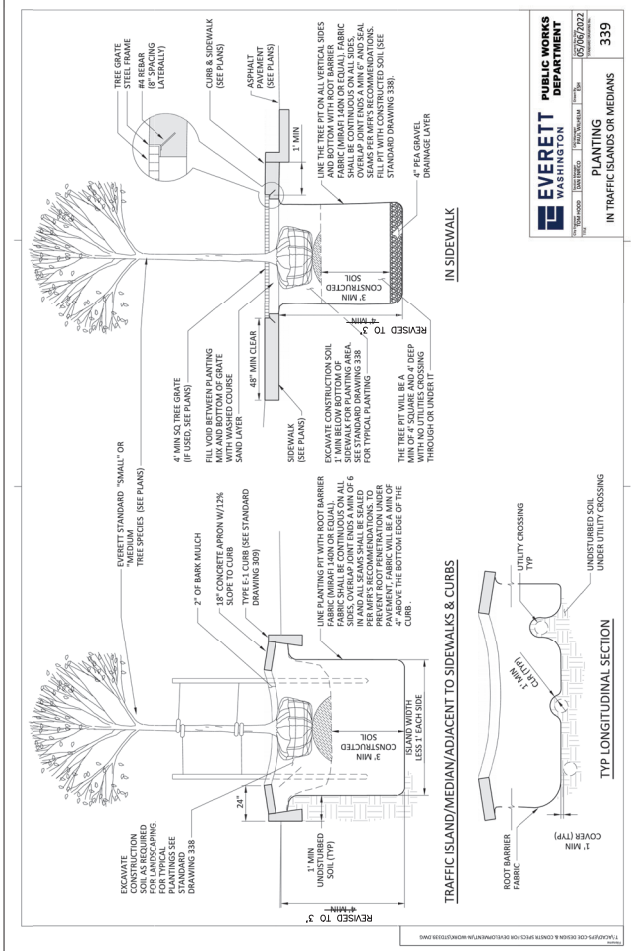
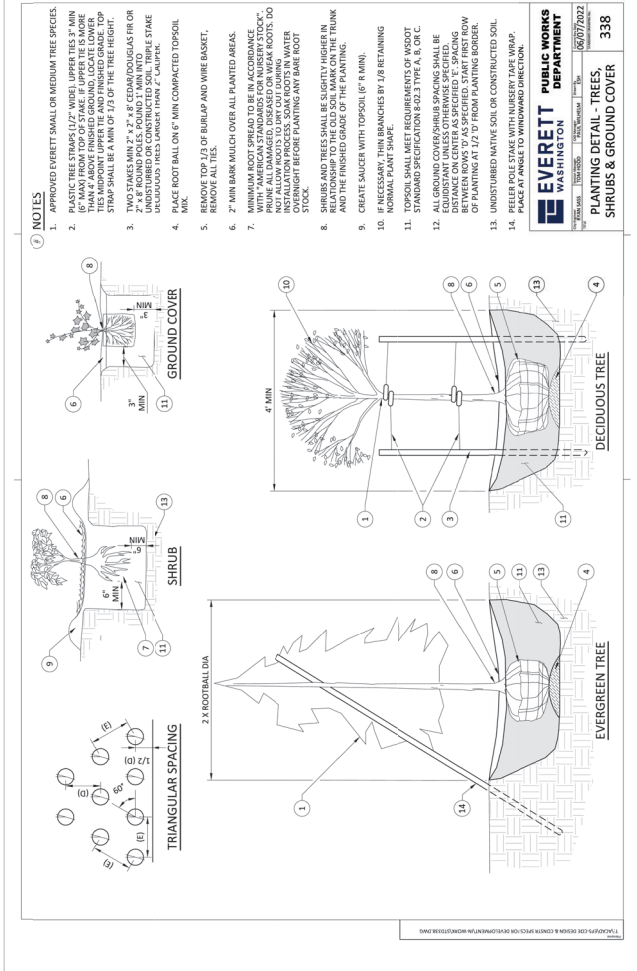


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EVERETT TRANSIT

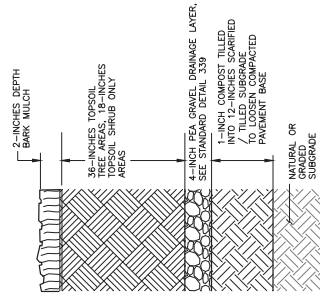
EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

SE 1/4 SEC 18 T 28N R5E



GENERAL PLANTING NOTES

- AN AUTOMATIC UNDERGROUND IRRIGATION SYSTEM IS REQUIRED FOR THIS PROJECT.
- GRADING SHALL BE ACCEPTED PRIOR TO PLANT INSTALLATION. FINISHED GRADE OR NEW PLANTING AREA SHALL ALLOW FOR TOPSOIL AND ROCK, MULCH AND 1 INCH CLEAR TO TOP OF CURB OR SIDEWALK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND HAULING ALL EXTRA DEBRIS AND EXCESS SOIL GENERATED BY THIS PROJECT.
- PRUNING OF TREES SHALL BE CONSISTENT WITH ANSI A300 (PART 1), AMERICAN PLANT MANAGEMENT, STANDARD PRACTICES AND COMPANION PUBLICATION BEST MANAGEMENT PRACTICES.
- PLANTING OF TREES SHALL BE DONE BY THE CONTRACTOR OR SUBSIDIARY. PLANTING SHALL BE DONE TO A HEIGHT OF SEVEN FEET TO MAINTAIN PEDESTRIAN AND VEHICLE CLEARANCE AND CLEAR LINES OF SIGHT.
- PLANTING / FERTILIZING AND MAINTENANCE
- ALL PLANTS SHALL CONFORM TO AMERICAN ASSOCIATION OF NURSERYMEN (AAN) GRADES AND STANDARDS AS PUBLISHED IN THE MOST RECENT 260.1 "AMERICAN ASSOCIATION OF NURSERYMEN" MANUAL. TREE CALIPER SHALL BE MEASURED SIX INCHES ABOVE THE ROOT FLARE.
- APPLY FERTILIZER TO ALL LAWN, GROUND COVER, SHRUB AND TREE PLANTING AREAS. FOLLOW MANUFACTURERS RECOMMENDATIONS FOR FERTILIZER TYPE (N-P-K RATIO) FOR LAWN, ORNAMENTAL SHRUBS, AND TREES.
- THE ONGOING MAINTENANCE IS THE RESPONSIBILITY OF THE PROPERTY OWNER.



1 PLANTING PREPARATION



Revised		Revised		Revised		Revised	
1		2		3		4	
DATE		DATE		DATE		DATE	
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EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/24462

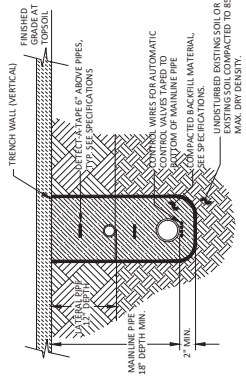
LANDSCAPING
LANDSCAPE DETAILS

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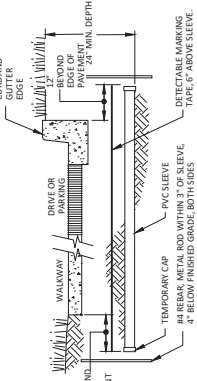
IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	AREA
	LANDSCAPE DRIP LINE IRRIGATION	761 SF
	RESTORED EXISTING IRRIGATION	495 SF

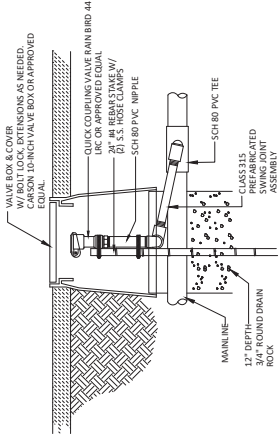
1 PIPE TRENCH DETAIL



2 SLEEVE DETAIL



3 ^{NTS} QUICK COUPLER VALVE



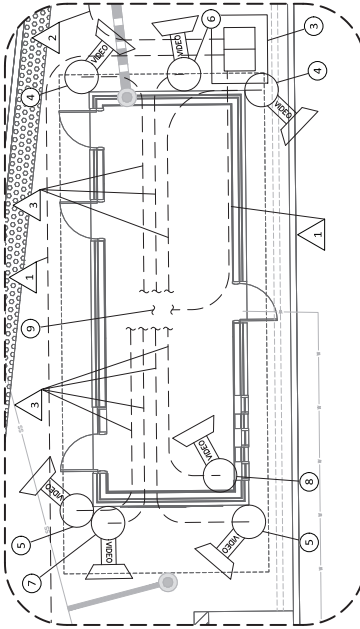
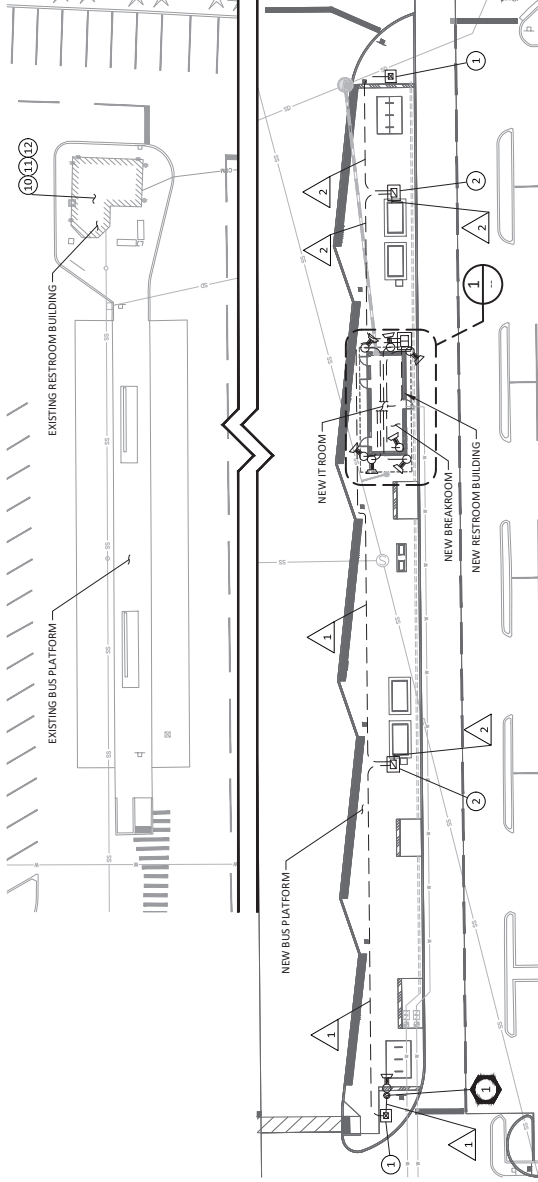
IRRIGATION CONSTRUCTION NOTES

1. MODIFY EXISTING IRRIGATION SYSTEM FOR ADEQUATE COVERAGE OF NEW PLANTING AREA. MATCH EXISTING IRRIGATION COMPONENTS INCLUDING PIPING AND MANUFACTURER.
2. INSTALL DECAL AT POINT OF CONNECTION PER COT STANDARD DETAIL 520. REFER TO DETAIL 1, SHEET 10 FOR ADDITIONAL REQUIREMENTS.
3. INSTALL MANUAL DRINK VALVE AT LOW POINT IN LATERAL.
4. INSTALL LONG-ARCH DRIPPIRE IRRIGATION IN NEW IRRIGATION AREAS. SEE DETAILS 1 SHEET 10 FOR REQUIREMENTS.
5. INSTALL IRRIGATION SLEEVES UNDER PAVEMENT AREAS. SEE DETAIL 2, THIS SHEET FOR REQUIREMENTS. EXTEND SLEEVES UNDER OR THROUGH SEATWALL WHERE INDICATED.
6. INSTALL QUICK COUPLING VALVE. SEE DETAIL 3, THIS SHEET.

PIPE TRENCH NOTES

1. ALL MAIN AND / OR LATERAL PIPE UNDER PAVEMENTS SHALL BE SLEEVED, SEE SPECIFICATIONS.
2. BACKFILL MATERIAL TO BE FREE OF ROCK OR DEBRIS LARGER THAN 1". ABSOLUTELY NO ROCK OR DEBRIS SHALL BE PLACED DIRECTLY ADJACENT TO ANY PIPE.
3. EXCESS MATERIAL GENERATED BY TRENCHING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE HAULED AND DISPOSED OF OFF-SITE

SE 1/4 SEC 18 T 28N R5E



1 NEW RESTROOM BUILDING

SCALE: 1"=5'

WIRE SCHEDULE				
RUN NO.	FACEWAY	CAMERA	SYSTEM GROUND	PULL CORD
1	2" PVC, SCH 40	1	1	1
2	2" PVC, SCH 40	1	1	1
3	2" PVC, SCH 40	1	1	2
4	2" PVC, SCH 40	1	1	3

LEGEND

- CONDUIT/WIRING
- TYPE 1 JUNCTION BOX WITH SECURITY COLLAR
 - TYPE 2 JUNCTION BOX WITH SECURITY COLLAR
 - TYPE 8 JUNCTION BOX WITH SECURITY COLLAR
 - VIDEO CAMERA



NOTES

- ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF EVERETT STANDARD PLANS AND SPECIFICATIONS, THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARDS AND SPECIFICATIONS, AND THE CONTRACT, UNLESS OTHERWISE NOTED.
- ALL WORK SHALL BE CONSISTENT WITH UTILITY AGENCY REQUIREMENTS. THE CONTRACTOR SHALL CONTACT UTILITY AGENCIES 48 HOURS PRIOR TO COMMENCING WORK AND SHALL COORDINATE WITH ALL AFFECTED UTILITY AGENCIES THROUGHOUT THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO EXISTING UTILITIES RESULTING FROM CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL NOTIFY THE AFFECTED UTILITY AGENCY IMMEDIATELY UPON DAMAGE AND SHALL BE RESPONSIBLE FOR REPLACING DAMAGED EQUIPMENT TO THE SATISFACTION OF THE AFFECTED UTILITY AGENCY.
- A COPY OF THE APPROVED PLAN SHALL BE ON SITE DURING CONSTRUCTION.
- THE LOCATION OF EXISTING FEATURES AND UTILITIES SHOWN WITHIN THESE PLANS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING WORK. NOT ALL EXISTING FEATURES AND UTILITIES MAY BE SHOWN.
- JUNCTION BOX AND CONDUIT LOCATIONS ARE SHOWN FOR ILLUSTRATIVE PURPOSES. ACTUAL LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR IN THE FIELD AND VERIFIED BY THE ENGINEER/INSPECTOR PRIOR TO INSTALLATION. COINCIDENT CONDUITS MAY OCCUPY THE SAME TRENCH.
- THE CONTRACTOR SHALL INVESTIGATE FOR UNDERGROUND UTILITIES PRIOR TO ANY POLE FOUNDATION EXCAVATION OR CONDUIT TRENCHING TO AVOID DAMAGE TO ANY UNDERGROUND UTILITIES.
- NEW CONDUITS INSTALLED BY THE CONTRACTOR SHALL BE LABELED IN EACH JUNCTION BOX AND WITHIN THE IT ROOM.
- NEW POLE LOCATIONS SHALL BE STAKED IN THE FIELD, POTHOLED TO VERIFY NO POTENTIAL UTILITY CONFLICTS EXIST, AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
- NEW JUNCTION BOXES WITHIN SIDEWALK SHALL HAVE NON-SLIP LIDS/FRAMES.
- ALL PERMITS REQUIRED FOR WORK WITHIN THE PUBLIC RIGHT-OF-WAY MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
- ALL POLE INSTALLATIONS SHALL BE INSPECTED AT SEVERAL STAGES, INCLUDING BUT NOT LIMITED TO FOUNDATION EXCAVATION, BOLT, REBAR AND CONDUIT INSTALLATIONS, POLE SET FOR PROPER RISE, LUMINAIRE INSTALLATIONS WHERE APPLICABLE, WIRING, GROUNDING, AND BONDING.
- FOR ANY EXCAVATION AND OPEN TRENCH, EXISTING AND NEWLY INSTALLED CONDUITS MUST BE INSPECTED PRIOR TO RESTORATION. PULL CORDS SHALL BE PRESENT IN ALL NEW CONDUITS.
- ALL MATERIALS USED SHALL GO THROUGH THE SUBMITTAL PROCESS OUTLINED IN THE STANDARD SPECIFICATIONS AND PROJECT SPECIAL PROVISIONS.
- SEE THE ARCHITECTURAL DRAWINGS FOR ADDITIONAL DETAILS ON CAMERA PLACEMENT AND MOUNTING.

POLE NOTES

- CONSTRUCT NEW POLE FOUNDATION. FURNISH AND INSTALL TYPE FB POWDER COATED (EVERETT GREEN) STEEL SIGNAL POLE PER WSDOT STANDARD PLANS 221.10, 221.16, AND 221.17, EXCEPT THE FLASHING BEACONS AND SIGN SHALL BE OMITTED. INSTALL ONE (1) RELOCATED HANWHWA XMO-9083R BULLET POLE AT APPROXIMATELY 14 FT. FURNISH AND INSTALL SBP-300MMW2 HANGING MOUNT BASE PER MANUFACTURER'S RECOMMENDATIONS.

CONSTRUCTION NOTES

- FURNISH AND INSTALL NEW TYPE 1 JUNCTION BOX WITH BASIC SECURITY COLLAR PER CITY OF EVERETT STANDARD DRAWING NO. 808 AND WSDOT STD PLAN 140.01.
- FURNISH AND INSTALL NEW TYPE 2 JUNCTION BOX WITH BASIC SECURITY COLLAR PER CITY OF EVERETT STANDARD DRAWING NO. 808 AND WSDOT STD PLAN 140.01.
- FURNISH AND INSTALL NEW TYPE 8 JUNCTION BOX WITH BASIC SECURITY COLLAR PER CITY OF EVERETT STANDARD DRAWING NO. 808 AND WSDOT STD PLAN 140.01.
- INSTALL ONE (1) RELOCATED HANWHWA QNV-8080R DOME CAMERA ON CORNER OF NEW RESTROOM BUILDING AT APPROXIMATELY 9 FT. 3 IN. FURNISH AND INSTALL SBP-300MMW2 CORNER MOUNT, SBP-300MMW1 WALL MOUNT, AND SBP-301MMW2 HANGING MOUNT PER MANUFACTURER'S RECOMMENDATIONS. ROUTE WIRING TO IT ROOM. COORDINATE WITH THE RESTROOM BUILDING CONTRACTOR FOR INSTALLATION.
- INSTALL ONE (1) RELOCATED HANWHWA QNV-8080R DOME CAMERA ON CORNER OF NEW RESTROOM BUILDING AT APPROXIMATELY 11 FT. 3 IN. FURNISH AND INSTALL SBP-300MMW1 CORNER MOUNT, SBP-300MMW1 WALL MOUNT, AND SBP-301MMW2 HANGING MOUNT PER MANUFACTURER'S RECOMMENDATIONS. ROUTE WIRING TO IT ROOM. COORDINATE WITH THE RESTROOM BUILDING CONTRACTOR FOR INSTALLATION.
- INSTALL ONE (1) RELOCATED HANWHWA QNV-8080R DOME CAMERA ON RESTROOM BUILDING WALL AT APPROXIMATELY 9 FT. 3 IN. FURNISH AND INSTALL SBP-137MMW1 WALL MOUNT PER MANUFACTURER'S RECOMMENDATIONS. ROUTE WIRING TO IT ROOM. COORDINATE WITH THE RESTROOM BUILDING CONTRACTOR FOR INSTALLATION.
- INSTALL ONE (1) RELOCATED HANWHWA XMO-9083R BULLET CAMERA ON RESTROOM BUILDING WALL AT APPROXIMATELY 9 FT. 3 IN. FURNISH AND INSTALL SBP-150MMW1 WALL MOUNT PER MANUFACTURER'S RECOMMENDATIONS. ROUTE WIRING TO IT ROOM. COORDINATE WITH THE RESTROOM BUILDING CONTRACTOR FOR INSTALLATION.
- INSTALL ONE (1) RELOCATED HANWHWA QND-6012R DOME CAMERA IN BREAKROOM. FURNISH AND INSTALL SHD-1128PFW IN CEILING MOUNT PER MANUFACTURER'S RECOMMENDATIONS. ROUTE WIRING TO IT ROOM. COORDINATE WITH THE RESTROOM BUILDING CONTRACTOR FOR INSTALLATION.
- FURNISH AND INSTALL ONE (1) 24-PORT CAT6 PATCH PANEL. INSTALL ONE (1) RELOCATED 5420M 24-PORT POE SWITCH. INSTALL ALL EQUIPMENT IN NETWORK RACK, WHICH EVERETT TRANSIT IT DEPARTMENT WILL PROVIDE. WITHIN THE IT ROOM, AS DIRECTED BY EVERETT TRANSIT IT DEPARTMENT. FURNISH AND INSTALL 18 CAT6 PATCH CABLES BETWEEN PATCH PANEL AND ETHERNET SWITCH. FURNISH, INSTALL, AND TERMINATE CAT6 WIRING BETWEEN THE CAMERAS AND THE PATCH PANEL. COORDINATE ALL WORK WITH EVERETT TRANSIT IT DEPARTMENT.
- REMOVE FIVE (5) EXISTING HANWHWA QNV-8080R DOME CAMERAS, TWO (2) EXISTING HANWHWA XMO-9083R BULLET CAMERAS, AND ONE (1) EXISTING QND-6012R DOME CAMERA FROM THE EXISTING RESTROOM BUILDING AND RE-INSTALL AT THE NEW BUS PLATFORM, AS SHOWN. REMOVE ALL ASSOCIATED CAMERA CABLES, MOUNTING BRACKETS, AND HARDWARE AND SALVAGE TO EVERETT TRANSIT.
- REMOVE ONE (1) EXISTING HANWHWA XNF-900RV FISHERY CAMERA AND ALL ASSOCIATED CAMERA CABLES, MOUNTING BRACKETS, AND HARDWARE FROM THE EXISTING RESTROOM BUILDING AND SALVAGE TO EVERETT TRANSIT.
- COORDINATE WITH EVERETT TRANSIT IT DEPARTMENT TO REMOVE ONE (1) EXISTING 5420M 24-PORT POE SWITCH FROM THE EXISTING RESTROOM BUILDING AND RE-INSTALL AT THE NEW BUS PLATFORM (WITHIN THE IT ROOM OF THE NEW RESTROOM BUILDING).

NO.		DATE		APPROVED		RECORD		ACTION		DATE		APPROVED	
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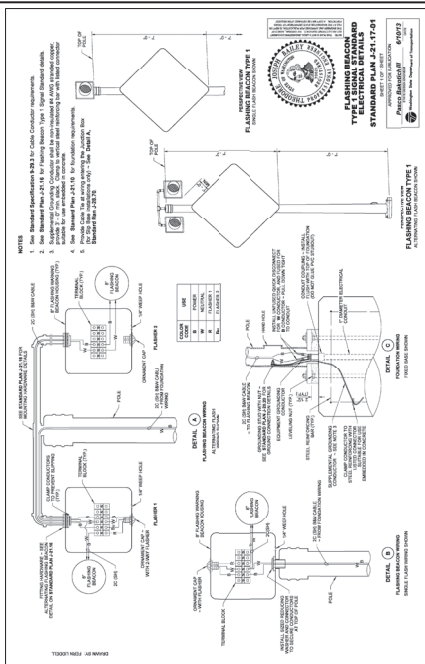
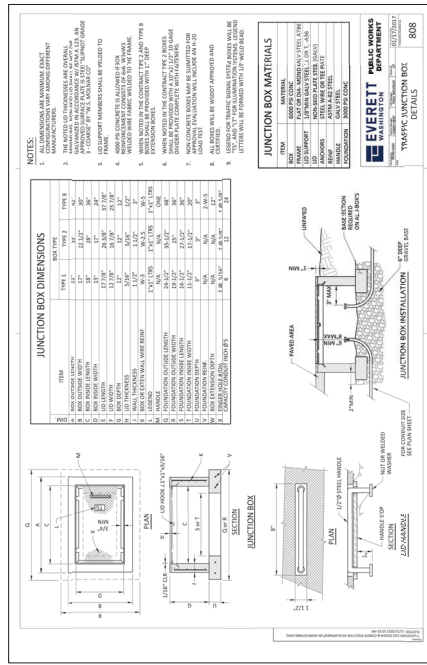
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EVERETT TRANSIT

EVERETT MALL BUS PLATFORM
WORK ORDER MALLSTN/244622

SECURITY SYSTEM PLAN
BUS PLATFORM

Sheet No.	28	84
Of Total		

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BID SET



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Contact: Jeff Hardwick
Email: jeff.hardwick@bceengineers.com

Design Review Level

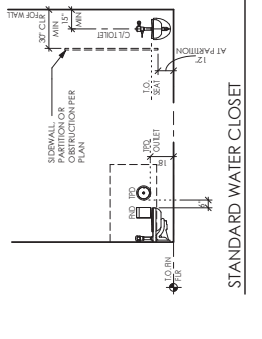
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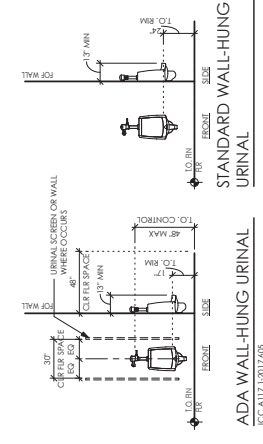
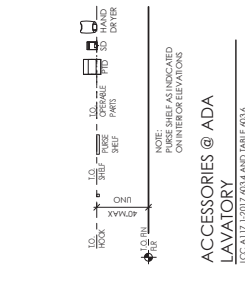
DRIVER BUILDINGSheet No. 7

GENERAL		STRUCTURAL			
G1.01	COVER SHEET	50.01	STRUCTURAL NOTES	ME01	ROOF PLAN
G2.01	SYMBOLS, GENERAL NOTES & MATERIALS LEGEND	50.11	MECHANICAL SCHEDULES	ME02	MECHANICAL DETAILS 1
G2.02	MONITORING HEIGHTS	50.12	TYPICAL DETAILS	ME03	SEQUENCE OF OPERATION 1
		50.21	TESTING AND INSPECTION NOTES	ME04	
		50.22	MECHANICAL SCHEDULES	ME05	
		51.01	FOUNDATION PLAN	ME06	
		52.01	ROOF FRAMING PLAN	ME07	
		52.02	FOUNDATION DETAILS	ME08	
		53.01	FLOOR FRAMING DETAILS	ME09	
		54.01	ROOF FRAMING ELEVATIONS	ME10	
		55.01	WINDOW FRAMING ELEVATIONS	ME11	
		55.02	WINDOW FRAMING DETAILS	ME12	
		56.01	MECHANICAL LEGEND	ME13	
		56.02	MECHANICAL SCHEDULES 1	ME14	
		56.03	MECHANICAL SCHEDULES 2	ME15	
		56.04	PLUMBING PLAN	ME16	
		56.11	MECHANICAL PLAN	ME17	
		56.12		ME18	
		56.13		ME19	
		56.14		ME20	
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		56.16		ME22	
		56.17		ME23	
		56.18		ME24	
		56.19		ME25	
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		56.21		ME27	
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		56.37		ME43	
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		56.39		ME45	
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		56.48		ME54	
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		56.79		ME85	
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		56.82		ME88	
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		56.84		ME90	
		56.85		ME91	
		56.86		ME92	
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		56.88		ME94	
		56.89		ME95	
		56.90		ME96	
		56.91		ME97	
		56.92		ME98	
		56.93		ME99	
		56.94		ME100	
		56.95		ME101	
		56.96		ME102	
		56.97		ME103	
		56.98		ME104	
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		56.100		ME106	

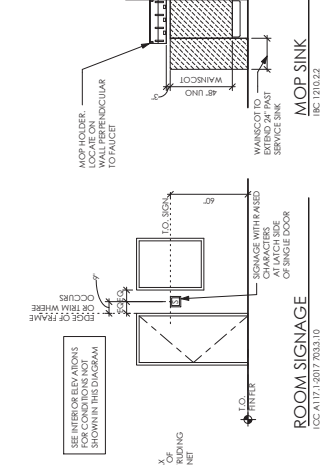
Sheet No. 7

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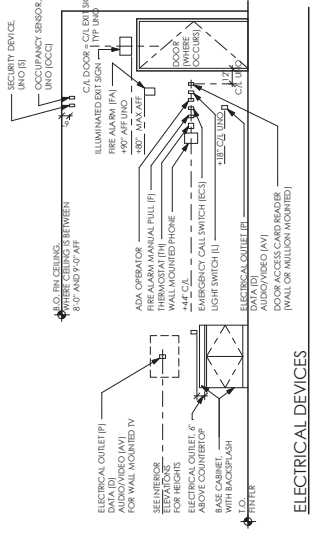
ADA WATER CLOSET
ICC A117.1-2017 604.3.1

ADA WALL-HUNG URINAL
ICC 4117.1-2017.605

ACCESSORIES @ ADA LAVATORY



ROOM SIGNAGE
ICC A117.1-2017 7033.10



NUMBER
(COUNTED)

10483
REGISTERED
ARCHITECT
Mark Hurler
MARK HURLER
PRINCIPAL ARCHITECT



G2.02	Sheet No.	84	Of Total
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SE 1/4 SEC 18 T 28N R5E

LEGEND

WALL TYPE REFERENCE: SEE SHEET A2.01 FOR WALL TYPE DESCRIPTIONS, AND WALL TYPE REFERENCE LEGEND

CEILING HEIGHT CHANGE ABOVE UNO.

FLOOR DRAIN WITH 2% LOCALIZED SLOPE, SEE DETAIL 4/72.01

DOWNSPOUT, SEE GENERAL NOTES

WALL MOUNTED FIRE BRACKET OR BRACKET

TYPICAL NEW WALL TYPES

TYPICAL EXTERIOR WALL TYPES

FLOOR TYPE A: SLAB ON GRADE, FORTIFIED CONCRETE

LVT FLOORING OVER FLOOR TYPE A

SAWN CONTROL JOINT

WALL TYPE REFERENCE: SEE SHEET A2.01 FOR WALL TYPE DESCRIPTIONS, AND WALL TYPE REFERENCE LEGEND

CEILING HEIGHT CHANGE ABOVE UNO.

FLOOR DRAIN WITH 2% LOCALIZED SLOPE, SEE DETAIL 4/72.01

DOWNSPOUT, SEE GENERAL NOTES

WALL MOUNTED FIRE BRACKET OR BRACKET

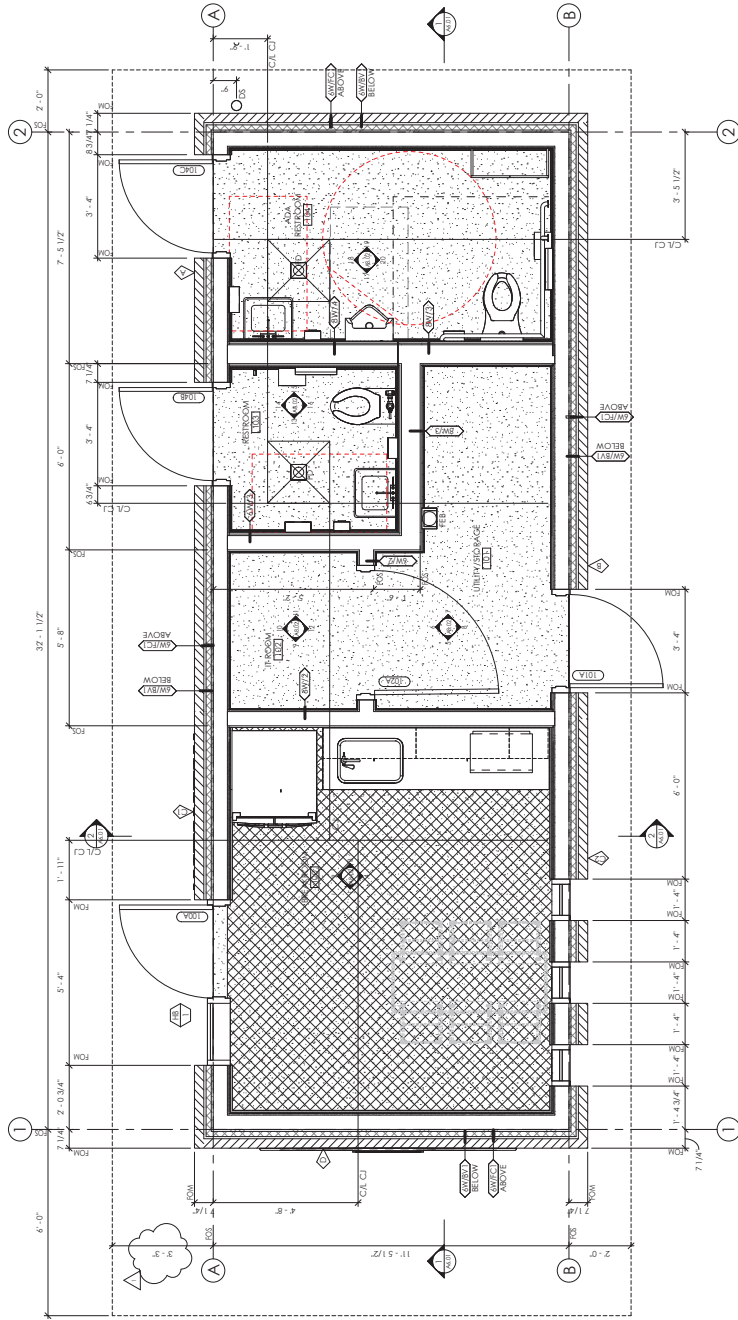
TYPICAL NEW WALL TYPES

TYPICAL EXTERIOR WALL TYPES

FLOOR TYPE A: SLAB ON GRADE, FORTIFIED CONCRETE

LVT FLOORING OVER FLOOR TYPE A

SAWN CONTROL JOINT



1 FIRST FLOOR REFERENCE PLAN
1/2\"/>



NO.		UNISSUED		REVISION	
ACTION		DATE		DATE	
BID		10/02/2024		10/02/2024	
ACTION		DATE		DATE	



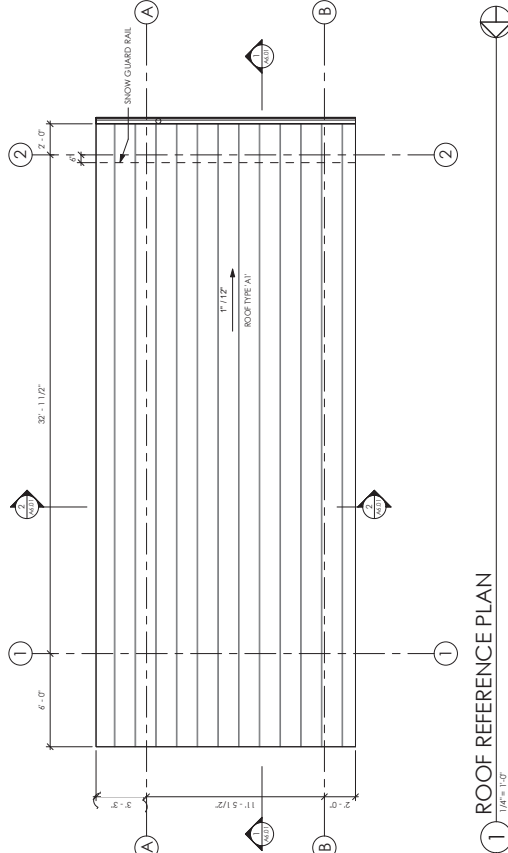
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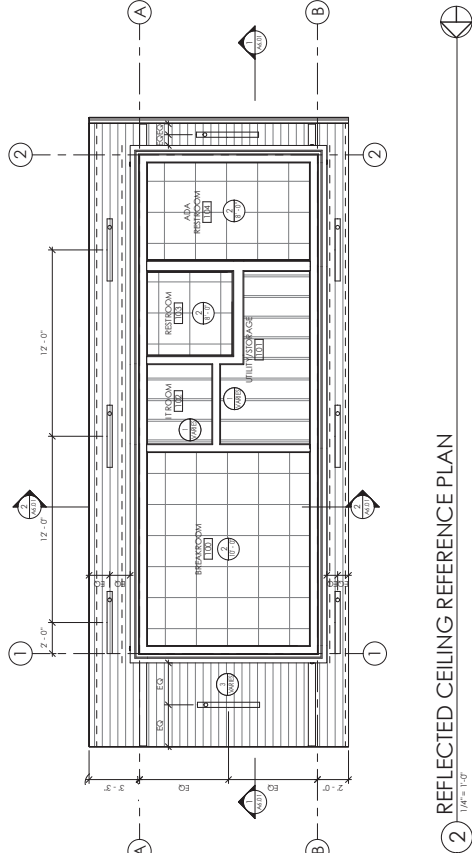
EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

FIRST FLOOR REFERENCE PLAN

Drawing
A2.01
Sheet No.
84
OF 100



ROOF REFERENCE PLAN



REFLECTED CEILING REFERENCE PLAN

RCPC GENERAL NOTES

- A. SEE SHEET G-2.01 FOR GENERAL NOTES
- B. GENERAL CONTRACTOR SHALL COORDINATE THE MECHANICAL, ELECTRICAL, AND PLUMBING (MEP) PROPER LOCATION AND INSTALLATION OF CEILING BEAMS AND SYSTEMS.
- C. MECHANICAL AND ELECTRICAL INFORMATION SHOWN ON THIS DRAWING IS UNLESS OTHERWISE NOTED. SHOWS POWER AND INFORMATION CONTAINED IN THIS DRAWING SHALL BE USED TO DETERMINE THE LOCATION OF LIGHTING FIXTURES, DIFFUSERS, GRILLE, ETC. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR SPECIFICATIONS FOR QUANTITIES OF DEVICES AND ALL OTHER RELATED INFORMATION.
- D. STRUCTURAL ELEMENTS ARE SHOWN FOR INFORMATION ONLY. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ACTUAL SIZES AND SPACINGS OF SUCH ELEMENTS.
- E. ALL CEILING HEIGHTS ARE FROM THE TOP OF SUB OR FINISH FLOOR FINISH. CEILING SHALL BE LOCATED DIRECTLY ABOVE, UNLESS OTHERWISE NOTED.
- F. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATIONS FOR ACTUAL CONSTRUCTION REQUIREMENTS.
- G. IF STAND ALONE LIGHT FIXTURES IS NOT INDICATED, LIGHTING SHALL BE COORDINATED WITH DIMENSIONALLY LOCATED, COORDINATE WITH MECHANICAL AND ELECTRICAL DRAWINGS.
- H. ALL LIGHTING FIXTURES, EQUIPMENT AND PERMANENTLY INSTALLED IN THE BUILDINGS MECHANICAL ENVELOPE SHALL BE AIR-TIGHT AND LEAKAGE SHALL BE MINIMIZED. ALL LIGHTING FIXTURES SHALL BE I.C.R. RATED. ALSO SEE THE CEILING TYPES

LEGEND

CEILING TYPE

CEILING HEIGHT ABOVE FLOOR BELOW
MODIFIER, WHERE APPLICABLE

ELECTRICAL

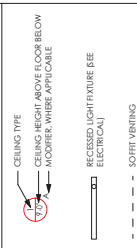
REQUIRED LIGHT FIXTURE FEE

SOFT VIBRATING

RCP GENERAL NOTES

A.	GENERAL CONTRACTOR SHALL COORDINATE THE WORK OF THE APPLICABLE TRADES TO PROVIDE THE BEST FINISHES AND INSTALLATION OF CEILING FINISHES AND SYSTEMS.
B.	MECHANICAL AND ELECTRICAL INFORMATION SHOWN ON ARCHITECTURAL RELATED CEILING PLANS FOR IDENTIFYING CEILING MOUNTED MECHANICAL AND ELECTRICAL DRAWINGS AND OTHER RELATED DRAWINGS OF DEVICES AND EQUIPMENT SHALL BE CORRELATED.
C.	STRUCTURAL ELEMENTS ARE SHOWN FOR CONTRACTORS' CONFORMANCE. SEE STRUCTURAL DRAWINGS FOR ACTUAL SIZES AND SPACING OF SCL ELEMENTS.
D.	ALL CEILING HEIGHTS ARE FROM THE TOP OF SLAB ON GRADE TO THE BOTTOM OF YELLOW LINES. HEIGHTS ARE SHOWN IN BRACKETED NOTATION.
E.	CEILING HEIGHTS ARE SHOWN IN BRACKETED NOTATION.
F.	SECTIONS OF ACTUAL CONSTRUCTION REQUIREMENTS.
G.	IF STAND ALONE LIGHT FIXTURES IS NOT ARCHITECT INTENDED, LIGHT LOCATED COORDINATE WITH ARCHITECT.
H.	AIR BARRIER, ALL TUBES, EQUIPMENT, AND PRETENSIONERS INSTALLED IN THE BUILDING'S CEILING SHALL BE IDENTIFIED AND CORRELATED. ALL CEILING SHALL BE IDENTIFIED. ALSO SEE THE CEILING

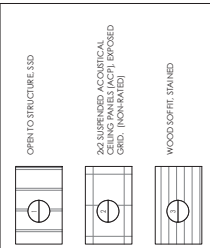
LEGEND



ROOF GENERAL NOTES

[illegible]

CEILING MODIFIERS



ROOF PLAN LEGEND



EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

EVERETT TRANSIT

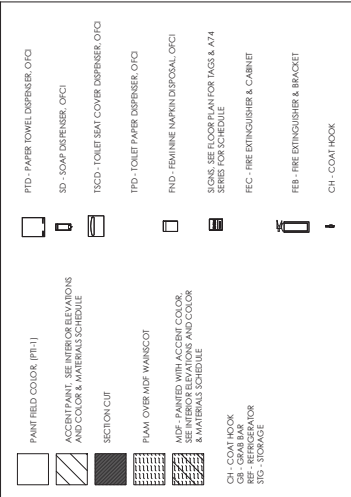
A3.01

Sheet No. 84

4 EXTERIOR ELEVATION - WEST
1/4" = 1'-0"

<div> <div>10363</div> <div> <div>REGISTERED ARCHITECT</div> <div> </div> </div> </div>	Designed		Drawn		JDS		Checked		MH		Design Review Level	
<div> <div>TCF Architecture</div> <div> <p>P. 253.572.3993 124 North I Street Tacoma, Washington, 98405 www.tcfarchitecture.com</p> </div> </div>	EVERETT MALL BUS PLATFORM - DRIVER BUILDING		EXTERIOR ELEVATIONS		A5.01		Drawing		Sheet No.		84	
											Of Total	

LEGEND & ABBREVIATIONS



A. SEE GENERAL NOTES & ABBREVIATIONS ON G2.D1

- [illegible]

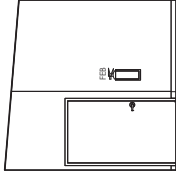
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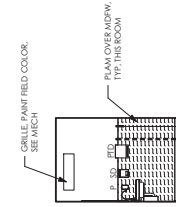
EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

INTERIOR ELEVATION GENERAL NOTES, ABV & LEGENDS

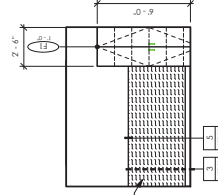
Drawing	A8.01
Sheet No.	84 Of Total



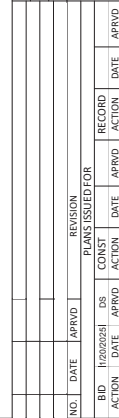
6 101 UTILITY/STG - E
1/4" = 1'-0"



13 103 RESTROOM - N
1/4" = 1'-0"



20 104 RESTROOM - W
1/4" = 1'-0"



Designed
Drawn JDS
Checked MH
Design Review Level

10393
REGISTERED
ARCHITECT
MARK HURLEY
STATE OF MISSISSIPPI

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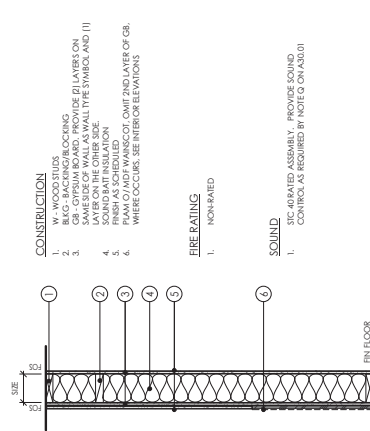
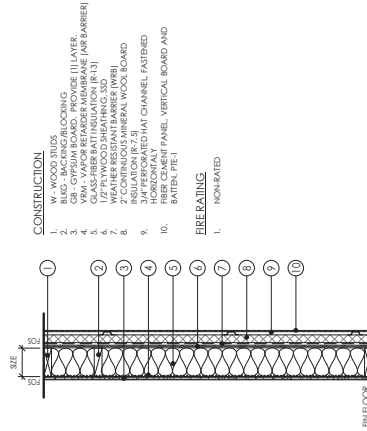
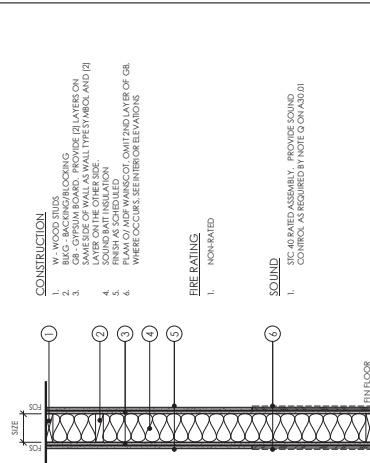
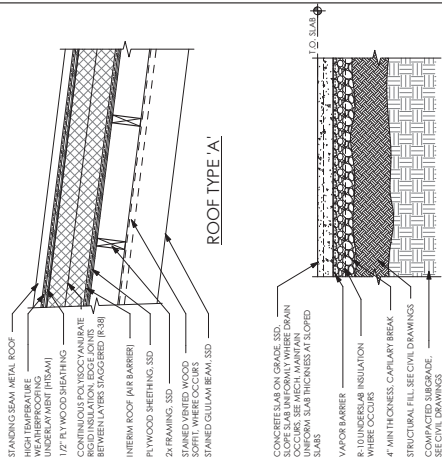
EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

INTERIOR ELEVATIONS

Drawing	A8.02
Sheet No.	84

SE 1/4 SEC 18 T 28N R5E

GENERAL NOTES TO WALL TYPES , BUILDING & WALL SECTIONS

[illegible]

M -	FLOOR, WALL, AND ROOF ASSEMBLIES	<div> Drawing A30.01 </div> <div> Sheet No. 84 </div> <div> OF TOTAL 84 </div>
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EVERETT TRANSIT
 EVERETT MALL BUS PLATFORM -
 DRIVER BUILDING

10493	REGISTERED ARCHITECT	TCF Architecture P 253.572.3993 124 North I Street Tacoma, Washington 98403 www.tcfarchitecture.com
105	MH	
	John C. Goff	

[illegible]

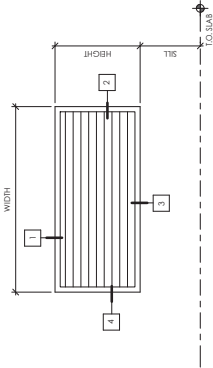


[illegible]

LOUVER, DOOR, FRAME & GLAZING

F.	FINISHES: SEE APPLICABLE SECTIONS IN THE SCHEDULES.
G.	FRAMES SHALL NOT BE FASTENED AT HEAD CONDITIONS UNLESS SPECIFICALLY RECOMMENDED BY THE MANUFACTURER. PROVIDE AN ACCOMMODATE DETECTION OF THE WALL ABOVE.
H.	ALL METAL AND GLASS WORK SHALL ALLOW FOR HORIZONTAL AND VERTICAL THERMAL EXPANSION AND CONTRACTION.
I.	DOOR SCHEDULES: ALL DOOR SCHEDULES SHALL BE CALLED OUT ON DRAWINGS AS TO TYPE, FINISH, WEIGHT, DIMENSIONS, AND OPERATING DIMENSIONS AT LOUVERS, AND OPERATING DIMENSIONS AT HANDLES. DIMENSIONS ARE GIVEN AS ACTUAL FRAME DIMENSIONS.
J.	DOOR SCHEDULES SHALL SHOW FRAME SCHEDULE AND TYPE. ALL DOOR SCHEDULES SHALL BE IDENTIFIED BY THE MANUFACTURER. PROVIDE REQUIRED CLEARANCES FOR INSTALLATION, INCLUDING BUT NOT LIMITED TO, MINIMUM SHAMING AND FINISHES CALLING. ALL AS SHOWN ON DETAILS AND AS NOTED.
K.	DIMENSIONS FOR GLAZING ON DOOR TYPES INDICATE CLEAR GLASSING GLASS SIZE.
L.	WHERE SCHEDULE SHOWS DIMENSIONS, BOTH TOP AND BOTTOM DIMENSIONS SHALL BE INDICATED. THE FRAME HEIGHT SHALL BE INDICATED SUCH THAT THE HEAD DIMENSIONS ARE PROVIDED FOR EASE OF MAINTENANCE.
M.	WHERE THERE ARE ANY VISIBLE CLEARANCES BETWEEN FRAME AND GLASS, THEY SHALL BE CALLED FOR A TIGHT FIT.
N.	WHEREVER METALS OF DIFFERENT GALVANIC RANGE ARE USED, PROVIDE AN ANODE OR ANODES, THRESHOLDS AND HOLLOW METAL DOOR FRAMES SHALL BE PROTECTED AGAINST CORROSION BY METHOD AS APPROVED BY ARCHITECT.
O.	SEE STRUCTURAL DRAWINGS FOR STRUCTURAL REQUIREMENTS. PROVIDE FINISHES AND DRAWINGS SHALL SHOW FRAMEWORKS AND FINISHES.
P.	ALL ELEVATIONS ARE SHOWN AS VIEWED FROM EXTERIOR. DETAILS SHALL SHOW METAL TO BE OPPOSITE HAND OF ACTUAL LOCAL CONDITION.
Q.	ALL DOOR SCHEDULES SHALL BE CALLED OUT AND SHOWN WITH OWNER AND ARCHITECT PRIOR TO INSTALLATION.
R.	LOUVERS: THE LAYOUT SCHEDULE ARE FOR SIZE AND LOCATION. THE LAYOUT SCHEDULE SHALL BE SHOWN ON THE EXTERIOR OF THE BUILDING BUT ALSO AN LOUVER NOT SCHEDULED SHALL BE INCLUDED IN THE ARCHITECTURAL DRAWINGS. ARCHITECT OF ANY DISCREPANCIES PRIOR TO COMMENCING WORK.
S.	GRUBS: CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR.
T.	LOUVERS SHOWN IN DETAILS ARE GENERIC. SEE CONFIGURATION REQUIREMENTS.
U.	FIELD VERTICAL SIZE OF ALL LOUVERS.

SE 1/4 SEC 18 T 28N R5E



LOUVER TYPE A

LOUVER TYPE	LOUVER NUMBER	ROOM NUMBER	DIMENSIONS				DETAILS				OPENING REMARKS
			WIDTH	HEIGHT	SILL		1	2	3	4	
A	1	104	8'-0"	1'-0"	8'-2"		1/4" x 10"	2/4" x 10"	3/4" x 10"	2/4" x 10"	
A	2	101	8'-0"	1'-0"	8'-2"		1/4" x 10"	2/4" x 10"	3/4" x 10"	2/4" x 10"	

SHEET NOTES

A. SEE SHEET A60.10 FOR GENERAL NOTES TO WINDOW, FRAME AND DOOR TYPES, SCHEDULES AND DETAILS.

LOUVER, FRAME & DOOR SCHEDULE ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS MAY BE USED

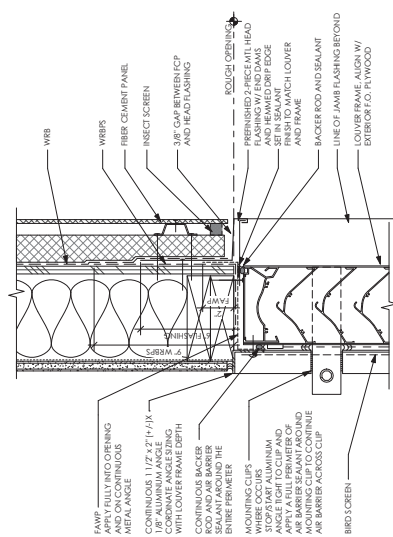
CONSTRUCTION:
AL ALUMINUM
HM HOLLOW METAL
ST STEEL
VL VINYL

FINISH:
FF FACTORY FINISH
SC STAIN AND SEAL (SEE SPECIFICATIONS)

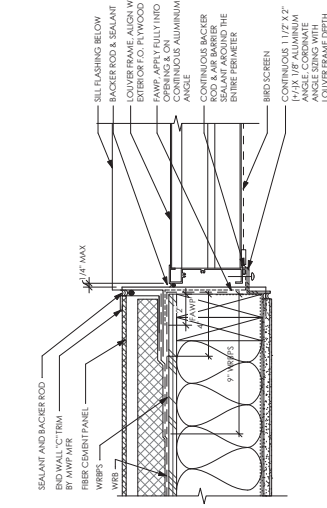
GLASS TYPES:
I INSULATED ALUMINUM PANEL W/ PAINTED FINISH
IT INSULATED THERMO-BREAK ALUMINUM PANEL
ITL INSULATED THERMO-BREAK ALUMINUM PANEL (EXTERIOR)
ITR INSULATED THERMO-BREAK ALUMINUM PANEL (INTERIOR)
ITLZT INSULATED THERMO-BREAK ALUMINUM PANEL (EXTERIOR) / INSULATED THERMO-BREAK ALUMINUM PANEL (INTERIOR) / Z-T
L LAMINATED
T TEMPERED
T-1/2 TEMPERED (1/2" THICK)
T-3/8 TEMPERED (3/8" THICK)
T-1/4 TEMPERED (1/4" THICK)
SPP STRUCTURED POLYCARBONATE PANELS
MOPBERS FOLLOW LOW GLASS TYPE
TR TRANSLUCENT INTERLAYER OF LAMINATED GLASS

NOTE:
AT INSULATED GLASS UNITS WITH A SINGLE LAMINATED PANE, THE INTERLAYER SHALL BE PLACED AT INTERIOR SIDE, TYPE 1, UNLESS SPECIFIED OTHERWISE.

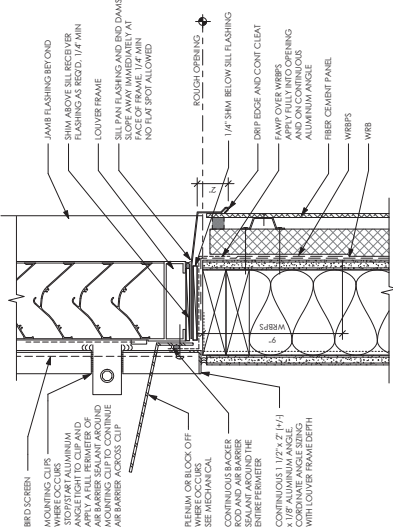
NOTE:
DEGREE OF DOOR OPENING ON PLANS IS GRAPHICALLY ILLUSTRATED AS MINIMUM DEGREES. TYPICALLY, ACTUAL WITHIN BUILDING CONSTRAINTS. ALSO SEE SPECIFICATIONS SECTION 087110.



1 LOUVER HEAD AT FC PANEL



2 LOUVER JAMB AT FC PANEL



3 LOUVER SILL AT FC PANEL

UNISSUED		DESIGN REVIEW		RECORD		ACTION	
NO.	DATE	APPROVED	REVISION	NO.	DATE	APPROVED	REVISION
BID	10/01/2024	DS	CONST	APPROVED	DATE	APPROVED	DATE



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EVERETT MALL BUS PLATFORM - DRIVER BUILDING

LOUVER SCHEDULE & DETAILS

Drawing: A60.10
Sheet No.: 84
Of 104

FLUSH

SE 1/4 SEC 18 | Z8N R5E *

A. SEE SHEET A60.10 FOR GENERAL NOTES TO WINDOW, FRAME AND DOOR TYPES, SCHEDULES AND DETAILS.

B. SEE SHEET A70.01 FOR FRAME PTI DESIGNATION.

- A. HEAD & JAMB DETAILS ARE ONLY NOTED FOR FRAME TYPES HA. SEE FRAME SCHEDULES FOR HEAD AND JAMB DETAILS AT ALL OTHER LOCATIONS.
- B. SEE SHEET 6400.1 FOR GENERAL NOTES TO WINDOW, FRAME AND DOOR TYPES, SCHEDULED TYPES AND DETAILS.
- C. GATES ARE NOT SCHEDULED. SEE SITE PLAN AND DETAILS FOR GATE LOCATIONS AND SIZES.
- D. DEGREE OF DOOR OPENING ON PLANS IS GRAPHICALLY ILLUSTRATED AS NINETY DEGREES. TYPICALLY, A HALF DEGREE OF DOOR OPENING IS TO BE MAXIMUM ALLOWED WITHIN BUILDING CONSTRAINTS. ALSO SEE SPECIFICATIONS.

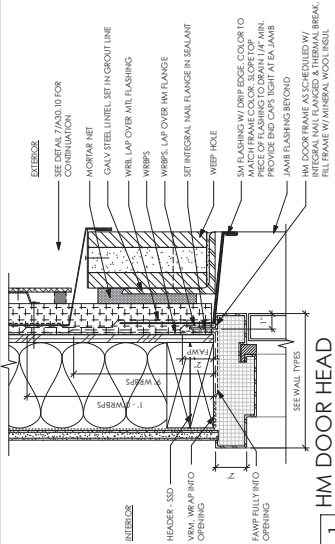
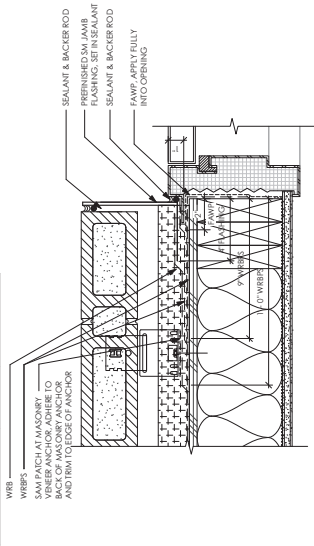
NOTE: NOT ALL ABBREVIATIONS MAY BE USED

CONSTRUCTION	
AL	ALUMINUM
HM	HOLLOW METAL
SS	STAINLESS STEEL
STL	STEEL
VL	VINYL

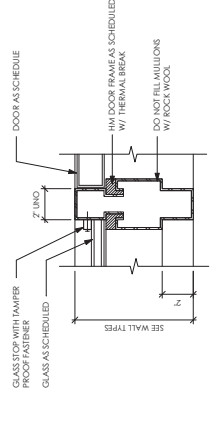
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WT	FRAME NUMBER	ROOM NUMBER	DIMENSIONS			GLASS	CONST/FIN	DETAILS			OPENING REMARKS
			WIDTH	HEIGHT	SILL			1	2	3	
1		100	5'-4"	7'-4"	0"	1" SAFETY	3/4" W/PT	1/4" x 3.10	2/4" x 3.10	4/4" x 3.10	

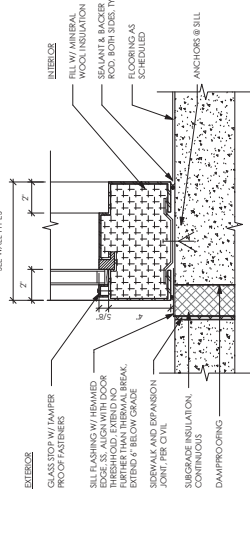
WT	FRAME NUMBER	ROOM NUMBER	DIMENSIONS			GLASS	CONST/FIN	DETAILS			OPENING REMARKS
			WIDTH	HEIGHT	SILL			1	2	3	
1		100	5'-4"		7'-4"	0"		1/16X3.10	2/16X3.10	2/16X3.10	4/16X3.10

 $3'' = 1.0''$ 
$$3^x = 1 \cdot 0^x$$


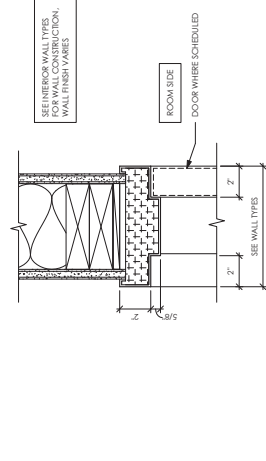
$3^w = 1 \cdot Q^w$



4
 $3^v = 1 \cdot \sigma^v$



5 $3' = 1.0'$



BID	1/20/2025	DS	CONST		DATE	ADD
ACTION	DATE	ADD/O	ACTION			

RECORD	DATE	ADD/D
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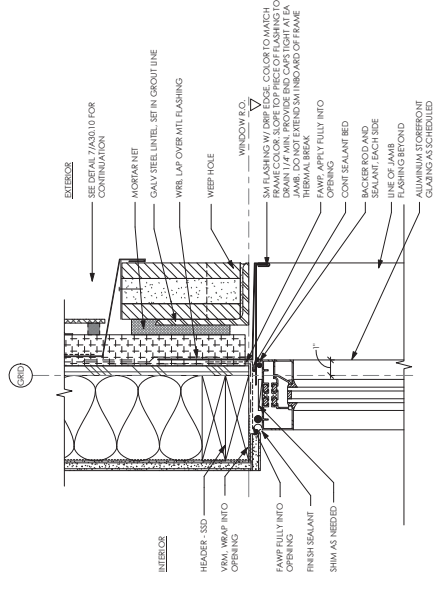


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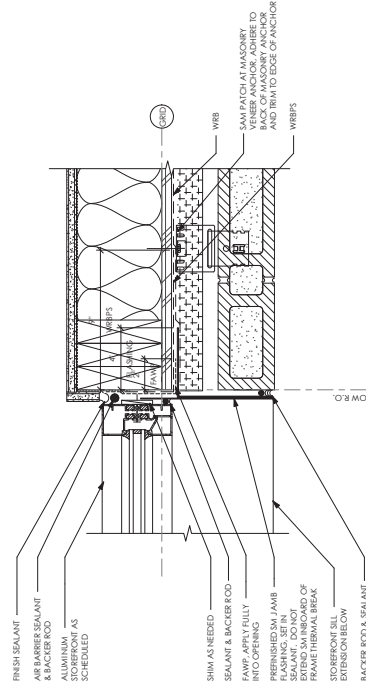
84



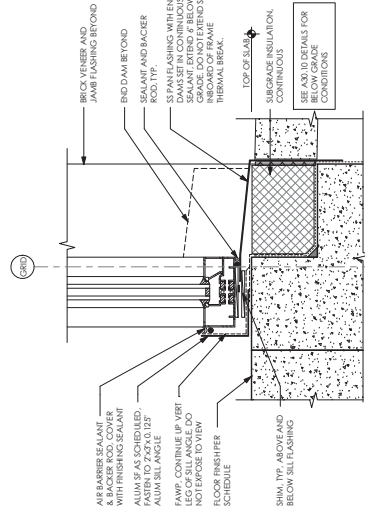
FRAME TYPE	FRAME NUMBER	ROOM			DIMENSIONS			GLASS	DETAILS				OPENING REMARKS
		WIDTH	HEIGHT	SILL	WIDTH	HEIGHT	SILL		1	2	3	4	
SA	1	100	1'-4"	6"	1/4"	7'-4"	6"	1/4"	1/4"	2/4x10	3/4x10	2/4x10	2/4x10
SA	2	100	1'-4"	6"	1/4"	7'-4"	6"	1/4"	1/4"	2/4x10	3/4x10	2/4x10	2/4x10
SA	3	100	1'-4"	6"	1/4"	7'-4"	6"	1/4"	1/4"	2/4x10	3/4x10	2/4x10	2/4x10



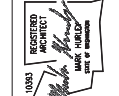
1 STOREFRONT HEAD @ 8" BRICK RECESS



JAMB - STOREFRONT @ BRICK



3 SILL - EXTERIOR STOREFRONT AT TOP OF SLAB

[illegible]

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STOREFRONT FRAMES, SCHEDULES,
AND DETAILS

EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

[illegible]

10393
REGISTERED
ARCHITECT
MARK HURLEY
STATE OF MICHIGAN

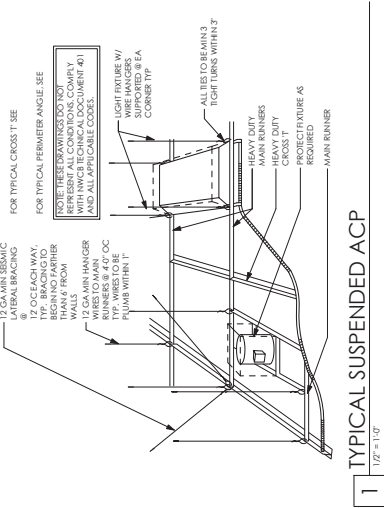


ROOM FINISH SCHEDULE

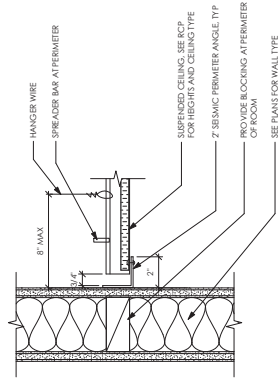
Drawing	A70.01
Sheet No.	84

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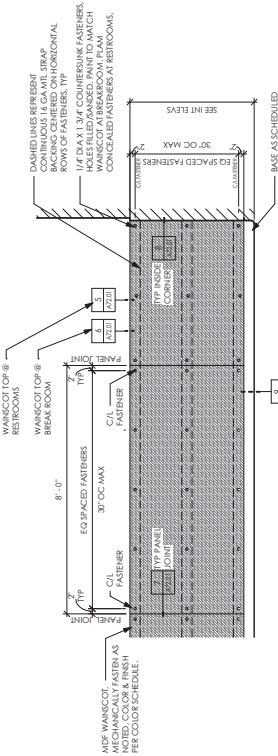
SE 1/4 SEC 18 T 28N R5E



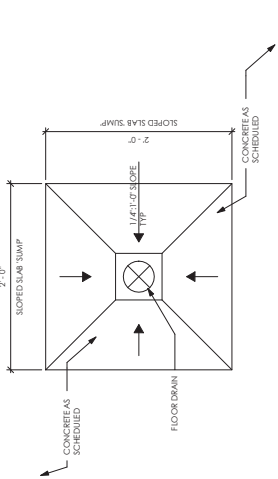
1 TYPICAL SUSPENDED ACP
1/2" = 1'-0"



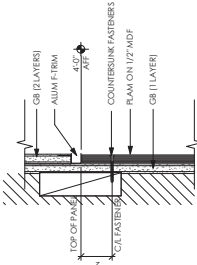
2 TYP ACP TO WALL Moulding
3\"/>



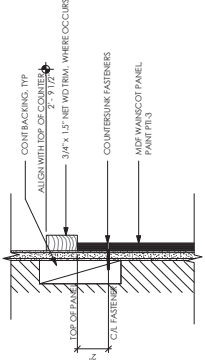
3 TYPICAL MDF WAINSCOT ELEVATION
1/2" = 1'-0"



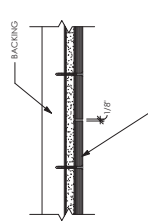
4 DRAIN SUMP
1/2" = 1'-0"



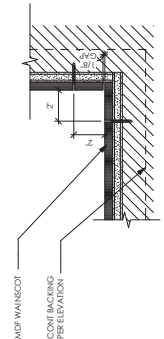
5 MDF WAINSCOT TOP @ RESTROOMS
3\"/>



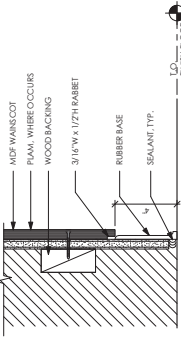
6 MDF WAINSCOT TOP @ BREAK ROOM
3\"/>



7 MDF WAINSCOT JOINT
3\"/>



8 MDF @ INSIDE CORNER
3\"/>



9 MDF WAINSCOT @ RUBBER BASE
3\"/>

NO.	DATE	APPROVED	REVISION
BID	10/02/2024	DS	CONST
ACTION	DATE	APPROVED	ACTION
DATE	APPROVED	DATE	APPROVED

UNIVERSITY OF TEXAS
REGISTERED ARCHITECT
T.C. FLETCHER
124 North I Street
Tacoma, Washington, 98402
www.tcfarchitecture.com

TCF Architecture
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124 North I Street
Tacoma, Washington, 98402
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EVERETT TRANSIT

EVERETT MALL BUS PLATFORM - DRIVER BUILDING

INTERIOR DETAILS

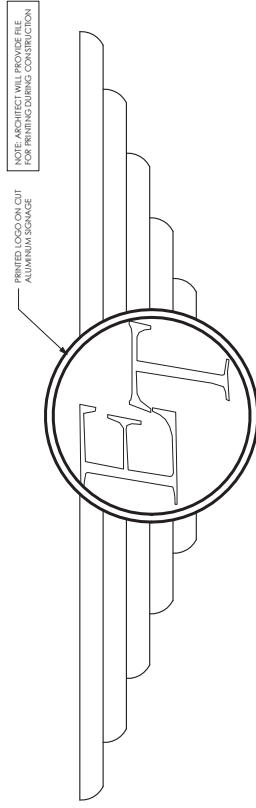
Drawing A72.01
Sheet No. 84
OF 106

1. SEE GENERAL NOTES ON SHEET G20.01 FOR ADDITIONAL INFORMATION.
2. ALL LOCATIONS FOR SIGNAGE LETTERING TO BE VERIFIED BY AN ARCHITECT PRIOR TO INSTALLATION. PROVIDE LETTERS TO BE USED FOR SIGNS WITH INTERIOR LETTERING.
3. DOOR SIGNS SHALL BE PLACED ON THE ENTRY SIDE (SIDE VIEWED AS YOU ENTER THE ROOM) UNLESS NOTED OTHERWISE. SHOW PROPOSED LOCATIONS FOR ALL INTERIOR SIGNAGE. PROVIDE LETTERING FIELD WITH ARCHITECT. VERIFY LOCATION SEALS IMPROPER OR IS IN CONFLICT.
4. CONTRACTOR SHALL REVIEW AND VERIFY INFORMATION FOR EACH LOCATION PRIOR TO BEFORE FABRICATION.
5. SEE ARCHITECTURAL SITE PLAN SHEET CIV-01 FOR DIMENSIONS AND IDEALS FOR SITE SIGNAGE PLACEMENT AND ADDITIONAL INFORMATION.
6. CONTRACTOR TO VERIFY THAT SIGNAGE AS SCHEDULED, WILL FIT PROPERLY IN SPACE PROVIDED. PROVIDE LETTERING FIELD WITH ARCHITECT. COORDINATE ALL CHANGES WITH ARCHITECT PRIOR TO INSTALLATION.
7. ALL SIGNAGE SHALL FULLY COMPLY WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS, INCLUDING, BUT NOT LIMITED TO, MANUFACTURING STANDARDS, MATERIALS, FINISHES, LETTERS, SYMBOLS, BASED ON PHOTOGRAPH AND FIELD VERIFICATION. PROVIDE LETTERING FIELD WITH ARCHITECT FOR ANY CHANGES DURING THE SUBMITTAL PROCESS FOR CLARIFICATIONS.
8. SIGN SIZES ARE APPROXIMATE. PROVIDE CONSISTENT SIZE AS REQUIRED TO MEET ALL APPLICABLE REGULATIONS, NUMBERS, LETTERS, ETC. AND TO MEET CODE.
9. SEE INTERIOR AND EXTERIOR LETTERINGS FOR ADDITIONAL INFORMATION ON SIGNAGE PLACEMENT.
10. SEE DIVISION 10 (INTERIOR & MATERIAL SCHEDULE) FOR SIGN COLORS (F.C.I.).
11. DRAWINGS ARE SHOWN ON ELECTRICAL



2 SIGN TYPE B - ROOM ID $\delta'' = 1'0''$

3 SIGN TYPE C - DIMENSIONAL LETTERING



4 SIGN TYPE D - LOGO

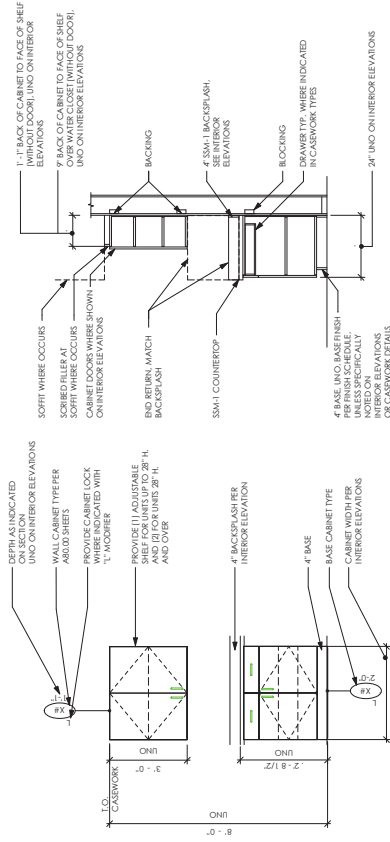
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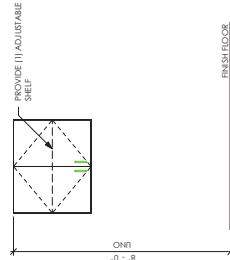
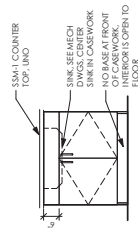


SIGNAGE SCHEDULE & DETAILS

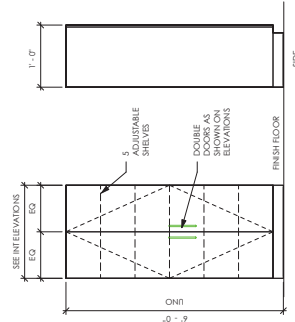
Drawing	A74.01
Sheet No.	84



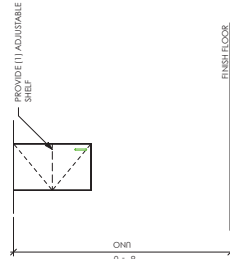
TYPE CASEWORK CONSTRUCTION

WALL CABINET (2)
DOORS

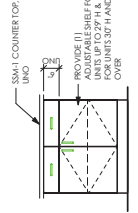
ACCESSIBLE BASE
CABINET W/SINK



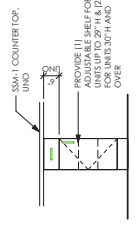
F1	FULL HEIGHT CABINET
----	---------------------



W2 DOOR WALL CABINET (1)



BASE W/ (2) DRAWERS
& (2) DOORS



BASE W/ (1) DRAWER &
(1) DOOR

CASEWORK TYPE LEGEND & GENERAL NOTES

- | ITEM | SEE INTERIOR ELEVATIONS FOR CALCULUS AND NOTATIONS NOT SHOWN OR LISTED HERE |
|------|---|
| 1. | SEE SHEET G SERIES SHEETS FOR LEGEND A, GENERAL NOTES |
| 2. | SEE INTERIOR ELEVATIONS FOR CASKETWORK, SCHEDULED AND USED FOR THE PROJECT |
| 3. | SEE A-60 SERIES SHEETS FOR WINDOW SILL DETAILS |
| 4. | ALL CABINETS SHALL BE FROM A SINGLE MANUFACTURER |
| 5. | FINISH ALL EXPOSED PORTIONS OF CASKETWORK AND COUNTERTOPS |
| 6. | BASES ON CASKETWORK AS PROVIDED BY OTHER TRADES, TYPICALLY 4" |
| 7. | BASES OTHERWISE NOTED |
| 8. | PROVIDE 1/4" RADIUS CORNER AND RADIUS ON INTERIOR CORNERS OF COUNTERS |
| 9. | PROVIDE 1/4" RADIUS CORNER AND RADIUS ON INTERIOR CORNERS OF COUNTERS |
| 10. | PROVIDE 1/4" RADIUS CORNER AND RADIUS ON INTERIOR CORNERS OF COUNTERS |
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SE 1/4 SEC 18 T 28N R5E

- 6.5. SHEETING (WOOD STRUCTURAL PANEL SHEETING)
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STRUCTURAL NOTES

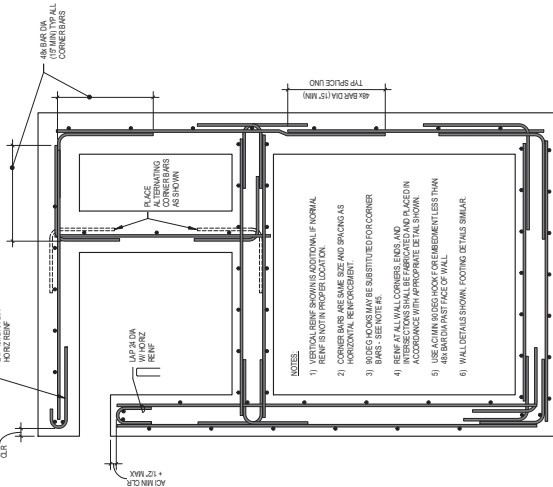
EVERETT MALL BUS PLATFORM -
DRIVER BUILDING



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BID	10/02/2024	DS	CONST	RECORD	ACTION	DATE	APPROV	ACTION	DATE	APPROV

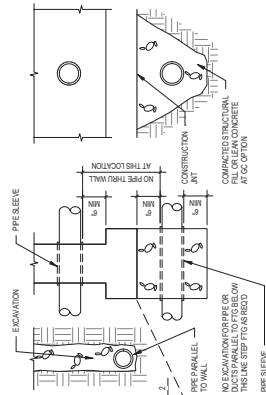


PLAN VIEW TYPICAL REINFORCEMENT PLACING DETAIL

TYPICAL

N.T.S.

9011-1



TYPICAL DETAIL OF PIPE AT CONCRETE FOOTING

TYPICAL

NTS

9011-4



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EVERETT TRANSIT

EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

TYPICAL DETAILS

Drawing

SO.11

84

TYPICAL

N.T.S.	TYPICAL

N.T.S. 9012-4

DRIVER BUILDING

P.253.572.3993

NO	DATE	ADDRES	REVISION	Design Review / Date
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259

SHEARWALL SCHEDULE

APA RATED SHEATHING SHEARWALL NOTES:-

- WALL LEGEND:



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EVERETT TRANSIT

EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

Sheet No. 84 Of Total

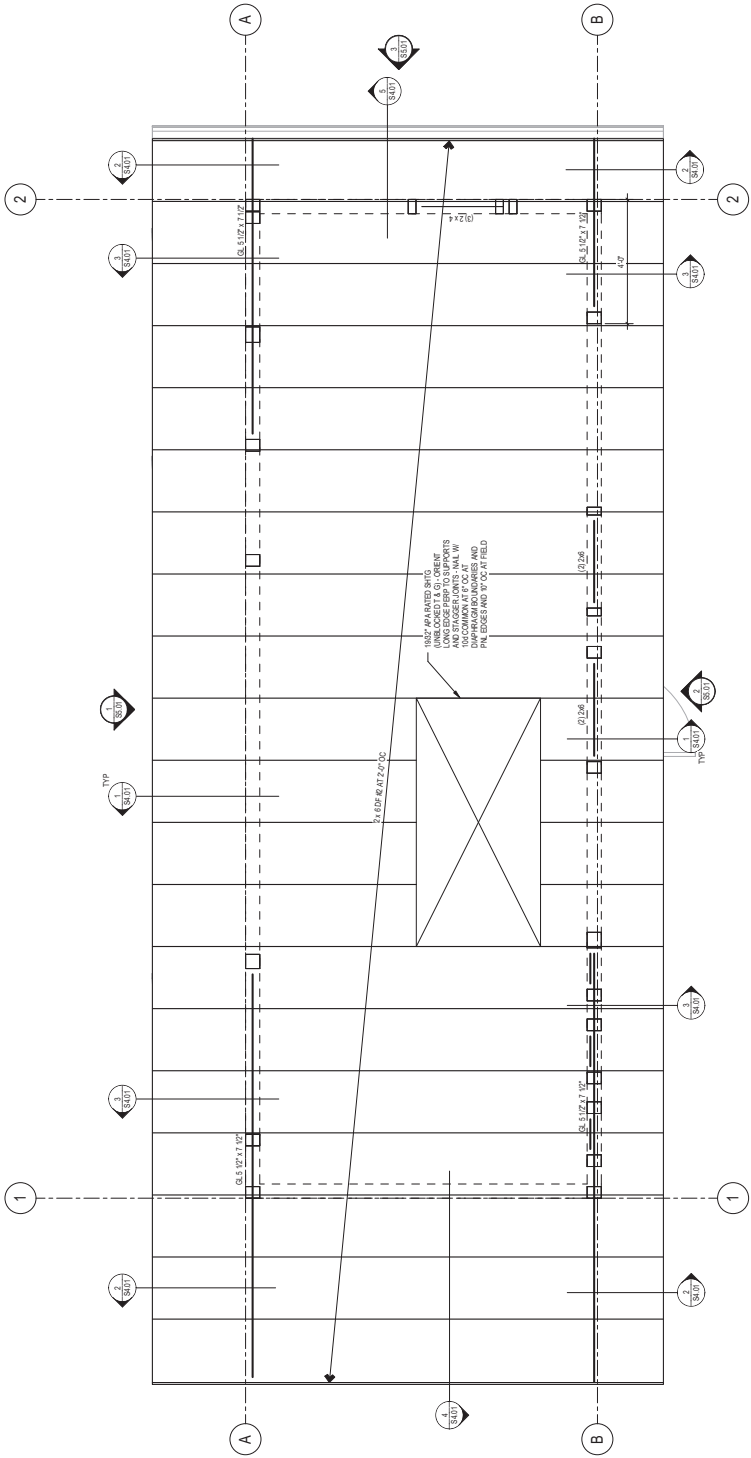
FRAMING NOTES AND SCHEDULES



SE 1/4 SEC 18 T 28N R5E

ROOF FRAMING NOTES

1. VERIFY ALL DIMENSIONS AND SPACING OF STRUCTURAL MEMBERS, JOINTS, AND DETAILS FOR ALL ROOF FRAMING. VERIFY ALL DIMENSIONS AND SPACING OF STRUCTURAL MEMBERS, JOINTS, AND DETAILS FOR ALL ROOF FRAMING.
2. ALL BEAMS SHALL HAVE 7 CAMBER UNLESS NOTED OTHERWISE.
3. VERIFY ALL TOP OF BEAM AND TOP OF WALL ELEVATIONS WITH ARCHITECTURAL DRAWINGS.
4. VERIFY ALL DOOR AND WINDOW HEIGHTS AND HEIGHTS WITH ARCHITECTURAL DRAWINGS.
5. VERIFY ALL DOOR AND WINDOW HEIGHTS AND HEIGHTS WITH ARCHITECTURAL DRAWINGS.
6. ALL SAWN HEADERS SHALL BE OF NO. 1 UNLESS NOTED OTHERWISE.
7. ALL WOOD JOISTS WITH STUDS BELOW WHERE SPACINGS ARE EQUAL.
8. ATTACH NON-STRUCTURAL WALLS TO ROOF PER DETAILS 11.5402 AND 7.5402.
9. UNLESS NOTED OTHERWISE, SHEATHING SHALL BE UNLINED AND ORIENTED WITH LONG DIMENSION PARALLEL TO JOISTS. SHEATHING SHALL BE UNLINED AND ORIENTED WITH LONG DIMENSION PARALLEL TO JOISTS. SHEATHING SHALL BE UNLINED AND ORIENTED WITH LONG DIMENSION PARALLEL TO JOISTS.



1 ROOF FRAMING PLAN
1/2" = 1'-0"



Drawing
S2.01
Sheet No.
84
OF 100

EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

EVERETT TRANSIT



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Designed		Drawn		Checked		T.J.		Design Review	
NO.	DATE	APPROV	REVISION	NO.	DATE	APPROV	REVISION	NO.	DATE
BID	10/02/2024	DS	CONST	PLANS	ISSUED FOR	RECORD	ACTION	DATE	APPROV
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SEE
FOR
CALLOUTS
IN COMMON

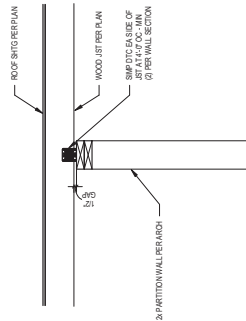
SECTION
3
1" = 1'-0" S401-3



5 SECTION
Ist = Ist - Qst S401-5



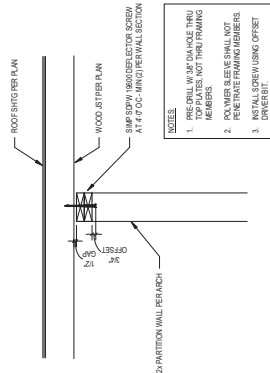
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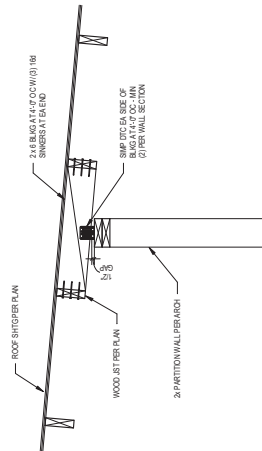
INTERIOR NON-LOAD BEARING
PARTITION WALL - PERPENDICULAR
TO ROOF JOISTS

1 SECTION

1" = 1'-0" S4.02.1



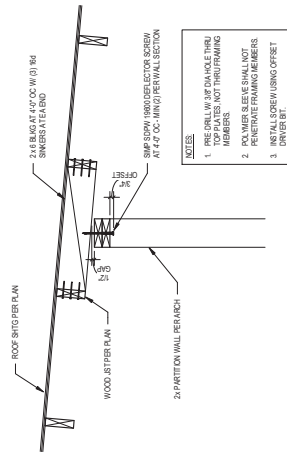
ALTERNATE SCREW CONNECTION



INTERIOR NON-LOAD BEARING
PARTITION WALL - PERPENDICULAR
TO ROOF JOISTS

2 SECTION

1" = 1'-0" S4.02.2



ALTERNATE SCREW CONNECTION

- NOTES
1. PRE-DRILL 1/8\"/>
 2. POLYMER & BITER SHALL NOT PENETRATE FRAMING MEMBERS
 3. INSTALL SCREW USING OFFSET DRIVER BIT.

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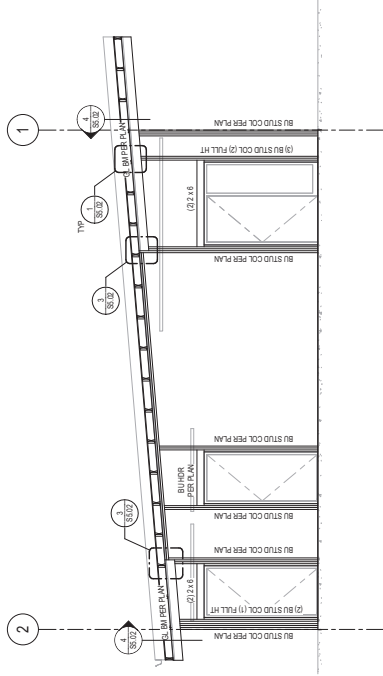
**EVERETT MALL BUS PLATFORM -
DRIVER BUILDING**

FLOOR FRAMING DETAILS

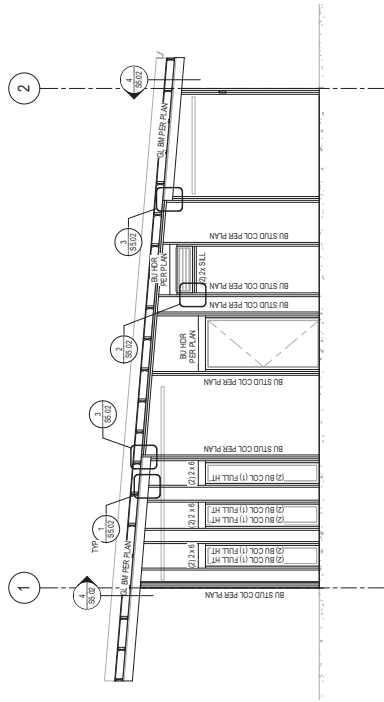
Drawing
S4.02
Sheet No.
84
OF 100



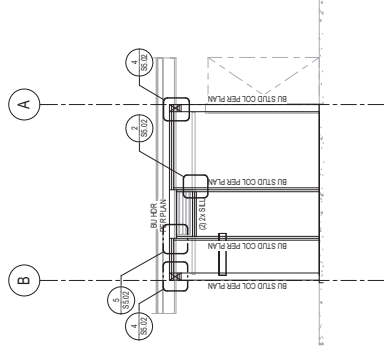
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1 EAST ELEVATION
1/4" = 1'-0"

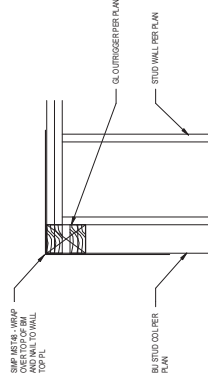
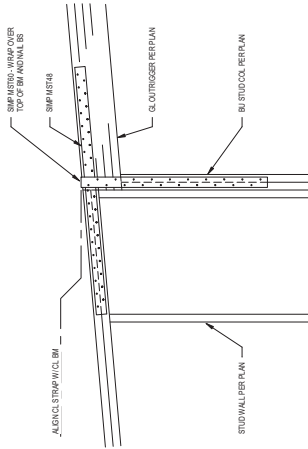
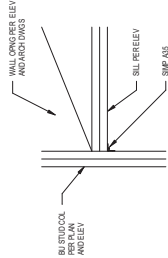
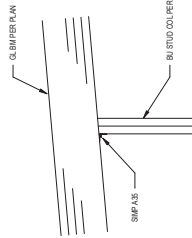


2 WEST ELEVATION
1/4" = 1'-0"



3 SOUTH ELEVATION
1/4" = 1'-0"

SE 1/4 SEC 18 T 28N R5E



1 SECTION

1" = 1'-0" S302.1

2 SECTION

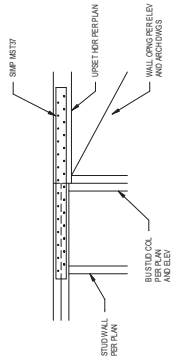
1" = 1'-0" S302.2

3 SECTION

1" = 1'-0" S302.3

4 SECTION

1" = 1'-0" S302.4



5 SECTION

1" = 1'-0" S302.5

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EVERETT MALL BUS PLATFORM - DRIVER BUILDING

WINDOW FRAMING DETAILS

Drawing
Sheet No.
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S5.02



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MECHANICAL LEGEND

H/VAC

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SUPPLY DUCT UP		FLEXIBLE DUCT
	SUPPLY DUCT DOWN		VOLUME DAMPER (VD)
	RETURN, RELIEF, TRANSFER, OSA DUCT UP		MOTORIZED DAMPER
	RETURN, RELIEF, TRANSFER, OSA DUCT DOWN		CEILING RADIANT FIRE DAMPER
	EXHAUST DUCT UP		FIRE DAMPER
	EXHAUST DUCT DOWN		COMBINATION FRESH SMOKE DAMPER
	RECTANGULAR DUCT SQUARE ELBOW UP		FLEXIBLE CONNECTION (DUCT)
	RECTANGULAR DUCT, RADIUS ELBOW UP		TURNING VANES (TV)
	RECTANGULAR DUCT, SQUARE ELBOW DOWN		BACKDRAFT DAMPER (BD)
	RECTANGULAR DUCT, RADIUS ELBOW DOWN		THERMOSTAT (TS/TA)
	ROUND DUCT ELBOW UP		POINT OF CONNECTION
	ROUND DUCT ELBOW DOWN		BELOW FINISHED FLOOR
	CEILING AIR TERMINAL - SQUARE		ABOVE FINISHED FLOOR
	AIR TERMINAL, SIZE, TYPE & CFM		GENERAL CONTRACTOR
	SQUARE DUCT		ROUND DUCT
			ELECTRICAL CONTRACTOR

PLUMBING/HYDRONIC

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	COND		DOMESTIC COLD WATER (CW)
	COND		DOMESTIC HOT WATER (HW)
	GLOVE VALVE		GLOVE VALVE
	PRESSURE REDUCING VALVE (PRV)		PRESSURE REDUCING VALVE (PRV)
	CHECK VALVE (CV)		CHECK VALVE (CV)
	FLOW CONTROL VALVE		FLOW CONTROL VALVE
	TEMP./PRESS. RELIEF VALVE (T&PRV)		TEMP./PRESS. RELIEF VALVE (T&PRV)
	BALL VALVE		BALL VALVE
	PIPE DOWN		PIPE DOWN
	BRANCH-TOP CONNECTION		BRANCH-TOP CONNECTION
	BRANCH-BOTTOM CONNECTION		BRANCH-BOTTOM CONNECTION
	BRANCH-SIDE CONNECTION		BRANCH-SIDE CONNECTION
	FLOW DIRECTION		FLOW DIRECTION
	VALVE IN RISE/ DROP		VALVE IN RISE/ DROP
	PIPE ANCHOR		PIPE ANCHOR
	PIPE GUIDE		PIPE GUIDE
	FLEXIBLE CONNECTION (PIPE)		FLEXIBLE CONNECTION (PIPE)
	REDUCER		REDUCER
	STRAINER		STRAINER
	UNION		UNION
	TRAP PRIMER WITH ACCESS PANEL		TRAP PRIMER WITH ACCESS PANEL
	FLOOR SINK		FLOOR SINK
	DRAIN VALVE		DRAIN VALVE

[illegible]

SE 1/4 SEC 18 T 28N R5E

DOMESTIC WATER CHILLER SCHEDULE

UNIT NO	MANUFACTURER	MODEL	LOCATION	GPH	TEMP° DROP	WEIGHT (LB)	ELECTRICAL	REMARKS
							WATS	IMP VOLT FH
CH-1	ELKAY	ERS1Y	-	1.5	50	35	140	- 120 1 1/2
NOTES FOR DOMESTIC WATER CHILLER SCHEDULE								
1. UNIT SHALL BE UL 350 AND CAN/CSA C22.2 No. 120 CERTIFIED.								
2. PROVIDE WITH WALL MOUNTING KIT.								

PLUMBING FIXTURE SCHEDULE

UNIT NO	FEATURE	MOUNTING	MANUFACTURER AND MODEL NUMBERS						W	V	HW	CW	REMARKS
P-1	WATER CLOSET	WALL	TOILET:	SLOAN ST-269					4"	2"	-	1"	1.6 GPF MANUAL FLUSHOMETER, PROVIDE WITH BOLT CAPS.
			SEAT:	CHURCH 8500CT									
			FLUSH VALVE:	SLOAN ROVAL 111-1.6									
P-2	URINAL ADA	WALL	URNAL:	SLOAN SU-109					2"	1-1/2"	-	3/4"	0.125 GPF MANUAL FLUSHOMETER, ADA COMPLIANT. RM MUST BE 16' AFF.
			FLUSH VALVE:	SLOAN ROVAL 186-0.125 DBP									
			SINK:	TOTO LT724G									ADA COMPLIANT, PROVIDE WITH PLUMBERX/SPECIALTY PRODUCTS INC ADA INSULATOR KIT. SET DELIVERY TEMPERATURE TO 103°F. PROVIDE MANUFACTURER'S MIXING VALVE, RECESS MIXING VALVE AND ECO-CONTROLLER IN A VALUE BOX.
P-3	LAVATORY ADA	WALL	FITTINGS:	TOTO T26SS1ET					2"	1-1/2"	1/2"		
			SUPPLIES:	MCQUIRE MANUFACTURING LF2165									
			TRAP:	MCQUIRE MANUFACTURING 887ZC									
			MIXING VALVE:	BRADLEY S59-4000									
P-4	1-COMP SINK ADA	UNDER MOUNT	SINK:	KOHLER K-3315B									ADA COMPLIANT, PROVIDE WITH PLUMBERX/SPECIALTY PRODUCTS INC ADA INSULATOR KIT. SET MAXIMUM HOT WATER DELIVERY TEMPERATURE TO 108°F. PROVIDE MIXING VALVE WITH MOUNTING BRACKET. BRADLEY MODEL S46-2405; SET TRAP PARALLEL TO WALL.
			FITTINGS:	CHICAGO FAUCETS 786-SN84ZEABCP									
			SUPPLIES:	MCQUIRE MANUFACTURING LF2165					2"	1-1/2"	1/2"		
			WASTE:	JUUST JADA-35 FS									
			TRAP:	MCQUIRE MANUFACTURING 887ZC									
			MIXING VALVE:	BRADLEY S59-4000									
P-5	APPLIANCE CONNECTION	WALL	UNIT:	GUY GRAY VSM56AB					-	-	1/2"		PROVIDE WITH INTEGRAL WATER HAMMER ARRESTOR.

TANKLESS WATER HEATER SCHEDULE

UNIT NO	MANUFACTURER	MODEL	LOCATION	TYPE	INPUT KW	TEMP° RISE	WET WEIGHT (LB)	ELECTRICAL			STARTER FURNISHED BY	DISCONNECT FURNISHED BY	REMARKS	
								MCA	MOP	PH				
TWH-1	EEMAX	SPF420T	-	ELECTRIC	4.1	56	5	20	-	208	1	MFR	EC	12.3
TWH-2	EEMAX	SPF420T	-	ELECTRIC	4.1	56	5	20	-	208	1	MFR	EC	12.3
TWH-3	BOSCH	TR6100C-18	-	ELECTRIC	18	45	15	90	-	208	1	MFR	EC	12.3

NOTES FOR TANKLESS WATER HEATER SCHEDULE

1. SINGLE POINT POWER CONNECTION. PROVIDE ALL POWER TRANSFORMERS AS NECESSARY.
2. SET TEMPERATURE AT 105F.
3. PROVIDE WITH ADJUSTABLE TEMPERATURE INTERFACE.
4. PROVIDE WITH PRESSURE RELIEF VALVE ON THE HOT WATER DISCHARGE; FIELD ROUTE TO TANK.

HOT WATER HEAT RECOVERY DEDICATED OUTSIDE AIR UNIT SCHEDULE

UNIT NO	MANUFACTURER	MODEL	SUPPLY FAN DATA						EXHAUST FAN DATA						HEATING				COOLING				HEAT EXCHANGER DATA - HEATING				HEAT EXCHANGER DATA - COOLING				FILTERS				ELECTRICAL	WEIGHT (LBS)	STARTER FURNISHED BY	DISCONNECT FURNISHED BY	REMARKS
			CFM	QTY	HP	BHP	ESP	RPM	CFM	QTY	HP	BHP	ESP	RPM	MBH	HSP2	COP	LAT	TOTAL MBH	SENSIBLE MBH	EER	SEERS	SENSIBLE	LATENT	OSA CFM	SENSIBLE	LATENT	OSA CFM	OSA	EXHAUST	MCA	MOP	VOLTS	PH					
COL-1	EPHCCA	ADP0IRAH1	400	1	1/16	1/25	0.6	-	640	1	1/16	1/25	0.6	-	14	8.64	3.3	93	14	11.6	11.2	13.35	83.1	60.3	80	68.1	51.2	80	MERV13	MERV3	20	35	120	1	200	MFR	EC	12,34,56,7,8	
COL-2	EPHCCA	ADP0IRAH1	400	1	1/16	1/25	0.6	-	640	1	1/16	1/25	0.6	-	14	8.64	3.3	93	14	11.6	11.2	13.35	83.1	60.3	80	68.1	51.2	80	MERV13	MERV3	20	35	120	1	200	MFR	EC	12,34,56,7,8	
COL-3	EPHCCA	ADP0IRAH1	400	1	1/16	1/25	0.6	-	640	1	1/16	1/25	0.6	-	14	8.64	3.3	93	14	11.6	11.2	13.35	83.1	60.3	80	68.1	51.2	80	MERV13	MERV3	20	35	120	1	200	MFR	EC	12,34,56,7,8	

NOTES FOR HEAT RECOVERY UNIT SCHEDULE

1. PROVIDE WITH SINGLE POINT POWER CONNECTION
2. PROVIDE BOTH SUPPLY AND EXHAUST FAN MOTORS WITH ECM MOTORS
3. PROVIDE BACKFIRE GATEWAY AND LOCAL THERMOSTAT.
4. ALL FANS SHALL BE INTERNALLY SPRING SOULATED
5. PROVIDE WITH INTEGRATED BYPASS.
6. UNIT SHALL BE FULLY ACCESSIBLE FROM BELOW.
7. EXTERNAL STATIC PRESSURE DOES NOT INCLUDE PRESSURE DROP DUE TO EXHAUST FAN
8. PROVIDE WITH ALL DUCTWORK CONNECTION TO EQUIPMENT OPENINGS.

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EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

MECHANICAL SCHEDULES I

Drawing	M0.02
Sheet No.	84

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GRILLES, REGISTERS & DIFFUSERS SCHEDULE

UNIT NO	MANUFACTURER	MODEL	DESCRIPTION	AIR PATTERN	MOUNTING	FACE SIZE	COLOR REMARKS
CD-1	TITUS	TDC-1	SUPPLY CEILING DIFFUSER	1 WAY	T-BAR	23-3/4" X 23-3/4"	WHITE FRAME 3
SDS	TITUS	300RL	SIDEWALL SUPPLY DIFFUSER	DOUBLE DEFLECTION	SURFACE	NECK SIZE +1-3/4" TOTAL	WHITE 1, 2
RG	TITUS	50F-A	RETURN/RELIEF GRILLE	-	T-BAR	23-3/4" X 23-3/4"	WHITE
RGS	TITUS	350RL	SIDEWALL RETURN/RELIEF GRILLE	-	SURFACE	NECK SIZE +1-3/4" TOTAL	WHITE 1, 2
TG	TITUS	50F-A	TRANSFER GRILLE	-	T-BAR	23-3/4" X 23-3/4"	WHITE
TGS	TITUS	350RL	SIDEWALL TRANSFER GRILLE	-	SURFACE	NECK SIZE +1-3/4" TOTAL	WHITE 2

NOTES FOR GRILLES, REGISTERS & DIFFUSERS SCHEDULE

1. FURNISH WITH OPPOSED BLADE DAMPER (OBD)
2. FURNISH WITH HORIZONTAL FRONT BLADES

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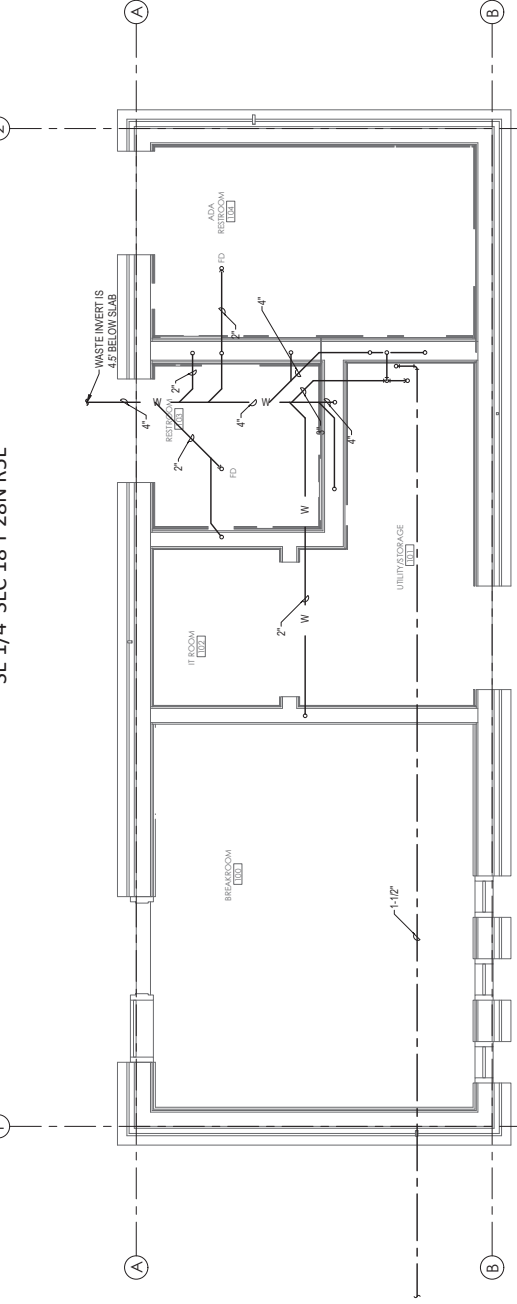
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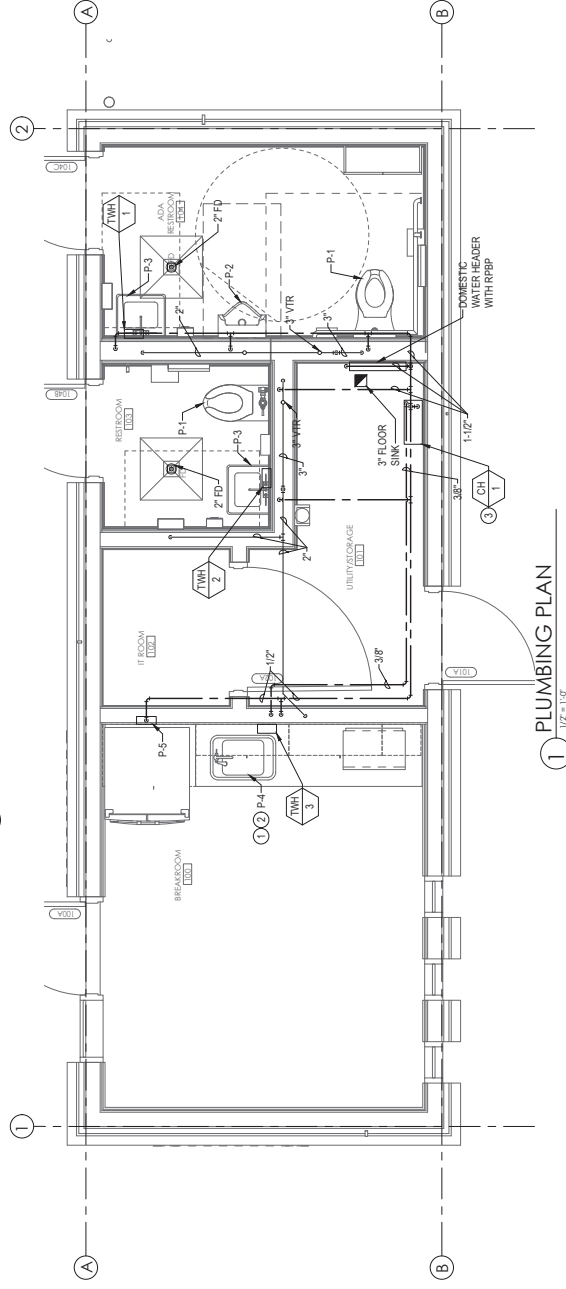
EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

MECHANICAL SCHEDULES II

SE 1/4 SEC 18 T 28N R5E



2 PLUMBING FOUNDATION PLAN
1/2" = 1'-0"



1 PLUMBING PLAN
1/2" = 1'-0"

GENERAL NOTES

1. WASTE PIPING SHALL BE SLOPED AT 1/4" LINEAR FOOT.
2. ALL PIPING SHALL BE RAN CONCEALED IN ROOMS 100, 102, AND 103.

CONSTRUCTION NOTES

1. 3/8" DOMESTIC CHILLED DRINKING WATER WALL FAUCET WITH BLUE LEVER, SHALL EXTEND FROM WALL MINIMUM 6" APPROXIMATELY 12" ABOVE COUNTER. PROVIDE LABEL STATING "CHILLED DRINKING WATER".
2. 3/8" HOT WATER SCOUT SHALL EXTEND FROM WALL MINIMUM 6" APPROXIMATELY 12" ABOVE COUNTER. PROVIDE LABEL STATING "CAUTION HOT WATER". SHALL BE SUPPLIED BY TWH-3 AT 140°F BYPASSING THERMOSTATIC MIXING VALVE FOR P-4.
3. PROVIDE ELKAY #51296C WATER FILTER AND WALL MOUNTING KIT.



Drawing		M2.01	
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EVERETT MALL BUS PLATFORM - DRIVER BUILDING

PLUMBING PLAN

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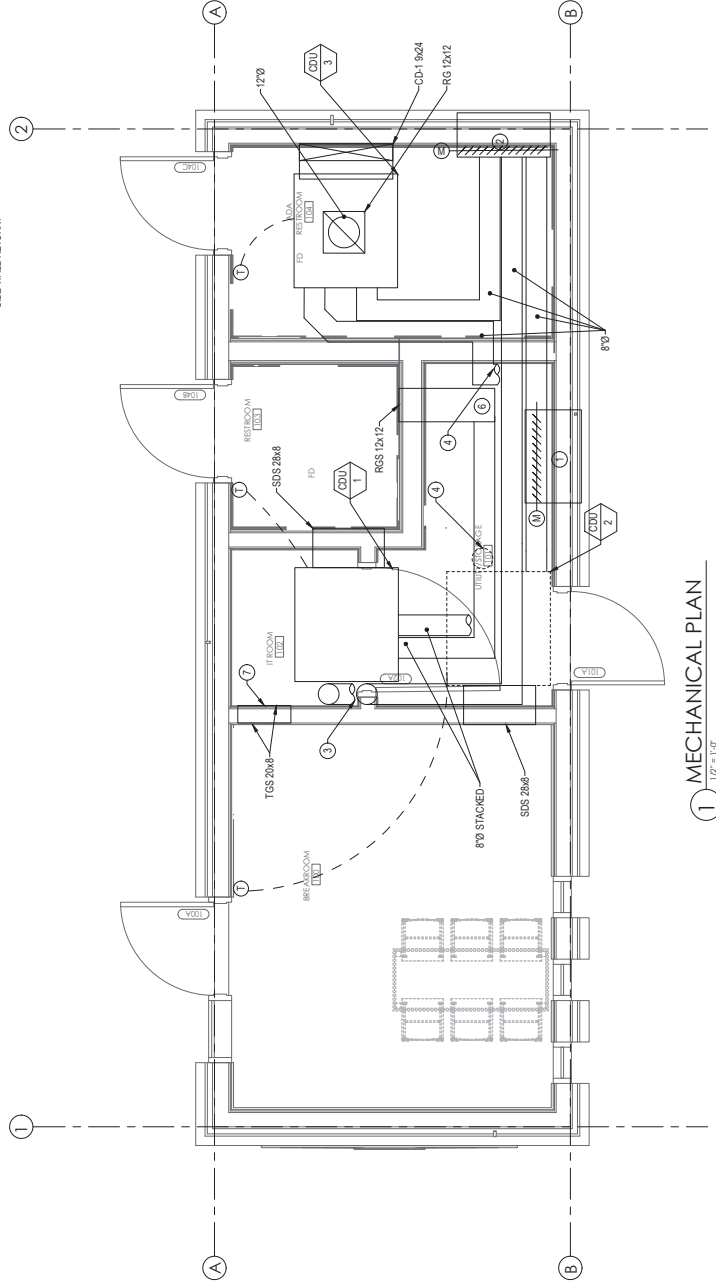
GENERAL NOTES

1. CDU-1 AND CDU-3 SHALL BE MOUNTED AS CLOSE TO THE ROOF DECK AS POSSIBLE.
2. CDU-2 SHALL BE 12" LOWER THAN CDU-1.
3. ROUTE 3/4" CONDENSATE FROM EACH CDU-X UNIT TO THE 3" FLOOR SINK IN ROOM 101. SLOPE CONDENSATE AT 1/8" PER LINEAR FOOT.

CONSTRUCTION NOTES

1. EXHAUST LOUVER PROVIDE MINIMUM 12" DEPTH OF INSULATED PLENUM BOX AT 12x36. PROVIDE WITH MOTORIZED DAMPER.
2. OUTSIDE AIR LOUVER PROVIDE MINIMUM 12" DEPTH OF INSULATED PLENUM BOX AT 12x36. PROVIDE WITH MOTORIZED DAMPER.
3. 8"Ø EXHAUST TO EXHAUST LOUVER.
4. 8"Ø EXHAUST TO EXHAUST LOUVER.
5. 8" EXHAUST DUCT TO EXHAUST LOUVER PLENUM BOX.
6. RECTANGULAR 12x12 PLENUM BOX CONNECTED TO SIDE WALL RETURN.

7. ZSTYLE AIR TRANSFER DUCT IN WALL.

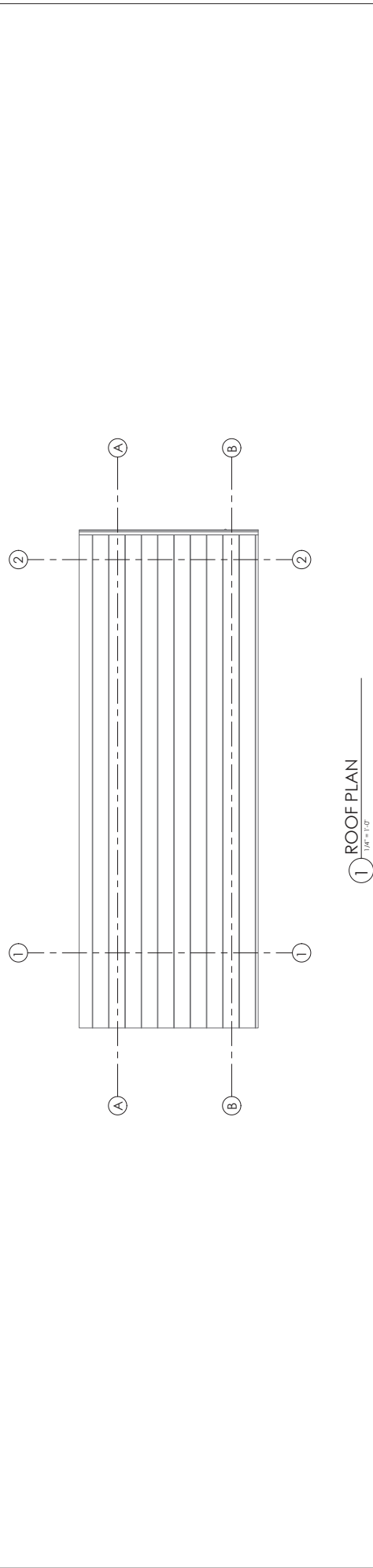


1 MECHANICAL PLAN
1/8" = 1'-0"

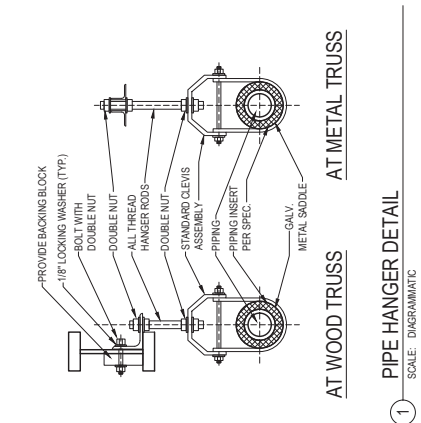
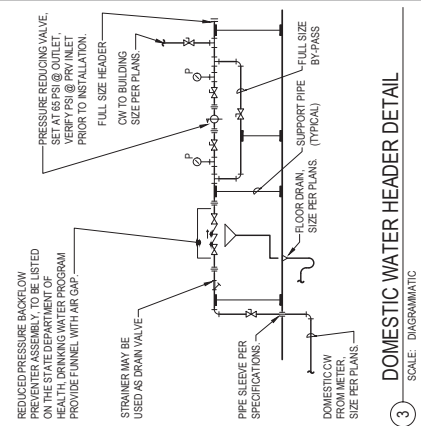
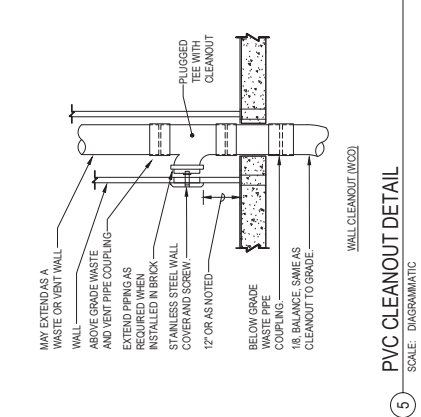
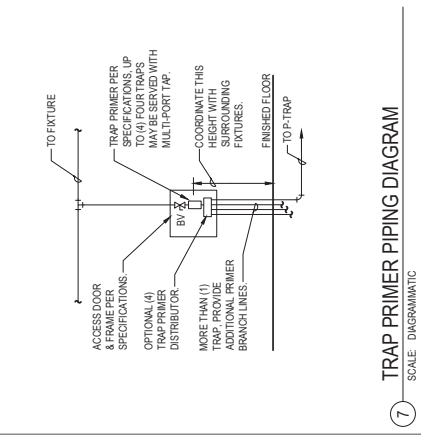
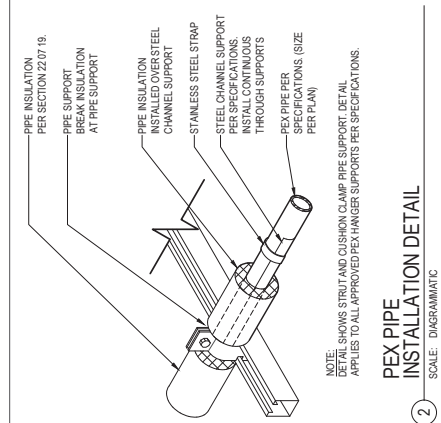
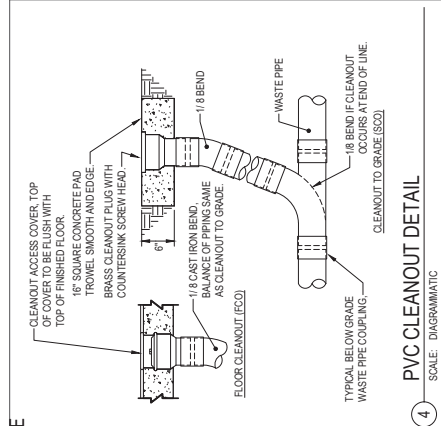
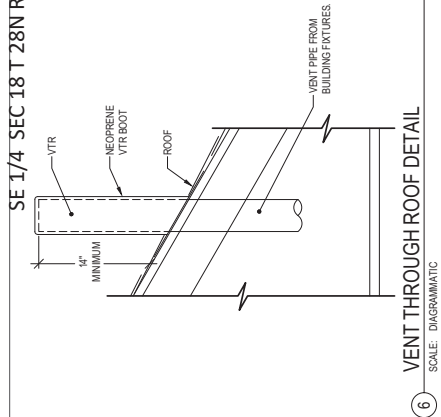
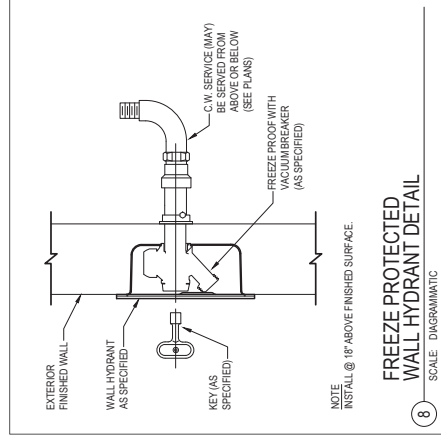


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Designed By Checked Design Review Date		REVISION PLAN ISSUED FOR		RECORD ACTION		RECORD ACTION		RECORD ACTION	
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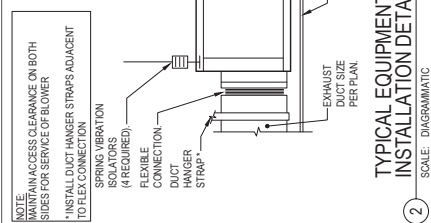
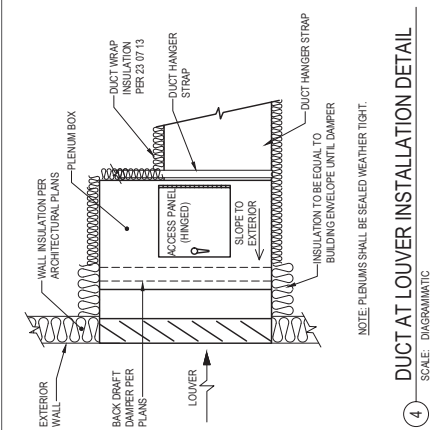
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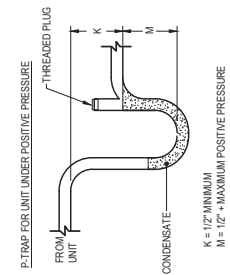
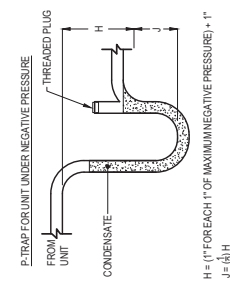
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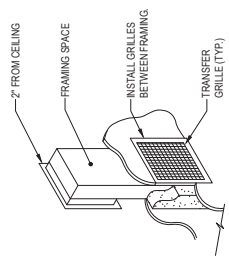
4 DUCT AT LOUVER INSTALLATION DETAIL
SCALE: DIAGRAMMATIC

2 TYPICAL EQUIPMENT
INSTALLATION DETAIL
SCALE: DIAGRAMMATIC



PRESSURE	H	J	K	M
1" W.C.	2"	1"	1 1/2"	1-1/2"
2" W.C.	3"	1.5"	1 1/2"	2-1/2"
3" W.C.	4"	2"	1 1/2"	3-1/2"

3 CONDENSATE P-TRAP DETAIL
SCALE: DIAGRAMMATIC



1 TRANSFER GRILLE INSTALLATION DETAIL
SCALE: DIAGRAMMATIC

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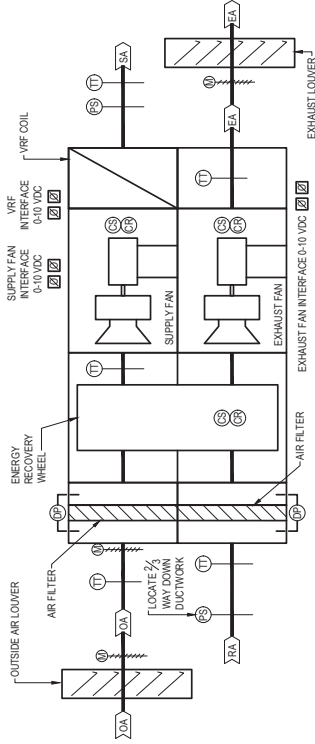
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EVERETT TRANSIT

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DRIVER BUILDING



DEDICATED OUTDOOR AIR UNIT (DOAS-1)

- A. GENERAL
1. ZONE SPACE TEMPERATURE SENSORS SHALL BE EQUIPPED WITH PUSHBUTTONS TO PROVIDE UNOCCUPIED OVERRIDE REQUEST. OVERRIDE RUNTIME SHALL BE 2 HOURS (VAR).
 2. UNIT SHALL BE PROGRAMMED FOR START/STOP THROUGH THE DDC SYSTEM BASED ON DESIGNED OCCUPIED MODES WITH WEEKDAY, WEEKEND AND HOLIDAY SCHEDULES.
- B. SUPPLY FAN
1. SUPPLY FAN SHALL START VIA A SCHEDULE (VAR), OVERRIDE COMMAND (VAR), OR COOL-DOWN MODE COMMAND (VAR). OVERRIDE COMMAND CAN BE TRIGGERED BY A ZONE SPACE TEMPERATURE SENSOR UNOCCUPIED OVERRIDE REQUEST OR BY EMCS USER INTERFACE. COOL-DOWN MODE COMMAND IS GENERATED BY AN EMCS OPTIMIZATION ROUTINE WHEN THE OUTDOOR AIR TEMPERATURE IS A MINIMUM 5°F BELOW THE WARMEST SPACE TEMPERATURE SERVED BY THEIR RESPECTIVE UNIT.
 2. OUTSIDE AIR DAMPER SHALL OPEN UPON ACTIVATION AND FAN SHALL START VIA DAMPER END SWITCH. DAMPER SHALL FAULT CLOSED.
 3. FAN ALARM ACTIVATES IF FAN STATUS FAILS TO ACTIVATE AFTER FAN HAS BEEN STARTED. EMCS RECORDS FAN ALARM.
 - a. FAN ALARM ACTIVATES IF FAN STATUS FAILS TO ACTIVATE AFTER FAN HAS BEEN STARTED. EMCS RECORDS FAN ALARM.
 - b. HARDWARE FAN SHUTDOWN UPON ACTIVATION OF FIRE/SMOKE ALARM. EMCS RECORDS FIRE/SMOKE ALARM.
 - c. HARDWARE FAN SHUTDOWN UPON HIGH DUCT PRESSURE ALARM ACTIVATION. EMCS RECORDS HIGH PRESSURE ALARM.
- C. EXHAUST FAN
1. EXHAUST FAN OPERATES WHENEVER THE SUPPLY FAN IS PROVIDED ON.
 2. EXHAUST DAMPER SHALL OPEN UPON ACTIVATION AND FAN SHALL START VIA DAMPER END SWITCH. DAMPERS SHALL FAULT CLOSED.
 3. FAN ALARMS:
 - a. FAN ALARM ACTIVATES IF FAN STATUS FAILS TO ACTIVATE AFTER FAN HAS BEEN STARTED. EMCS RECORDS FAN ALARM.
 - b. HARDWARE FAN SHUTDOWN UPON ACTIVATION OF FIRE/SMOKE ALARM. EMCS RECORDS FIRE/SMOKE ALARM.
 - c. HARDWARE FAN SHUTDOWN UPON HIGH DUCT PRESSURE ALARM ACTIVATION. EMCS RECORDS HIGH PRESSURE ALARM.
- D. HEAT PUMP
1. HEAT PUMP CONDITIONS IS OFF WHEN FAN STATUS IS OFF.
 2. HEAT PUMP CONDITIONING MODULATES TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.
- E. TEMPERATURE SETPOINT
1. DISCHARGE AIR TEMPERATURE (DAT) SETPOINT SHALL VARY BETWEEN 60°F TO 78°F (VAR). AT THE START OF EACH MORNING, AFTER MORNING WARMUP, HEAT PUMP SHALL START AND MAINTAIN DAT SETPOINT.
 2. INCREMENT THE DAT BY 2°F IF ANY HEAT PUMP UNIT IS UNABLE TO MAINTAIN THEIR RESPECTIVE HEATING SPACE TEMPERATURE HEATING SETPOINT FOR 10 CONSECUTIVE MINUTES (VAR).
 3. DECREMENT THE DAT BY 2°F IF ALL HEAT PUMP UNITS ARE ABLE TO MAINTAIN THEIR RESPECTIVE HEATING SPACE TEMPERATURE SETPOINT FOR 60 CONSECUTIVE MINUTES (VAR).
 4. A SOFTWARE PUSHBUTTON MAXIMUM COOLING MODE SHALL BE PROVIDED THAT WILL ADJUST THE DAT SETPOINT DOWN TO 55°F (VAR) AND SCHEDULE ITS OPERATION DURING AN OPTIMUM START COOL DOWN ON OCCUPIED MODE OPERATION.
- F. FIRE ALARM SHUTDOWN
1. UPON A GENERAL FIRE ALARM ALL AIR HANDLING EQUIPMENT SHALL SHUTDOWN.
- G. INFORMATIONAL/NOTE TERMINAL
- UNIT OPERATING MODE (OCCUPIED/UNOCCUPIED)
 - TEMPERATURES (°F) OUTSIDE AIR, SUPPLY AIR, EXHAUST AIR, RETURN AIR, AND ENERGY RECOVERY SUPPLY AIR
 - DISCHARGE AIR TEMPERATURE SETPOINT
 - ALL DAMPER POSITIONS (% COMMAND OPEN)
 - DAMPER END SWITCH STATUS
 - SUPPLY FAN START/STOP STATUS
 - SUPPLY FAN START/STOP STATUS
 - ALL FILTER DIFFERENTIAL PRESSURES (IN W.G.)

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**EVERETT MALL BUS PLATFORM -
DRIVER BUILDING**

SEQUENCE OF OPERATION I

ELECTRICAL LEGEND

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LIGHTING FIXTURE SCHEDULE									
SYMBOL	FIXTURE DESCRIPTION	METALUX #	MANUFACTURER/MODEL #	LAMPS	V	W	MOUNTING & REMARKS		
PL1	4' PENDANT MOUNTED LINEAR LED FIXTURE	45N448SL	UNIV L840-QD-1	LED 4586	120V	277	32	SUSPEND THE BOTTOM OF FIXTURE AT 4'-0" AFF	
PLZE	4' PENDANT MOUNTED LINEAR LED FIXTURE WITH EMERGENCY BATTERY PACK	45N441SL	UNIV L840-QD-1-ELIOW	LED 3848	120V	277	26	SUSPEND THE BOTTOM OF FIXTURE AT 4'-0" AFF	
RL1	6" DOWNLIGHT CAN LED FIXTURE	HALO COMMERCIAL	PRFS120010 PR812M20RFSMW 100LM4000K	LED 1000	120	10			
RL2	4" RECESSED LED FIXTURE	NULITE #	R64-DRF-10-146 UNV-Q-1-MHX-4	LED 3884	120V	277	32		
WL1	2' WALL MOUNTED LED FIXTURE	PRECISION ARCHITECTURAL LIGHTING	A3306-H4-K6-8-2-FIN-LO-HO-UNV-J-M1	LED 1748	120V	277	14	MOUNT THE BOTTOM OF FIXTURE AT 4" CENTERED ABOVE THE MIRROR. MOUNT BACKBOX HORIZONTAL TO MATCH FIXTURE PROFILE.	
SL1	4' WET RATED SURFACE MOUNTED LED FIXTURE	LED	UNIV L840-QD-1-ELIOW	LED 3848	120V	277	43	SURFACE MOUNTED TO BOTTOM OF ROOF. PROVIDE WITH INTEGRATED OCCUPANCY SENSOR.	
SLIE	4' WET RATED SURFACE MOUNTED LED FIXTURE WITH EMERGENCY BATTERY PACK	LED	UNIV L840-QD-1-ELIOW	LED 3848	120V	277	43	SURFACE MOUNTED TO BOTTOM OF ROOF. PROVIDE WITH INTEGRATED OCCUPANCY SENSOR.	

LIGHTING FIXTURE SCHEDULE NOTES

1.
- FOR ALL LIGHTING CONTROLS THAT INCLUDE DAYLIGHT HARVESTING SENSORS, OCCUPANCY SENSORS, PHOTO SENSORS, AND DIMMER SWITCHES, THE CONTRACTOR SHALL PROVIDE THE FOLLOWING INFORMATION TO THE OWNER:
1. THE TYPE OF SENSORS AND SWITCHES TO BE USED.
2. THE LOCATION OF SENSORS AND SWITCHES.
3. THE WIRING AND CONNECTIONS FOR SENSORS AND SWITCHES.
4. THE STATE ENERGY CODE, COMMISSIONING AND DOCUMENTATION REQUIREMENTS PER C103, C405 AND C408.
2.
- ELECTRICAL CONTRACTOR SHALL COORDINATE ALL LIGHT FIXTURE FINISH COLORS WITH ARCHITECT AND THE OWNER.
3.
- COORDINATE TIME/CLOCK SCHEDULE WITH THE OWNER HOURS.

NO. DATE APRVD

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BID 10/09/2024

DATE APRVD

CONSTR

DATE APRVD

RECORD

DATE APRVD

ACTION

Designed: JLS

Drawn: JAB

Checked: CH

Design Review: JAB



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EVERETT MALL BUS PLATFORM - DRIVER BUILDING

LIGHTING FIXTURE SCHEDULE

Drawing: E0.02

Sheet No.: 84

Of Total: 84

GENERAL NOTES (APPLY TO ALL DRAWINGS)

SEE EACH SHEET FOR ADDITIONAL GENERAL NOTES THAT ARE SP

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CONSTRUCTION NOTES

- ① ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT DISCONNECT AND FUSE SIZE WITH INSTALLED EQUIPMENT NAMEPLATE DATA PRIOR TO ORDER.

TANKLESS WATER HEATER SCHEDULE

UNIT NO	ELECTRICAL					CIRCUIT	CONDUIT/PIPE SIZE	COMBINATION MANUAL STARTER	FUSED DISC. AND FUSIBLE OVER	REMARKS
	HP	FLA	MCA	MOP	VOLTS @					
TWH-1		20		208	1	P1	11.13	(1) 3W*2 WIG #10 CU & (1) #10 CU GND.	EC	
TWH-2		20		208	1	P1	15.17	(1) 3W*2 WIG #10 CU & (1) #10 CU GND.	EC	
TWH-3		90		208	1	P1	19.21	(1) 1-W*2 C. WIG #2 CU & (1) #8 CU GND.	EC	90

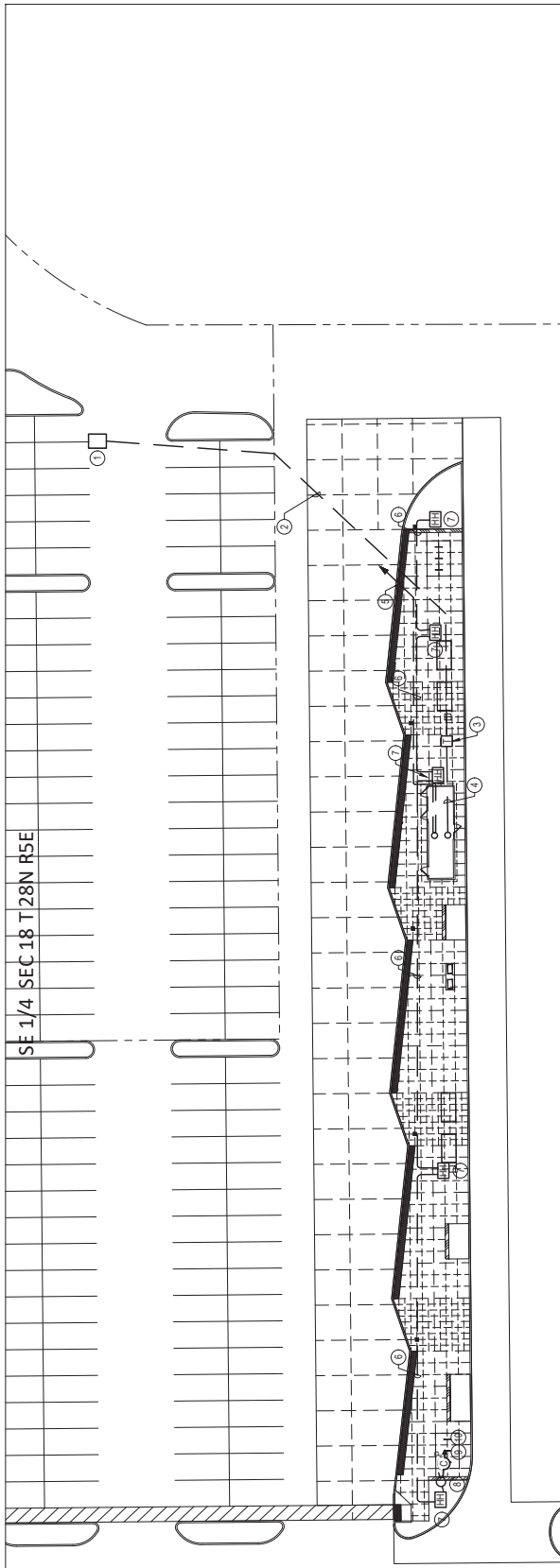
DOMESTIC WATER CHILLER SCHEDULE

DOMESTIC WATER CHILLER SCHEDULE												
UNIT NO	ELECTRICAL				CIRCUIT		CONDUIT/WIRE SIZE	MANUAL STARTER	COMBINATION DISC MAGNETIC STARTER	FUSED DISC.	DISC. AND FUSE SIZE 30A OVER ①	REMARKS
	HP	W	MCA	MOP	VOLTS	Ø						
Ch-1	140	140			120	1	P1	18				(1) 3W C. W/2 #12 CU & (1) #2 CU GND.

HOT WATER HEAT RECOVERY DEDICATED OUTSIDE AIR UNIT SCHEDULE

HOT WATER HEAT RECOVERY DEDICATED OUTSIDE AIR UNIT SCHEDULE											
UNIT NO	ELECTRICAL				CIRCUIT		CONDUIT/WIRE SIZE	COMBINATION MANUAL STARTER	FUSED DISC. AND FUSED DISC. (A) DISC. (C)	REMARKS	
	HP	FLA	MCA	MOP	VOLTS	Ø					PANEL
COU-1		20	35	120	1	P1	12		EC		
COU-2		20	35	120	1	P1	14		EC		
COU-3		20	35	120	1	P1	16		EC		

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Designed JHS Drawn AB Checked CH Design Review Label						
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			PLANS ISSUED FOR			
BID 02/09/2024	OS DATE	CONST ACTION	RECORD DATE	APPROV DATE		



GENERAL NOTES

- 1. SEE TYPICAL GENERAL NOTES ON SHEET E-002.
- 2. SEE SHEET E-501 FOR TRENCHING DETAILS.
- 3. SEE ONE-LINE DIAGRAM ON SHEET E-01 FOR CONDUIT CONDUCTORS INFORMATION.
- 4. COORDINATE ALL ROUTING OF UNDERGROUND CONDUITS WITH OTHER UNDERGROUND UTILITIES AND TREES. COORDINATE LOCATIONS WITH ARCHITECTURAL, CIVIL, MECHANICAL, AND LANDSCAPE PLANS.
- 5. ELECTRICAL CONTRACTOR TO COORDINATE AND COMPLY WITH ALL SNOPOD REQUIREMENTS.
- 6. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING THE CONDUIT RISER, UNDERGROUND PRIMARY CONDUIT, TRANSFORMER VAULT AND PAD AS REQUIRED BY SNOPOD.
- 7. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL SERVICE POINTS FOR COMCAST, ASTOUND AND CENTURY LINK. PROVIDE AND INSTALL CONDUIT POLE RISERS AND UNDERGROUND CONDUITS AS REQUIRED BY THE UTILITY.
- 8. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ANY ADDITIONAL HANDHOLES AND VAULTS TO MEET THE UTILITIES BEND QUANTITY REQUIREMENT. DEPENDING ON THE ACTUAL CONDUIT ROUTING, CONTRACTOR MAY ADD ADDITIONAL HANDHOLES OR VAULTS.
- 9. CONDUIT AND PIPE ROUTING SHOWN IS DIAGRAMMATIC. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDUIT AND PIPE PRIOR TO ROUGH-IN.
- 10. COORDINATE ALL UNDERGROUND CONDUIT ROUTING WITH BUILDING FOUNDATION AND FOOTING.

CONSTRUCTION NOTES

- 1. EXISTING SNOPOD VAULT #K-3546.
- 2. PROVIDE 4" CONDUIT FOR PRIMARY SERVICE FEEDER OVER SNOPOD REQUIREMENTS. COORDINATE EXACT ROUTING AND INSTALLATION REQUIREMENTS WITH SNOPOD ENGINEER.
- 3. PROPOSED SNOPOD PAD MOUNTED SERVICE TRANSFORMER.
- 4. BUILDING 208Y120V, 200A, 4-WIRE SERVICE FEEDER.
- 5. (2) 2" FOR TELECOMMUNICATIONS SERVICE. COORDINATE SERVICE TIE-IN POINT WITH THE OWNER AND SERVICE PROVIDER.
- 6. (1) 2" FOR CCTV CABLEING.
- 7. PROVIDE 1/11 TYPE 2 HANDHOLE FOR CCTV CABLEING.
- 8. PROVIDE 14" TYPE FB POLE.
- 9. OFFICE POLE MOUNT CAMERA. PROVIDE HANWHA SDD-180PMW POLE MOUNT BASE FOR CAMERA INSTALLATION.
- 10. PROVIDE EXTENDED LENGTH ANTENNA CABLE FOR CAMERA BEYOND 200' CABLE LENGTH. UTILIZE SUPERIOR ESSEX POWERWISE CABLE OR APPROVED EQUAL.

1 ELECTRICAL SITE PLAN
1"=20'



Designed: JLS Drawn: JLB Checked: CH Design Review: JLB				TCF Architecture P253.572.3993 124 North 1st Street Tacoma, Washington, 98405 www.tcfarchitecture.com				 EVERETT TRANSIT				EVERETT MALL BUS PLATFORM - DRIVER BUILDING				ELECTRICAL SITE PLAN			
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GENERAL NOTES

1. SEE SHEET E0.03 FOR G

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DRIVER BUILDING

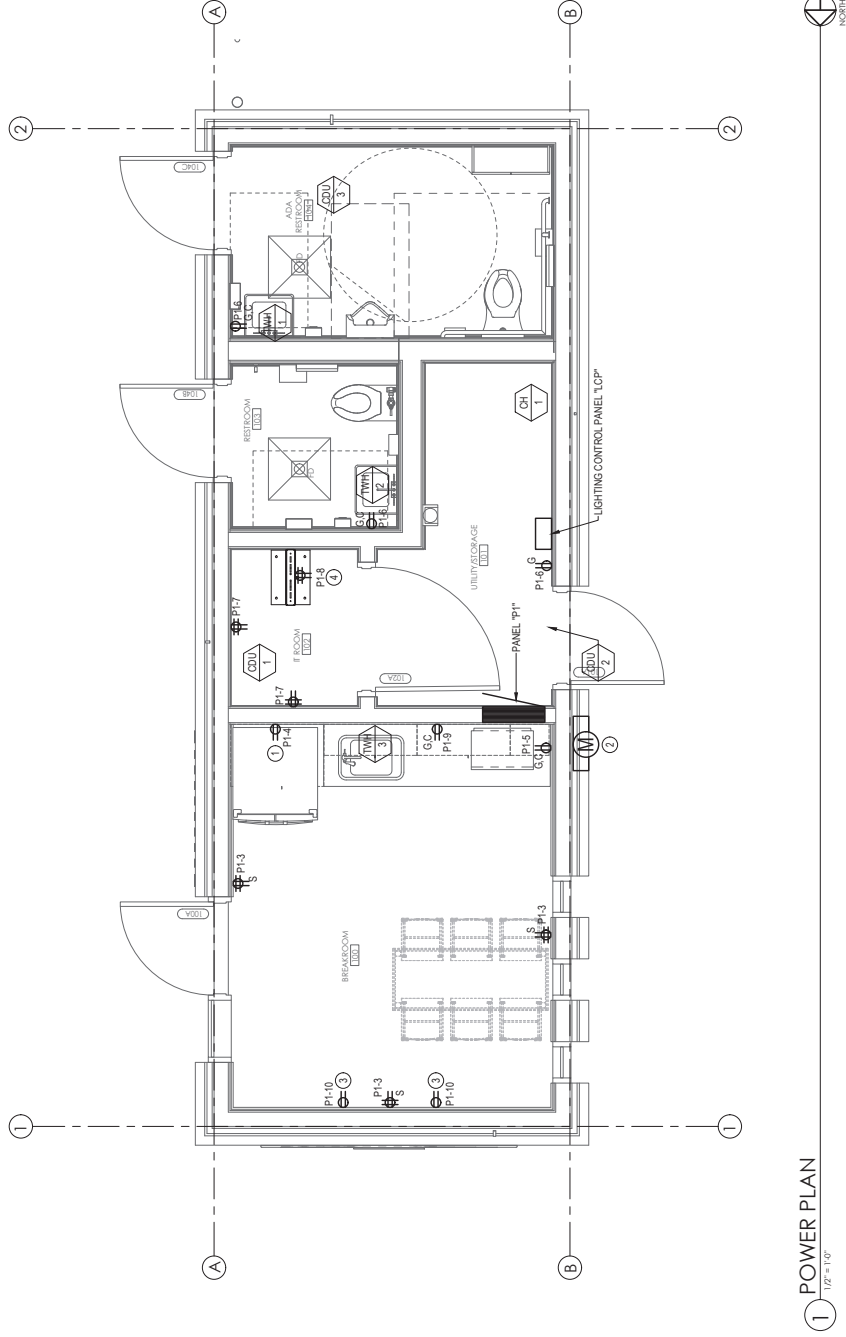
LIGHTING PLAN

Drawing E2.01	Sheet No. 8	Of To 10
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GENERAL NOTES

1. SEE SHEET E3.03 FOR GENERAL NOTES



1 POWER PLAN
1/2" = 1'-0"

CONSTRUCTION NOTES

1. PROVIDE DEDICATED CIRCUIT BREAKER FOR REFRIGERATOR. FED FROM GFCI CIRCUIT BREAKER.
2. CT ENCLOSURE AND DEMAND METER.
3. PROVIDE RECEPTACLE FOR TV. COORDINATE WITH ARCHITECT FOR EXACT LOCATION AND MOUNTING HEIGHT.
4. PROVIDE DEDICATED RECEPTACLE CIRCUIT FOR DATA RACK. MOUNT RECEPTACLE ON TOP OF THE DATA RACK.

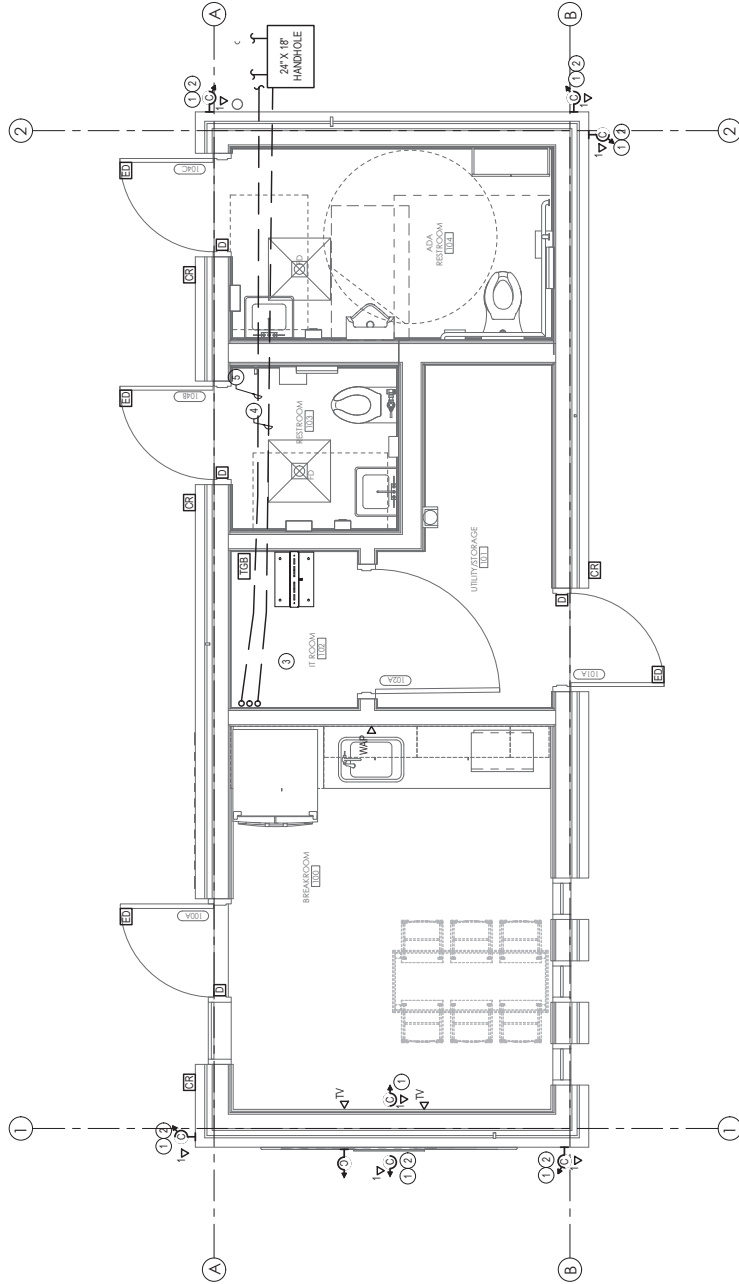


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GENERAL NOTES

1. SEE SHEET E5.03 FOR GENERAL NOTES



1 SYSTEMS PLAN
1/2\"/>



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Drawn: JAB
Checked: CH

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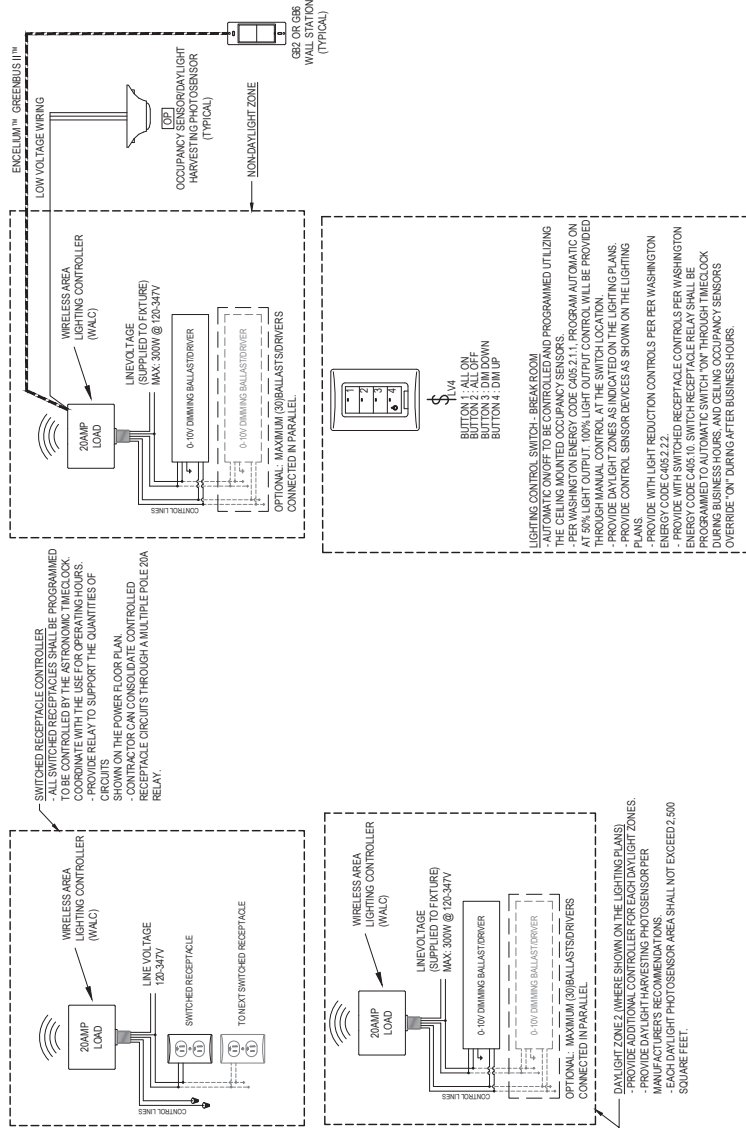
EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

SYSTEMS PLAN

Drawing
E4.01

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OF TOTAL

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HYBRID WIRELESS NETWORKED / WIRED DEVICES LIGHTING CONTROL SYSTEM DETAIL

DIAGRAMMATIC

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LIGHTING CONTROL DETAILS

Drawing	E5.02
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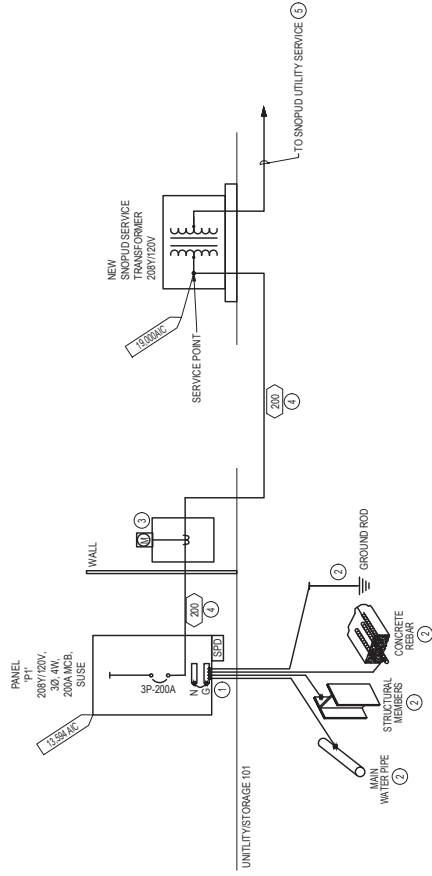
GENERAL NOTES

1. $\frac{2000 \text{ AWC}}{112.5 \text{ KVA SERVICE TRANSFORMER BY SNOPIUD WITH 1.65\% Z AT 19,000 AC. COORDINATE EXACT A/C VALUE WITH SNOPIUD PRIOR TO ORDERING EQUIPMENT.}$
2. SEE THE ELECTRICAL SITE PLAN ON SHEET E1.01 FOR LOCATIONS AND ROUTING OF ELECTRICAL EQUIPMENT.
3. COORDINATE ALL POWER SERVICE UPGRADE WORK WITH SNOPIUD.
4. PROVIDE CONNECTION TO SPD. COORDINATE EXACT REQUIREMENT WITH MANUFACTURE RECOMMENDATIONS.
5. ALL CONDUCTOR SIZES ARE BASED ON COPPER.
6. PROVIDE AND INSTALL ALL BONDING JUMPERS MADE AT PANEL.

CONSTRUCTION NOTES

1. ESTABLISH MAIN SERVICE GROUND AT SUBE RATED EQUIPMENT GROUND BAR.
2. PROVIDE ALL GROUNDING ELECTRODE CONDUCTOR. ESTABLISH SERVICE GROUND AND CONNECT TO MAIN WATER PIPE, CONCRETE REBAR AND STRUCTURAL STEEL PER NEC.
3. PROVIDE METER AND METER CT ENCLOSURE PER SNOPIUD REQUIREMENTS.
4. PROVIDE ADDITIONAL 1/2" 1/2" SPARE CONDUIT.
5. PROVIDE 4" CONDUIT FOR PRIMARY SERVICE FEEDER PER SNOPIUD REQUIREMENTS. COORDINATE EXACT ROUTING AND INSTALLATION REQUIREMENTS WITH SNOPIUD ENGINEER.

FEEDER SCHEDULE				
AMPS SYMBOL	NUMBER OF RUNS	CONDUIT SIZE	NUMBER OF WIRES	CONDUCTOR SIZE - AWG
$\langle 200 \rangle$	(1)	2-1/2"	(4)	COPPER: 30



1 POWER RISER DIAGRAM
DIAGRAMMATIC

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EVERETT MALL BUS PLATFORM - DRIVER BUILDING

POWER RISER DIAGRAM

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PANEL SCHEDULE NOTES

① PROVIDE DEDICATED CIRCUIT BREAKER FOR REFRIGERATOR. FED FROM GFCI CIRCUIT BREAKER.

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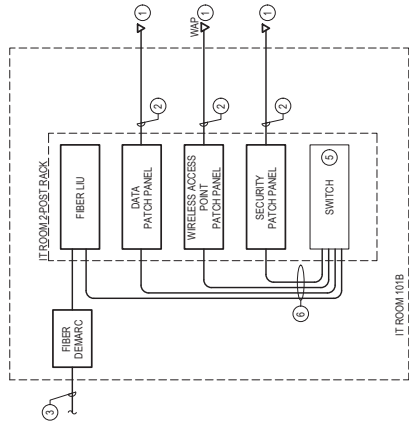


EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

Drawing	E6.02
Sheet No.	84 of 100

TELECOMMUNICATIONS RISER DIAGRAM
GENERAL NOTES

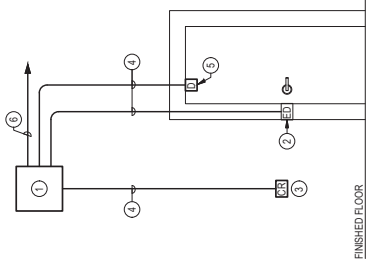
1. THIS RISER DIAGRAM IS DIAGRAMMATIC IN NATURE.
 2. THE PATCH PANELS ARE ONLY SHOWN ONCE IN ORDER TO SIMPLIFY THIS DIAGRAM. FROM ONE AND ONLY ONE PATCH PANEL, ALL CABLES ARE REQUIRED (BASED ON THE QUANTITIES OF DEVICES SHOWN ON THE FLOOR PLANS).
 3. FOR THE SAKE OF ILLUSTRATION, ACTUAL LOCATION OF PATCH PANELS IN THE RACK IS DIAGRAMMATIC, AND NOT NECESSARILY WHERE THE DEVICES ARE TO BE MOUNTED.
 4. CABLES AND EQUIPMENT PROVIDED BY THE DATA AND VOICE INFRASTRUCTURE INSTALLING VENDOR, UNLESS NOTED OTHERWISE.
 5. RACKS, BALANCED TWISTED PAIR CABLES, PATCH PANELS, PUNCH DOWN BLOCKS, AND OTHER RELATED APPURTENANCES SHALL BE PROVIDED, INSTALLED, AND TESTED BY THE TELECOMMUNICATIONS INSTALLING CONTRACTOR.
- TELECOMMUNICATIONS RISER DIAGRAM
CONSTRUCTION NOTES
1. SEE THE ELECTRICAL LEGEND, DETAIL SHEETS, AND FLOOR PLANS, FOR TYPES AND QUANTITIES.
 2. PROVIDE HORIZONTAL CABLE TYPES AND QUANTITIES AS SPECIFIED, AS SHOWN ON THE LEGEND, AND AS SHOWN ON OUTLET DETAILS.
 3. FIBER UTILITY SERVICE TO BUILDING.
 4. PROVIDE RACK MOUNT FIBER LU FOR PATCHING TO UTILITY FIBER.
 5. SWITCH SHOWN FOR REFERENCE ONLY (PROVIDED BY THE OWNER).
 6. PROVIDE PATCH CORDS AS SPECIFIED.



1 TELECOMMUNICATIONS RISER DIAGRAM
NTS

ACCESS CONTROL
CONSTRUCTION NOTES

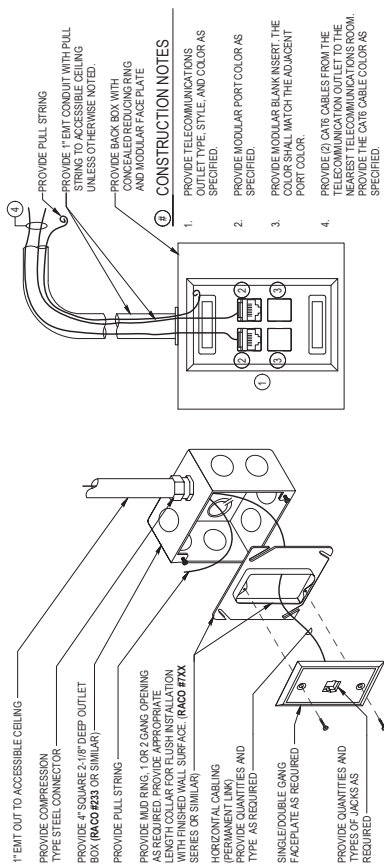
1. SWITCH BOX - SIZE AS REQUIRED. LOCATE NEAR DOOR AT 4'-10 1/2" AFF.
2. ELECTRIFIED DOOR HARDWARE - PROVIDED BY DMV. & COORDINATE WITH EXACT DOOR HARDWARE AT EACH LOCATION FOR ROUGH-IN REQUIREMENTS.
3. CARD READER - ROUGH-IN ONLY
4. PROVIDE 3/4" METAL RACEWAY(S), QUANTITIES AS REQUIRED.
5. DOOR POSITION SWITCH - ROUGH-IN ONLY
6. ROUTE (1) 1-1/4" C. TO THE IT ROOM.



NOTES:
1. DIVISION 8 PROVIDED DOOR HARDWARE SHOWN IS DIAGRAMMATIC. REFER TO THE ARCHITECTURAL DOOR HARDWARE SCHEDULE, HARDWARE GROUPS, AND SPECIFICATIONS FOR EXACT TYPES AND QUANTITIES OF EQUIPMENT.

2 ACCESS CONTROL SYSTEM DOOR RISER DIAGRAM
NTS

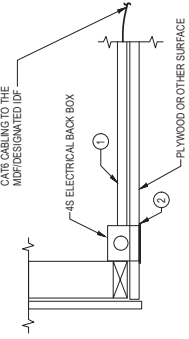
TELECOMMUNICATIONS OUTLET
INSTALLATION DETAIL (4/S")
5 NTS



TYPICAL TELECOMMUNICATIONS
OUTLET (2-PORT)
6 NTS

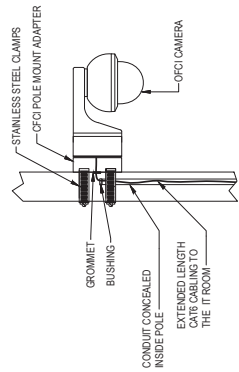
CONSTRUCTION NOTES

1. PROVIDE (1) 3/4" CONDUIT FROM THE JUNCTION BOX TO THE ACCESSIBLE CEILING SPACE AS REQUIRED.
2. PROVIDE BLANK COVER PLATE



3 CEILING MOUNT CAMERA ROUGH-IN DETAIL
NTS

4 POLE MOUNT CCTV CAMERA DETAIL
NTS



NO.		DATE	APPROVED	REVISION	PLANS ISSUED FOR		RECORD	ACTION		DATE	APPROVED
BID	10/01/2024	NO	CONST		ACTION		DATE	APPROVED	ACTION	DATE	APPROVED



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EVERETT MALL BUS PLATFORM -
DRIVER BUILDING

SYSTEMS DETAILS